Predicting The Acceptance of Model-Driven Software Applications in Organisations

M.G.P.W. Kleinreesink
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands
m.g.p.w.kleinreesink@student.utwente.nl

ABSTRACT

Model-driven engineering (MDE) is becoming more emerging in the software industry [3], however, there is little coverage about its acceptance in organisational context. This lack of coverage raises uncertainties about the factors influencing the acceptance process of the software product. This paper will focus on creating a theoretical model for measuring the acceptance of MDE. The study will present a theoretical model which fits the characteristics of the software development method and will furthermore validate the structural path of the model. This will be done by carrying out regression analysis based on survey data. The final outcome of the paper will lay a foundation for future work in examining the acceptance and value of model-driven software.

Keywords
Universal Theory of Acceptance and Use of Technology, Model-Driven Engineering, Task-Technology Fit, Software Acceptation

1. INTRODUCTION

"Software-engineering is an engineering discipline that involves all aspects of developing and maintaining a software product" following Braude et al. [3], but there are many different methods in order to accomplish a software product. One of those methods is the use of model-driven engineering (MDE). Mohagheghi et al. [11] defines model-driven engineering as all methodologies which are model-centric and which encourage the use of models during all stages of software development efficiently. This paper will stick to that same definition.

While MDE is becoming more popular in the software industry [14], there is not much coverage about its acceptance [11]. The research tries to gain a more concise view on the acceptance of this method, because of the emerging popularity and claimed advantages. Examples of advantages of MDE are shorter development time and improved quality of the product [10]. These advantages need further investigation to prove the validity and reliability of what is claimed.

Renaud [12] describes the acceptance of software as the attitude of the user with regards to the acceptance of new technology. Acceptation has also been defined as "One of the most mature research areas within contemporary information systems literature" [13]. However, several theoretical models have been created to capture the acceptance process, such as the Technology Acceptance Model [5], and the Theory of Reasoned Action [1]. A combination of eight models, included the mentioned ones, resulted in the Unified Theory of Acceptance and Use of Technology (UTAUT). In Figure 1 The UTAUT model is depicted. The purpose of the model is to capture the reason behind the intentional use of a software application. This use is influenced by several constructs which are Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions.

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Figure 1. The Unified Theory ofAcceptance and Use of Technology

Performance Expectancy focuses itself on the user's expectation about the system's performance, this is founded on the expectations about time-reduction and efficiency of new software. Effort Expectancy describes the amount of effort the user expects to put into working with new software. Social Influences are characterized by the norms and values of your environment which make you want to use a system. Peer pressure and company-wide used applications will make you interact more easily with a certain software application than without it. Finally there are Facilitating Conditions which affect the intentional use of an application. The conditions are described as the network infrastructure that is available to you (e.g. certain computers, networks and Internet speed available to you). These different factors are biased by several factors such as gender, age, experience and voluntariness of use. In addition to UTAUT, Task Technology Fit (TTF) is also a widely used model to measure the utilization of a certain technology with a certain task set. Goodhue describes TTF as "The theoretical perspective that can usefully link
underlying systems to their relevant impact” [6]. In Figure 2 is the TTF model depicted. Zhou et al. [17] has used in their paper a combination of TTF and UTAUT to measure the adoption of a mobile banking application. By combining these two theoretical models, they were able to implement specific technology and task characteristics in a research model, which will be the same approach as will be used in this research to measure MDE. This is important, because we will be able to specify MDE’s specific characteristics in the model.

The final goal of the paper is to propose a model on the combination of both theories, which embodies the specifications of MDE. The validation of the models will be carried out with statistical analysis. In more precise words, regression analysis will be used to measure the validation of UTAUT and TTF with regards to MDE. This regression analysis will be carried out on a dataset populated with quantitative data of a survey conducted on the new proposed research model.

1.1 Problem Statement

Although MDE’s practice is widely used in software engineering businesses worldwide [14], there is barely any coverage about MDE in the context of the organisations they are used in. Therefore there is a lack of information about the practice of MDE. This further implicates that there has not been looked thoroughly into the acceptance of this type of software. The problem that occurs is that companies who are willing to implement this software, are not able to determine the actual value of the product they are considering to purchase.

Despite the fact that other alternatives such as TAM and TRA [1][5] are available, it is not known if the most concise view of acceptance in MDE context has been created. Moghaghehi et al. [16] has used the TAM for an implementation of MDE characteristics. The proposed research model has not been statistical validated and therefore the validity of the proposed model is not guaranteed. There also does not seem to be any application of the UTAUT model with MDE dimensions. UTAUT is one of the most widely used models in the research field. In a paper by Williams et. al. [15] is mentioned that "UTAUT provides a useful tool by which to evaluate the potential for success of new technology initiation, and helps identify factors likely to influence adoption of technology”. Therefore UTAUT will be extended by MDE’s specific characteristics (In TTF) and research will be conducted on the model’s prediction. Thus, the primary goal of the research is to give a clearer view of user acceptance in model-driven software applications and therefore a new technology acceptance model specific on MDE will be proposed. The research questions that are related to the problem statement are:

- What is a good theoretical model that can predict the use of MDE in organisations?
- What dimensions of MDE influence the acceptance of the final software product?
- What is the predictive power of the theoretical model that measures MDE’s acceptation within organisations?

2. EXTENDED REVIEW ON ACCEPTANCE MODELS

In this section a selection of acceptance models will be briefly discussed. These acceptance models are UTAUT and TTF. The latter parts of the section provide a combination of both, which results in the proposition of the research model.

2.1 Model-driven engineering

MDE is part of the model-driven spectrum as proposed by David Ameller in his postgraduate dissertation. MDE shares the spectrum with Model-Driven Architecture (MDA) and Model-Driven Development (MDD) [2]. MDE in particular, is based on the fact that models are used in each stage of development. MDE is also differentiating itself from other development methodologies, because the specification of the program is separated from implementation on the system’s operating system.

MDE’s existence is heavily influenced by the introduction of Model Driven Architecture by the OMG Group, A consortium for creating software development standards, in 2000 [8]. MDA was introduced as an initiative to find a set of standards that will specify the technologies that can realize model-driven development. This has set the first official steps of looking into the usage of models in combination with software engineering. The previous resulted in MDE’s first appearance in a scientific paper in 2006.

2.2 Task Technology Fit

2.2.1 Model Description

Task Technology Fit is proposed by Goodhue et al. [6] in order to create a model which uses User Evaluation as a measurement method instead of a construct (as would be seen in earlier acceptance models). The model uses Technology Characteristics and Task Characteristics which can lead to a ‘Task Technology Fit’. This fitness measures the effectiveness between the earlier mentioned constructs.

2.2.2 Technology Characteristics

The Technology Characteristics construct is based on the following proposition: "Do characteristics of information systems / services affect UE (User Evaluation) of TTF"[6]. This construct will be divided into several criteria. These criteria are integrated common systems, workstation penetration, assistance ratio and decentralization of assistance respectively. While the paper has aged, the theory is still used with citations up to the present.

2.2.3 Task Characteristics

Task Characteristics depict the dimensions of tasks that are accompanied by interacting with the system. Dimensions of task characteristics are broad, and cover the facets of variety and difficulty, interdependence and hands-on tasks.

2.2.4 Task Technology Fit

An effective Task Technology Fit will lead to higher performances. The construct combines the constructs of Technology and Task Characteristics and will be used to gain a view of the match between task and technology. The dimensions of the construct are quality, locatability, authorization, compatibility, ease of use/training, production timeliness, systems reliability, and relationship with
2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

2.3.1 Model description
The UTAUT model is introduced by Venkatesh et. al. [13]. The model tries to describe acceptance of technology through use of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. The theory is a combination of eight previously introduced models, such as the Technology Acceptance Model [5] and the Theory of Planned Behaviour [1]. The combination of these models make it a widely used model, but the main choice for the use of UTAUT instead of theories as TAM is based on UTAUT’s validated R squared value of 69 percent. This implicates that the model is able to predict in 69 percent of the cases user adoption successfully [13]. This is significantly higher than all other acceptance models available. The R squared value will be presented after regression analysis and will indicate how well the proposed model predicts the user acceptance.

The original dimensions of UTAUT have been used in the research, therefore hypotheses will be formulated in the upcoming subsections. The numbering of the hypotheses will follow the same proposed path as used by Zhou [17] in Figure 3.

2.3.2 Performance Expectancy
The definition of performance expectancy is stated as: "The degree to which an individual believes that using the system will help him or her to attain gains in job performance". This construct uses five dimensions in which the expectancy can be measured. Perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations are the dimensions specified.

Because the original dimensions of performance expectancy are used to predict MDE acceptance. The following will be hypothesized based on the research model depicted in Figure 3.

H4: Performance Expectancy significantly affects User Adoption

2.3.3 Effort Expectancy
Effort Expectancy measures the ease of use associated by interacting with a system. The construct is specified over the dimensions of perceived ease of use, complexity and ease of use. The difference between the first and third dimensions, listens to the fact that perceived usefulness measures the opinion of the user, while ease of use reflects the opinion from a society’s perspective.

The research model of Zhou shows that Effort Expectancy has two different paths hypothesized. This will result in a path between Effort Expectancy and User Adoption and a path between Effort Expectancy and Performance Expectancy.

H5: Effort Expectancy significantly affects User Adoption

H6: Effort Expectancy significantly affects Performance Expectancy

2.3.4 Social Influence
The construct of social influence measures the importance for an individual to interact with a system, based on others their opinions. The construct is measured through subjective norm, social factors and image. Subjective norm is based on a person’s perspective about important people indicating them to use a certain system. Social factor is based on an organisation’s influence on the acceptance behaviour of an individual. Image describes the enhancement of one’s social status by using a technology. The hypothesis of this construct is mentioned below.

H7: Social Influences significantly affects User Adoption

2.3.5 Facilitating Conditions
Facilitating conditions are covering the level of support from the organisational and technical infrastructure. The dimensions are perceived behavioural control, facilitating conditions and compatibility. Perceived behavioural control measures the perceptions of an individual’s and an infrastructural compatibility with the system. Facilitating conditions describe the amount of effort put in to make a task less complex. Compatibility is defined as a technology’s consistency with current norms. The final construct of UTAUT has the following hypothesis.

H8: Facilitating conditions significantly affects User Adoption

2.4 Zhou’s Integrated Model

2.4.1 Task Technology Fit meets UTAUT
Zhou states the following about the incorporation of TTF in UTAUT: “We believe that, compared with each research perspective, both perspectives will lead to richer insights”.

The research model that will be used to measure the acceptance of MDE-driven applications, will be based on earlier work of Zhou [17] (Figure 3). Zhou’s paper “Integrating TTF and UTAUT to explain mobile banking user adoption” describes the combination between TTF and UTAUT to adapt for the need of mobile banking. Technology and Task Characteristics of the TTF model were altered to fit to the specific dimension of the mobile banking industry. Zhou’s adopted research model is visualised in Figure 3. The constructs that are used in TTF and UTAUT are combined, depicted as the relations H3, H9 and H10. The constructs of Task Characteristics, Technology Characteristics and Task Technology Fit will be discussed in more detail, while the dimensions have been adapted to mobile banking’s characteristics.

2.4.2 Technology Characteristics
The Technology Characteristics that are described by Zhou, are the dimensions of ubiquity, immediacy and security. These characteristics are adapted from earlier research of Lin et al.[9]. The process of altering these tasks should be taken into consideration for setting up the dimensions of MDE. The framework that Churchill [4] proposes in his paper, can be used to find accurate criteria.

Figure 3. Research model adapted from Zhou
2.4.3 Task Characteristics
Zhou’s Task Characteristics fit the dimensions of ubiquitous account management, money transfer and remittance and real-time account information inquiry. These items are validated after they were proposed to three experts in the field of mobile banking. Afterwards, the dimensions were purified with the help of Confirmatory Factor Analysis.

2.4.4 Task Technology Fit
The dimensions that were used to measure TTF in the research of Zhou, are adopted from Lin and Huang [9]. This paper investigated the integration of TTF and Social Cognitive Theory (SCT) [16]. Lin and Huang state that they used the dimensions in the context of Spatial Decision Support Systems and these are therefore not usable for MDE research.

2.5 Research Model
Zhou has used TTF and UTAUT to measure the acceptance of mobile banking applications. In order to do so, he had to alter the constructs of TTF to fit with the characteristics of mobile banking applications. The model that will be proposed, has changed the dimensions of TTF to fit with MDE-developed software. The process of converting these dimensions will be explained more extensively in Section 3.1. The criteria of the UTAUT constructs will remain the same. Only the measurement scales will be converted to the context of MDE.

2.5.1 Task Characteristics
Through qualitative evaluation with experts on MDE-software and through literature research, the Task Characteristics that seemed to be most fitting are Adaptability, Flexibility and Task effectiveness [10][11][14]. Adaptability will focus on how the system can adapt to the tasks of the user. Flexibility will cover the ability of the system to handle with routine/non-routine tasks and how this affect the software experience. Finally task effectiveness will focus on how effective the system can support an user in carrying out a specific task. The measurement scales used for the study can be found in Appendix A.3. This construct leads to the following hypothesis:

H1: MDE’s Task Characteristics will significantly affect the Task Technology Fit.

2.5.2 Technology characteristics
Dimensions of Technology Characteristics have been set up with the same approach seen at the Task Characteristics. These dimensions are Agility, Effort to adapt software and Evolution of Software. Agility measures how ‘agile’ the software program is experienced. Effort to adapt software refers to the degree of how easy models of the software program are to change. Finally Evolution of Software will measure how up-to-date the system is with respect to the fast pace of our modern world. This will bring us to the following hypotheses:

H2: MDE’s Technology Characteristics significantly affect the Task Technology Fit.

H9: MDE’s Technology Characteristics significantly affect Effort Expectancy.

2.5.3 Task Technology Fit
For the dimensions of Task Technology Fit, the dimensions that were set up by Goodhue [6] will be adopted. These dimensions cover confusion, right level of detail, meaning, locatability, accessibility, assistance, ease of use hardware and software, systems reliability, accuracy, compatibility, currency and presentation. This resulted in the following two hypotheses as depicted in Figure 3:

H3: Task Technology Fit will significantly affect User Adoption.

H10: Task Technology Fit will significantly affect Performance Expectancy.

3. RESEARCH METHODS
Before the validation of the structural model can start, the new dimensions of the Technology and Task Characteristics have to be validated. The operationalisation can be found in Section 3.1

For the actual research there has been chosen for a positivist research design due to the main purpose of validating the hypotheses in Section 2. The design exhibits itself in a field survey that is used for quantitative research with statistical methods. More information about the research population and the sampling of the field survey is discussed in Sections 3.2 and 3.3 respectively. Statistical methods such as reliability testing and linear regression were used for validating the model properly. More information about these methods is available in Section 4.

3.1 Operationalisation
For the operationalisation of the new dimensions mentioned under the Technology and Task Characteristics of the research model, the framework that is described by Churchill [4] is used to structurally give meaning to MDE’s dimensions. First a sample of dimensions was generated based on literature review. These dimensions were purified by input of expert reviews. The expert reviews have been carried out with the use of semi-structured interviews. The measurement scales were proposed on which the expert gave his opinion about and suggested on recommendations. The experts had an affinity with the practical and theoretical sense of MDE, this was useful for giving a concise view of the characteristics of MDE in organisational context. The purified data had a clean-up and became more specified. This was once again validated by the means of expert review. There was an initial idea to conduct a pilot testing to check the validity of the proposed dimensions, but unfortunately due to time constraints and a niche target group the testing was canceled.

3.2 Sampling
For the sampling a target group was defined. The research survey focused on end-users of model-driven software applications. In this sense, evaluations of daily users will be captured. These evaluations will provide a concise view on the proposed characteristics of the application. User evaluation will be used as measurement method.

In total a sample group of n = 75 has been gathered. The first halve of this group consists of employees of a software-development company who are using MDE software on a daily basis. The other halve of the research consists of users of specialized MDE forums. While users of forums are anonymous, the validity of their answers can’t be tested. However there is a strong assumption that users of a MDE-specialised forum will at least have affinity with MDE.

3.3 Quantitative Research
As a quantitative research method, a field survey has been sent out. The survey has been distributed under the sample group, which is described in Section 3.2. The participants all claimed to have experience with a model-driven system.
The survey used Lickert scales (7-pointed) for measuring the different opinions. The measurement scales are detailed in the Appendix.

4. RESULTS

The results of the survey were gathered, but before the structural model could be checked, the reliability of the constructs was assessed. Usually this will be tested in the Operationalisation phase, by means of pilot testing. Section 3.1 will explain the reasons for the cancellation of the pilot test.

The first step to validate the model is to test reliability of the constructs. The reliability testing was done by computing the Cronbach Alpha for each construct. Initially the approach consists of Confirmatory Factor Analysis (CFA) to check the validity of the constructs. Unfortunately, due to software limitations, the CFA could not be carried out properly. In Table 1 are the results of the tests depicted. An Alpha value of 0.70 or higher is considered a reliable construct [13][17][6].

Not all constructs comply with the 0.70 rule. However, the new introduced dimensions of Task Characteristics and Technology Characteristics are computed as reliable. The Task Technology Fit, Performance Expectancy and Facilitating Conditions are 0.60 or above which indicates that the construct is deemed good, but not highly reliable. The User Adoption constructs seems to show a low reliability, which will be explained in Section 5. While there was no initial pilot testing for the research, the results of the low-reliability constructs will be used in the further analysis.

The second step was to validate the structural path of the model. This was done by the use of linear regression analysis in IBM SPSS Statistics 24. Linear regression shows the correlation between the different constructs. The computed value of regression analysis is depicted as R squared. The variable explains how ‘strong’ one construct affects the other. The results from the constructs are depicted in Table 2. The consistency of the significance is diverse, but no higher significance values (p-values) than 0.10 were found. The significance values show the reliability of the computed R squared values. Generally, a p-value lower than 0.05 is considered reliable for rejecting a null hypotheses [13][17].

The squared multiple correlations (SMC) [7] were calculated right after. The SMC shows how well a construct is predicted by the model. The outcomes are described in Table 3. It is noted that the User Adoption variable is higher in the TTF incorporated model than in the sole UTAUT model, however, the difference is small and the constructs are not reliable enough to prove significance.

Finally the hypotheses of the research were tested. In Table 4 the results can be found. The table shows that the most important assumptions (H1, H2) of the research, Technology Characteristics and Task Characteristics in relation with Task Technology Fit will not be accepted. Their significance is higher than the 5 percent threshold, which can not guarantee the reliability of the hypothesis. The exact significance of the relationships are about 7/8 percent. A significant correlation is found in H3, H4, H5, H6, H8, H9, and H10 (Figure 4) The most important outcomes are that H9 and H10 are showing a significant correlation be-

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<th>Table 2. Linear Regression Values</th>
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<th>Table 3. Squared Multiple Correlations</th>
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| Figure 4. R Squared Values in Research Model |

Finally the hypotheses of the research were tested. In Table 4 the results can be found. The table shows that the most important assumptions (H1, H2) of the research, Technology Characteristics and Task Characteristics in relation with Task Technology Fit will not be accepted. Their significance is higher than the 5 percent threshold, which can not guarantee the reliability of the hypothesis. The exact significance of the relationships are about 7/8 percent. A significant correlation is found in H3, H4, H5, H6, H8, H9, and H10 (Figure 4) The most important outcomes are that H9 and H10 are showing a significant correlation be-
between the UTAUT and TTF models. This implicates that the models can be used in a combination for MDE. The most strong correlation that has been found, was between Facilitating Conditions and User Adoption. This relationship concludes that good resources are essential for accepting MDE software. This implies that an organisation should supply their employees with the proper technological and organisational infrastructure to smoothen the acceptance process.

5. DISCUSSION

The research exhibits the process of finding a correct model to predict the acceptance of MDE systems. This was done by finding a right acceptance model, fitting the acceptance model with the right dimensions, validate the dimensions and lastly by validating the model with the use of a field survey.

The research did not find an acceptance model that shows a significant link between all theorised constructs, but it raises the assumption that there could be a significant relationship between them. This can be seen by the first two hypotheses (Table 4). The hypotheses are rejected, but the regression analysis of the paths show that relationships were about 2 to 3 percent above the threshold of significance. This indicates that a correlation might be apparent. Furthermore, H9 showed that the correlation between Technology Characteristics and Effort Expectancy is significant. This implicates that the use of a TTF construct with UTAUT can be used and that MDE’s Technology Characteristics influence the expected difficulty with the software.

The study also showed in Table 3 that the incorporated model shows a slightly higher value than the sole UTAUT model on User Adoption. However, there is no specific guarantee for the assumptions made. This is due to the low Alpha value (Table 1) of the User Adoption construct. The low value could possibly be explained by the interviewed people from forums, who might not be daily users of model-driven software. There might be another bias, which could have been introduced by the employees of the software development company. This is because the company creates model-driven software, this can result in an overestimation on the qualities of the methodology.

Another reason for the lower Cronbach Alpha values could be that the adoption of the TTF and UTAUT measurement scales has not been carried out properly. This could have resulted in a wrong interpretation of the measurement scales which can explain a lower Alpha value.

Finally a limitation of the research could be the relatively small research population of n = 75. To validate an acceptance model, usually larger samples of over hundred participants are used [17][13][6].

6. CONCLUSIONS AND FUTURE WORK

The research aimed to predict the acceptance of model-driven software in organisations. In the introduction of the paper three research questions are formulated which will be discussed below.

The research first tried to propose a research model that can capture the acceptance of MDE-software. Through literature research an appropriate model, introduced by Zhou (Figure 3) was adopted. The research model is fitting, because the combination of TTF and UTAUT provides the opportunity to implement MDE specific characteristics.

The second question wanted to capture the dimensions of model-driven software, which should be implemented in the research model. Through expert review and literature research the dimensions of MDE (Task characteristics: Adaptability, Flexibility, Task Effectiveness; Technology Characteristics: Agility, Effort to adapt, evolution of software) were found.

Finally the dimensions were tested by means of a survey. The predictive power of the proposed model is captured in a R Squared value of 0.59. This implicates that in 59 percent of the cases the model can predict the User Adoption of model-driven software. While the model has not been validated properly enough, the claim can not be proven significant.

The most important outcome is the significant correlation between the TTF and the UTAUT model, which implies that the combination of these models can be used in future research of acceptance modeling in MDE context. The strongest relationship that was found, was between Facilitating Conditions and User Adoption. This implies that good resources are essential in the acceptance process. These resources should be provided by the organisations that implement a new system. The previous shows the importance of a good organisational and technical infrastructure.

The research provides a direction for future research in the field of uncovering the true acceptance of model-driven software applications. The use of UTAUT and TTF can be extended to different acceptance models and should be considered in future work. One could also note that the different measurement scales that were introduced, can be adapted to find stronger and more significant correlations.

The research has given the assumption that the model can predict the acceptance of model-driven software applications, but there is no guarantee for the significance of the model with the performed validation. Therefore it is suggested to perform further analysis on the used framework.

This further analysis should take into account that pilot testing should be carried out to test the constructs. A higher research population could be used to exclude any biases based on sample size.

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8. REFERENCES


APPENDIX

A. MEASUREMENT SCALES

A.1 Measurement Scales UTAUT

Performance Expectancy.
- I would find system useful in my job
- Using the system enables me to accomplish tasks more quickly
- Using the system increases my productivity
- If I use system, I will increase my chances of getting a raise.

Effort Expectancy.
- My interaction with the system would be clear and understandable.
- It would be easy for me to become skillful at using the system.
- Learning to operate the system is easy for me.

Social Influence.
- People who influence my behaviour think that I should use the system.
- People who are important to me think that I should use the system.
- The senior management of this business has been helpful in the use of the system.
- In general, the organisation has supported the use of the system.

Facilitating Conditions.
- I have the resources necessary to use the system.
- I have the knowledge necessary to use the system.
- The system is not compatible with other systems I use.
- A specific person (or group) is available for assistance with system difficulties.

User Adoption.
- I intend to use the system in the next months
- I predict I would use the system in the next months
- I plan to use the system in the next months

7
A.2 Measurement Scales TTF

Task Technology Fit.

- There are so many different systems or files, each with slightly different data, that it is hard to understand which one to use in a given situation.
- Sufficiently detailed data is maintained by the corporation or division.
- On the reports or systems I deal with, the exact meaning of data elements is either obvious, or easy to find out.
- It is easy to locate corporate or divisional data on a particular issue, even if I haven’t used that data before.
- I can get data quickly and easily when I need it.
- I am getting the help I need in accessing and understanding the data.
- It is easy to learn how to use the computer systems that give me access to data.
- I can count on the system to be "up" and available when I need it.
- The data that I use or would like to use is accurate enough for my purposes.
- There are times when supposedly equivalent data from two different sources is inconsistent.
- The data is up-to-date enough for my purposes.
- The data is presented in a readable and useful format.

A.3 Measurement Scales Research Model

Task Characteristics.

- The MDE-driven system easily adjusts to the tasks I need to carry out
- Routine as well as non-routine tasks are handled by the MDE-driven system with ease
- My MDE-driven system works better than alternatives on the market

Technology Characteristics.

- My MDE-driven system is agile
- My MDE-driven system is easily adapted
- There are regularly updates for my model-driven system, so it’s up-to-date with present technologies