The USE IT-adoption-model to Predict and Evaluate Adoption of Information and Communication Technology in Healthcare*

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Keywords
Adoption model, information and communication technology, healthcare, electronic patient record, evaluation

Summary
Background and Objective: The USE IT-model integrates theories about adoption and diffusion of innovations and is suitable to predict and evaluate the success of an information system from a user's perspective. The USE IT-model consists of four determinants: relevance, requirements, resources and resistance, which are measured at the macro-level (organizational), and at the micro-level (individual). After applying the USE IT approach in several researches we evaluated and updated the USE IT-model.
Methods: We used the USE IT-model in ten case studies in healthcare and compared the results of the studies with the determinants and dimensions of the USE IT-model.

Results: The quality of the implementation process is part of the innovation process-dimension and therefore relocated as a dimension of macro-resistance. The improvements and value in the relevance determinant are made more concrete by quality, efficiency, effectiveness, and task support. The dimensions of micro-resistance are reduced, and the dimension negative consequences is added. Also the dimensions of macro- and micro-requirements are made more specific to express the importance of information quality, availability and accessibility.
Discussion and Conclusion: The research resulted in the updated USE IT-adoption-model to predict and evaluate the adoption of information systems in healthcare. The structure and determinants of the original USE IT-model with a distinction between the macro- and micro-level remained unchanged.

1. Introduction

The results of our research about the adoption of an Electronic Prescription System for general practitioners (GP's) inspired us to develop the USE IT-model. The final model was published in 2006 [1]. The USE IT-model integrates theories about adoption and diffusion of innovations (see next section) and provides an interview-model and a questionnaire to predict and evaluate the success of an information system from a user's perspective. Based on our recent researches we evaluate and update the USE IT-model. The USE IT-questionnaire is presented in another article [2]. Compared to other models and methods the USE IT approach provides more specific and detailed results, which can be used to create specific changes or targets. The USE IT-approach is applied in other fields than healthcare [3], but in this article only the use in healthcare will be discussed.

1.1 USE IT-model (Scientific Background)

Before going into detail about the factors that determine success of information systems, it is good to explain how we define success. Since we look from a user's perspective, we consider an information system successful when the user uses the system and is satisfied about it. This matches the concept of adoption as defined by Rogers: "Adoption is the decision to make full use of an innovation as the best course of action available" ([4] p 21). In the USE IT-model Schuring et al. [5] present two dimensions: the innovation-dimension and the domain-dimension. Innovation is defined as: making a change in something established, especially by introducing new methods, ideas, or products [6]. The innovation dimension has two constructs: the product, which refers to the innovation itself, e.g. the electronic patient record (EPR), and the process, which refers to the process of development or implementation, in compliance to Saarinen and Sääksjärvi

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* Supplementary material published on our website www.methods-online.com

(1995), who point out that different factors act as critical success factors under different circumstances and who make a distinction in (implementation) process factors and (innovation) product factors [7]. The domain dimension refers to the social aspects in the user domain and the technical aspects in the information technology (IT) domain. From early evaluation research, it became clear that both the user and the technology should be studied in order to explain adoption success and failure [8–11]. The two dimensions make four determinants for success: relevance, requirements, resistance and resources (►Figure 1).

Each of the four dimensions is regarded at two levels: the macro-level which refers to the group or organizational level, the micro-level refers to the level of the individual end-user. On both levels the decision to adopt an innovation is made [4]. The interests and reasons to adopt or reject at both levels do not have to be the same [12]. The definitions and sub-dimensions of the four determinants in the original model are presented in ►Table 1, with theoretical background of each construct.

1.2 Rationale for the Study

As more and more clinical information systems such as EPRs are implemented in healthcare, measuring whether adoption has occurred or not is no longer enough. To increase the success of the implementation and user satisfaction, it is essential to know what specific characteristics of the system or the user, contributed to the success. The USE IT-approach provides the tools to perform these specific measurements. However, when applying the

USE IT-approach we experienced inconsistencies within the model. E.g. relevance and resistance are both only defined at the macro- and micro-level, in contrast to the requirements and resources determinant. When analyzing the results from research and health practice, the four determinants of the USE IT-model proved to be very useful, but inconsistencies were found in the definitions and at the sub-dimensions level. For that reason we decided to evaluate and update the model using our research results.

1.3 Objectives of the Study

The purpose of the evaluation of the USE IT-model was to create an updated model in order to create a USE IT-approach, which is grounded in theory and applicable for pre- and post-evaluation of information systems in healthcare. The research question was: How should the USE IT-model be adjusted to predict and explain the adoption of Electronic Patient Records by healthcare professionals? We also intended to provide other researchers and practitioners with a set of instruments to apply the USE IT-approach.

2. Methods

An approach is chosen, in which we compared the outcomes of our researches concerning the pre- or post-evaluation of the implementation of EPRs, with the constructs in the USE IT-model. The outcomes of each case were analyzed in respect to the determinants and dimensions of the USE IT-model. These analyses were used to redefine the definitions of the determinants

and to redefine the sub-dimensions of the determinants. ►Table 2 provides an overview of the included USE IT- researches. In all cases the USE IT-interview model was applied to conduct semi-structured interviews. The interview-model addresses the care process, the relevance of the proposed solution and the specific patient group for the interviewee, the information needs and other requirements, the available and required means, and the attitude of the interviewee towards innovation and ICT (►Appendix I for the interview-model) (supplementary material). In case 2, 5, and 6 the USE IT-questionnaire was used to evaluate the adoption of an EPR. In case 7 a shorter version of the USE IT-questionnaire was applied for pre-evaluation. The USE IT-questionnaire is available in ►Appendix II (supplementary material).

In the next section the results of the case studies will be presented in relation to each of the determinants of the USE IT-model.

3. Results
3.1 Relevance

For most care providers providing good care to patients in order to increase their health and well-being, is the main motivation to do their job. All activities should be directed to that goal (case 2–10). This implies that an EPR is highly relevant if the EPR supports the care provider in his task. Task or job support at the macro-level includes supporting cross-functional and cross-organizational collaboration, co-ordination and communication (case 3, 6 and 8), increasing the quality of care (case 2, 3, 8, 10), diminishing the administrative tasks (case 9, 10), and improving the work flow (case 3, 10) in order to make the care process more efficient (4, 9). Financial benefits other than better utilization of available resources are not mentioned as goals for the implementation of EPRs in healthcare. Compared to the dimensions of macro-relevance in the USE IT-model, mainly functional improvements are reported to be relevant. The functional improvements include quality of the product or service the organization delivers (like care), effectiveness and collaboration. In the updated model functional improve-

USE IT	Domain	
	User	Information Technology
Innovation — Product	Relevance	Requirements
Innovation — Process	Resistance	Resources

Figure 1
USE IT-model

Table 1   USE IT-determinants with references [1]

USE IT-Determinant	Reference
Relevance **Macro-relevance** Definition: The degree to which the user expects that the IT-system will solve his problems or help to realize his actually relevant goals. (co)determines: IT-diffusion 1. Economic improvements 2. Social improvements 3. Functional improvements 4. Saving of time and effort	Definition based on [13], [4], [14] Relevance refers also to relative advantage [4], net benefits [15]
Micro-relevance: Definition: The degree to which IT-use helps to solve the here-and-now problem of the user in his working process 1. Absolute value of relevance 2. Here and now value 3. Low initial costs 4. Immediacy of reward	Micro-relevance refers also to perceived usefulness [14, 16]
Resistance **Macro-resistance** Definition: The degree to which the surroundings and locality negatively influence the users of IT (co)determines: IT-diffusion Generic sub-dimensions: *Opportunity to change* is the degree in which the users are forced to or allowed to change + budget available, clear objectives, top management support, social improvement - decrease of autonomy, local effort for general gain, remaining old structures *Ability to change* is the change potential of the workers and the management + training, education, experience and enough resources - constraints beyond the scope of the user that prevent him from using the IT	[17] [18] [19] [18] [20]
Micro-resistance Definition: The degree to which IT-users themselves are opposing or postponing the IT-change 1. Parochial self-interest 2. Misunderstanding or lack of trust 3. Different assessments 4. Low tolerance of change	[21] [17]
Requirements Definition: the degree to which the user needs are satisfied with the product quality of the innovation. (co)determines: IT-diffusion	Definition based on [22]
Macro-requirements Strategic general requirements and tactical approach is the degree in which the users agree with the objectives and methods used. + clear objectives, iterative approach, users involved – unclear communication, no participation, education	[23] [24]
Micro-requirements Functional and performance requirements specify what the content of the innovation should be. + timeliness, accurateness, ability to integrate, content fuzziness, non contract	[23] [25] [26]

Table 1   Continued

USE IT-Determinant	Reference
Resources Definition: The degree to which material and immaterial goods are available to design, operate and maintain the system. (co)determines: IT-use **Material** Generic sub-dimensions: 1. costs 2. hardware and software 3. user's and designer's time **Immaterial** 1. adaptability 2. capabilities 3. reliability	[27] [18] [28] [29]

ments is therefore replaced by these three dimensions. Efficiency replaces economic improvements and saving time and effort. Social improvements are not mentioned at all and therefore removed from the USE IT-model (►Figure 2). The definition of macro-relevance is rephrased, to make the distinction with micro-relevance clearer.

At the micro-level an EPR is relevant when it supports the care provider in performing his job (case 4, 5, 6, 10) by giving access to patient information or supporting communication between professionals (case 1, 3–7, 9, 10), and achieving good quality of care and patient satisfaction (case 2, 5 – 8). To be relevant the EPR also needs to relieve the time and administrative

pressure of care providers, in order to balance the time care providers can spend on patients instead of on secondary tasks (case 1, 7, 9, 10). These outcomes make it possible to specify the value dimensions of micro-relevance in the USE IT-model into task support, effective care (outcome quality), efficient care (reduce workload) and client satisfaction. Immediacy of the

Table 2   Overview of USE IT researches

Case nr	Context	Participants	Questionnaire response % (n)	Number of interviews	Reference
1	General Practice, evaluation of rejection of Electronic Prescription System	GP's	–	56	[1]
2	Hospital, evaluation of adoption of an EPR	Medical specialists	47% (9)	3	[30]
3	Integrated care MS, pre-evaluation of Patient Relation Management system	Nurses, medical staff, paramedical staff, patients	–	22	[31]
4	Rheumatism care guide, pre-evaluation of electronic version of the rheumatism care guide	Nurses	–	6	[32]
5	Hospital, evaluation of adoption of Nursing Information System	Nurses	48% (93)	12	[33, 34]
6	Nursing home, evaluation of adoption of EPR	Nurses, medical staff, paramedical staff	38% (129)	12	[35]
7	Home care, pre-evaluation of EPR	Nurses	20% (341)	20	[36]
8	Stroke Service, pre-evaluation of Information System for Integrated Care	Project managers, vendor, nurses, medical staff, paramedical staff	–	25	[32, 37, 38]
9	Hospitals, evaluation of EPR implementation	Medical staff, project managers, IT managers	–	12	[39]
10	Hospitals, evaluation of EPR implementation	Medical staff, project managers, IT managers	–	15	[40]

reward is not mentioned as an element of relevance. Benefits like saving time in composing letters are regarded as a 'bonus', not as a prerequisite, and are therefore not an element of relevance (case 1 and 10). Low initial costs are not mentioned as relevant, but are an element of resources. The altered dimensions of micro-relevance can be found in ► Figure 2.

3.2 Requirements

In the USE IT-model the definition and elements of the requirements determinant at the macro-level express the requirements for the implementation process. This is not consistent with the location of the determinants in the innovation and domain dimension: the user aspects of the implementation process are part of the resistance determinant. In the revised model the requirements for the implementation process can be found in the resistance determinant at the macro-level. Requirements at a macro-level are defined as: 'the degree to which the user needs are satisfied with the product quality of the innovation' (► Figure 2). As the macro-level refers to the group or organizational level, macro-requirements refer to the organizational level of the information system, which is the infrastructure and to the general quality of the software (case 1). In case 5 and 10 requirements for the infrastructure are mentioned: reliability, speed, and a stable wireless network.

From the items of micro-relevance follows an important requirement at the macro- and micro-level: availability of the infrastructure in order to realize accessibility of patient information anytime, anywhere (case 2, 3, 5, 6, 9, 10). The requirements at the micro-level further include a high quality of information (case 2, 3, 5, 6). Attributes of information quality are: complete, correct, up-to-date, accessible (case 5) and relevant information (case 2). Compatibility of the lay-out with the working process (case 2, 5, 6, 10), and interoperability with existing systems (case 1, 8, 10) are also important requirements. Based on these results the functional and performance requirements in the USE IT-model are specified as: information quality, accessibility, compatibility, interface satisfaction and interoperability (► Figure 2).

3.3 Resources

In the original USE IT-model in the resources determinant a distinction was made between material and immaterial resources. However, no distinction was made between the macro- and micro-level of the resources determinant. Since resources can be divided to organizational resources and individual resources, resources are defined at the macro- and micro-level in the updated model. Although our researches, except for case 9 and 10, focus at the innovation product and less at the innovation and implementation process, information is gained about the resources determinant. At the macro-level a stable infrastructure with enough capacity, adequate user support, adequate budget, and good training facilities, and minimal user effort enhance a successful implementation (case 2, 5, 6, 10). Material resources are usually provided by the organization and the individual user has little control over these resources. That is why at the micro-level only one material resource is included: access to technical resources (case 7). The immaterial resources at the micro-level refer to the capabilities and experience of end-user, e.g. computer skills [41] and educational level, which were measured in case 6 and 7.

3.4 Resistance

It is often assumed that resistance to change is a natural characteristic of human beings. However, Dent and Goldberg explain how this perspective interferes with successful change management [42]. Resistance usually has a reason and often a good reason. Hackl et al. revealed that the resistance of Austrian doctors against a national EHR was mainly due to lack of (impartial) information [43]. The research of Lapointe et al. demonstrated that resistance is justified when the system does not meet the users' requirements, and can be overcome when the problems are solved [44].

At the macro-level resistance the quality of the innovation process determines resistance of groups or organizations and de-pends on the way the implementation process is organized and proceeds. Although our researches (except case 9 and 10) were focused at the innovation product and not at the implementation process, we gained insight about the dimensions which influence macro-resistance. Participation of the end-user plays an important role in the adoption of the system (case 5–10). Other aspects of the quality of the implementation process we encountered were clear objectives (case 1) and top management involvement (case 10). Other organizational changes that are implemented simultaneously can obstruct the ability or opportunity to change (case 6).

At the micro-level we found very little genuine resistance (all cases), but we did encounter many good reasons for rejecting, postponing, or partly adopting the innovation. Lack of relevance was the strongest reason (case 1, 3, 4, 8) for rejection of the innovation. Perceived negative consequences, such as reduced professional autonomy (case 1 and 2), or diminished social contacts with colleagues (case 7) or patients (case 4) have to be overcome, to increase adoption. Based on these results the four dimensions of micro-resistance in the USE IT-model are combined to two dimensions: lack of trust and low tolerance of change. Negative consequences is added as a dimension of resistance at the micro-level. This leads to the updated USE IT-adoption-model in ► Figure 2.

4. Discussion
4.1 USE IT-adoption-model

In the original model definitions were sometimes at the determinant level and sometimes at the macro- or micro-level. The distinction between the macro- and micro-level was not always clear. For that reason the determinants are consistently defined at the macro- and micro-level only, where the macro-level refers to the group or organizational level, and the micro-level to the level of the individual end-user. Most definitions are also rephrased to make them more consistent with each other and with literature. Dimensions are made more specific to make them measurable and comparable with constructs in literature.

The macro-requirements of the original model referred mainly to the innovation process, and not to the innovation product. That is why the definition and dimensions are replaced to product requirements at the macro-level. When the innovation is an information system, the requirements focus on information. That is why the dimensions of the micro-requirements are rephrased and replaced.

When we developed the USE IT-model we assumed the determinants to be related

| USE IT		Domain dimension	
		User	**Information & Communication Technology**

Innovation dimension	**Product**	*Relevance*
		
		Macro-relevance
		Definition: The degree to which the user expects that the ICT-system will provide benefits / create value for his profession or organization.
		
		Dimension:
		  1. Quality of product / service (care)
		  2. Effectiveness of organization
		  3. Support of collaboration
		  4. Efficiency of organization
		
		Micro-relevance:
		Definition: The degree to which the ICT-system helps to solve the here-and-now problem of the user in his working process and provides benefits
		
		Dimensions
		  1. Task support
		  2. Effectiveness (quality of care)
		  3. Efficiency (reduce workload)
		  4. Customer (patient) satisfaction
			Requirements
			
			Macro-requirements
			Definition: the degree to which the user is satisfied with the general product quality of the ICT-system.
			
			Dimensions:
			  1. Quality of infrastructure
			  2. Availability of infrastructure
			  3. Quality of software
			
			Micro-requirements
			Definition: the degree to which the individual user needs are satisfied by the ICT-system.
			
			Dimensions:
			  1. Information quality
			  2. Accessibility (anywhere, anytime)
			  3. Compatibility
			  4. Interface satisfaction
			  5. Interoperability

	Process	*Resistance*
		
		Macro-resistance
		Definition: The degree to which the surroundings and locality negatively influence the users of ICT
		
		Dimensions:
		  1. Quality of Implementation / change process (clear objectives, top management support, information)
		  2. Participation (user involvement)
		  3. Opportunity to change
		  4. Ability to change
		
		Micro-resistance
		Definition: The degree to which the individual user rejects (does not adopt) the ICT-system
		  1. Lack of trust
		  2. Low tolerance of change
		  3. Negative consequences
			Resources
			
			Macro-resources
			Definition: The degree to which material and immaterial goods are available to design, operate and maintain the ICT-system.
			
			Material
			  1. Costs (money)
			  2. Implementation effort / training effort
			  3. System (hardware) quality / infrastructure quality/
			
			Immaterial
			  1. Human resources
			  2. Service and support quality
			  3. Training facilities
			
			Micro-resources
			Definition: The degree to which the individual user is capable of using the ICT-system.
			
			Material:
			Access to infrastructure / technical resources
			
			Immaterial:
			  1. Capabilities (physical, cognitive)
			  2. Experience / education

Figure 2
The USE IT-adoption-model

and we expected relevance to be the dominant factor. However, we did not know the nature of the relations between relevance, requirements, resistance and resources. After conducting the case studies presented in table 1, we developed hypotheses about the relations between the determinants. All cases, and especially cases 1, 3, 4, 6 and 8, learned that relevance is the most influential determinant of the four. This is to be expected, since perceived usefulness which is an element of relevance, is also found to be the most significant factor in the adoption of IS or IT in healthcare [45]. Requirements is the second most important determinant, since relevance determines the requirements for the system. Relevance and requirements deal with the content of the innovation. Accessibility and information quality are the most important requirements (case 5 and 6). The requirements determine what resources are needed to build a system that meets the requirements of the end-user. Sufficient resources are therefore a prerequisite for a successful implementation, resulting in adoption by the end-user. A system that meets the end-user's requirements helps to realize the expected benefits and makes the system relevant to the end-user. Genuine resistance hardly exists. Resistance can be explained by lacking expected relevance (case 3, 4 and 8) or (fear of) inadequate resources. Solving both, diminishes resistance. It is not clear whether meeting the requirements has a direct influence on resistance (dotted arrow), or whether the effect is through relevance and resources. ▶ Figure 3 shows the relations between the determinants as we hypothesize them. The relative importance of the determinants is depicted in the font size in ▶ Figure 3.

Since the research is predominantly performed in a qualitative way, the relations cannot be confirmed by statistical tests.

4.2 Results in Relation to Other Studies

The FITT-framework of Ammenwerth et al. [46] adds the fit between task and individual to the Task-Technology-Fit model of Goodhue [9]. FITT stands for Fit between Individuals, Task and Technology. The fit between the task and the individual refers
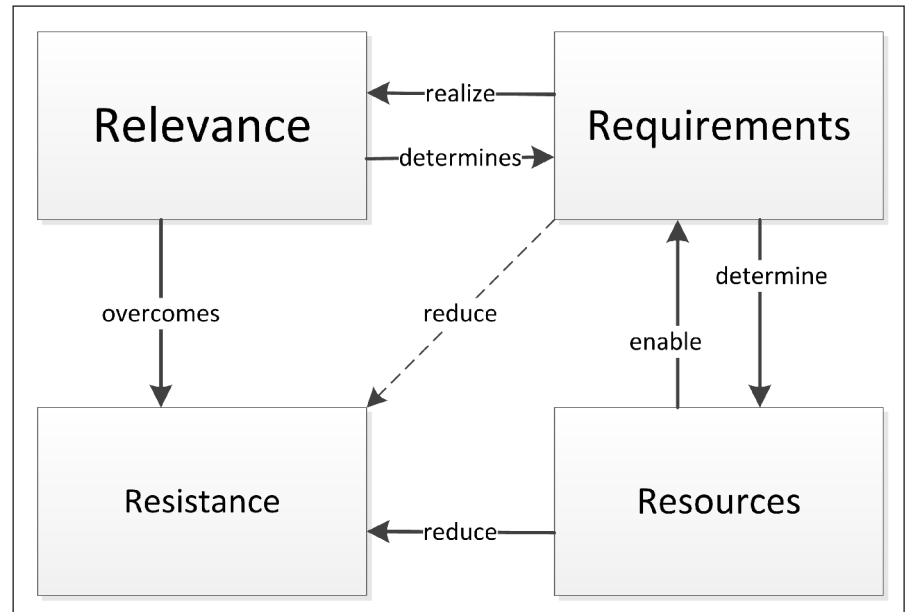
Figure 3   Relations between the USE IT-determinants (hypotheses). The font size reflects the relative importance of the determinant.

to the attitude of the user towards the task which is supported by IT. When the fit is problematic, adoption will be problematic. In the USE IT-adoption-model the fit between task and individual is included in the micro-relevance determinant, which does not only measure the micro-relevance of the ICT-solution, but also measures the micro-relevance of the supported process. E.g. in case 3 and 8 the micro-relevance of MS-care and stroke care for care providers in primary care was too low to make an ICT-solution micro-relevant. The FITT-framework does not distinguish between the organizational and individual level, nor does the FITT-framework provide specific attributes for the influencing factors. The HOT-fit framework of Yusof et al. [47] focuses on the fit between technology and the user, and adds the organizational component to the user domain in the ISSM framework [15]. However, the HOT-fit framework, does not make clear what aspects determine the fit between technology and user. In the USE IT-adoption-model the organizational component is measured at the macro-level in all determinants. The fit between technology and user domain is included in the requirements and resources determinants.

Wills et al. suggest to expand IS-success models with patient outcomes measures [48]. This is a worthwhile addition to the overall-evaluation of an Information System. However, Wills et al. do not make clear to what extent patient outcomes influence the decision of an end-user to adopt the IS. Also Thornett described benefits as improved quality of care, disease prevention, and disease management of chronic physical illnesses [49]. In our research almost all care providers state that the patient satisfaction or patient's health is their most important motivation (case 2–10). It can be expected that a positive effect on the patient's health would enhance adoption of ICT in healthcare. In the USE IT-model the effect on the patient's outcome is included in the relevance determinant.

Gagnon et al. [50] added Habits, Compatibility, Facilitators and Subjective Norm to the Technology Acceptance Model and categorizes the factors in three categories: technological context, individual context and organizational context, which is an adaptation of the model of Chau and Hu [40]. The technological context refers to the IT domain in the USE IT-adoption-model, and the organizational and individual context to the user domain, in which the macro-level represents the user's perception of the organizational context, and the micro-level represents the individual level.

The concept of compatibility in the individual context 'refers to the degree of correspondence between an innovation and existing values, past experiences and needs of potential adopters' [50]. Compatibility defined this way resembles micro-relevance. The concept of compatibility as a dimension of micro-requirements (►Figure 2) is restricted to the 'fit' between the system and the working process of the end-user, and is related to usability instead of usefulness.

Gagnon et al. [50] also found that Perceived Usefulness and Facilitators were the predictors in the intention to adopt a Telemedicine system. The construct Facilitators matches the Resources determinant of the USE IT-model [1]. Hackl et al. revealed that the resistance of Austrian doctors against a national EHR was mainly due to lack of (impartial) information about the EHR and its consequences for their professional autonomy [51]). The research of Lapointe et al. demonstrated that resistance is justified when the system does not meet the users' requirements, and can be overcome when the problems are solved [44]. These two studies confirm our conclusion that resistance is the result of a low or negative value of the other three determinants (relevance, requirements, and resources).

4.3. Strengths and Weaknesses

Because of the qualitative nature of most case studies, statistical testing of the model is not applicable. However, the number of interviews in most cases was substantial, and gave a good representation of the users and their heterogenity [52]. The mixed method approach, which was applied in several case studies proved to be a strong design, because quantitative results provided support to the qualitative results and qualitative results helped to explain the quantitative results.

The USE IT-model is based on literature and provided a good theoretical base for the case studies. All case studies together contributed to the evaluation of the USE IT-model, which lead to the more consistent and specified USE IT-adoption-model. The results of the case studies were in line

with each other, despite the variety in contexts, systems and end-users.

4.4 Meaning and Generalization

Evaluations of the implementation of information systems in healthcare do not always make a distinction between the implementation or development process and the resulting information system. Often the evaluation tests or expands the Technology Acceptance Model [50] or Information Systems Success Model in order to explain success or failure of the implementation [53]. However, these models fail to identify what the dimensions of relevance or perceived usefulness are. The USE IT-adoption-model provides more specific outcomes which can serve as an input for making improvements in the specific case. In the same time more insight is provided to understanding adoption by the individual end-user's level.

We applied the USE IT-model to researches in healthcare in a variety of cases, which demonstrated that the application of the model is not restricted to a specific healthcare setting. We also applied the USE IT-approach in a case in a different sector [3]. Since the USE IT-adoption-model is based on adoption and acceptance theories not restricted to the healthcare sector, (see Table 1) and the dimensions we found are not specific for healthcare, we believe that the model is valid in other sectors as well. Case 6 included participants of different educational levels and limited professional autonomy, which was no obstacle for applying the USE IT-model. We therefore expect that the using the USE IT-adoption-model is not restricted to professional end-users.

4.5 Unanswered and New Questions

We updated the USE IT-model based on our research results. However, it is worthwhile to test the USE IT-adoption- model in new cases, inside and outside healthcare, especially for the macro-levels. Also the hypothesized relations between the determinants should be tested statistically in larger studies. Another step that has to be made is to investigate whether the interview-

model, and the questionnaire need adjustment.

5. Conclusion

The research resulted in the updated USE IT-adoption-model to predict and evaluate the adoption of information systems in healthcare. The structure and determinants of the original USE IT-model with a distinction between the macro- and micro-level remained unchanged. However, the macro- and micro-level are defined in a more consistent way as respectively organizational or group level and individual level. The distinction between the macro- and micro-level are added to the resources determinant. The approach for implementation is positioned as an element of the resistance determinant (►Figure 2) and moved from the requirements determinant (►Figure 1), because the implementation approach is part of the innovation process and not of the innovation product. The improvements and value in the relevance determinant are made more concrete by adding quality, efficiency, effectiveness, and task support. The dimensions of micro-resistance are reduced, and the dimension negative consequences is added. In the requirements determinant the product quality is specified at both levels to express the importance of information quality, availability and accessibility. The new version is renamed to the USE IT-adoption-model, because it intends to predict or explain adoption of information systems, which is more focused than information systems success.

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