

## MASTER

### Modeling antecedents and processes of technology lab adoptions within an IT consultant company

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**Master Thesis**  
**Operations Management and Logistics**

Modeling antecedents and processes of technology lab  
adoptions within an IT consultant company

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## Preface

Finally, the time is there, writing my last chapter of my master thesis. The end of 20 years of education and this final paper is the one that counts the most. The end of my student life is there, and a new chapter is about to start. Feeling happy, because I finally achieved what I've been studying so hard for. But also sad when I think about all the great wonderful memories of the last 20 years. I feel proud and satisfied that I have made so much great memories and wonderful friendships. Now the time is there to deliver the final paper and prepare for the dissertation.

Luckily, I was not alone in the last part of the academic journey. Therefore, I would like to thank some people who supported me during my master thesis. First, I would like to thank my first supervisor Leander van der Meij for the great support, review and coaching during the whole project. Without his feedback and motivation this project would not be what it is today. Secondly, a big thank you to my second supervisor Llewellyn van Zyl for his great enthusiasm, time and supervision of the whole combined project. His involvement and energy in the project as a second supervisor is more than I could have wish for. Third, I would like to give a big thank you to Martin Hundepool. Without his endless support within the company this project wouldn't be finished at all. Always just a call away to gave me everything I needed. Fourth, I would like to thanks Max Obers and Ruben Sikkema as my fellow students who were also part of this project. Especially Max who was always there in the long early morning train trips and flyer sessions. Finally, I want to thank all the other people who supported me during my master thesis project which I did not mention yet.

Aswin Jongsma  
Eindhoven, October 2019

## Management summary

For an IT consultancy company, it is important to continuously improve their knowledge and expertise in new technologies. To do so, an innovation space called the technology lab was created to empower innovation and to be able to alter to the changing world. For the management, it is important that the investments made are worth it and that the technology lab is performing to its full potential. Currently, the technology lab is not working to its full potential and one reason is that the adoption of the technology lab within the company is not maximized. Therefore, this thesis investigated the antecedents and processes of the adoption of the technology lab and the possible moderating effects on the adoption.

The adoption of new technologies in the broadest sense can be modeled with the Technology Acceptance Model (TAM) (Davis et al., 1989). The model has the proposition that the perceived usefulness and perceived ease of use are solely sufficient to predict the actual use through attitude towards using and behavioral intention. A drawback of the TAM is that it is not tailored to specific situations. To tailor the TAM to specific situations it has to be extended. Accordingly, the TAM was extended with three more constructs to capture the full meaning for the IT consultancy company. The three constructs added are; user predisposition, social influence and facilitating conditions, which were suggested by Rao Hill and Troshani (2007). The user predisposition and social influence were expected to have a relation with the attitude towards using and the facilitating conditions were expected to have a relation with behavioral intention. Furthermore, the moderating effect of the personal factors age, gender and educational level was studied (Hammond et al., 2011; Sim and Koi, 2002). After a comprehensive literature review the model was developed which is visually represented in figure 1.

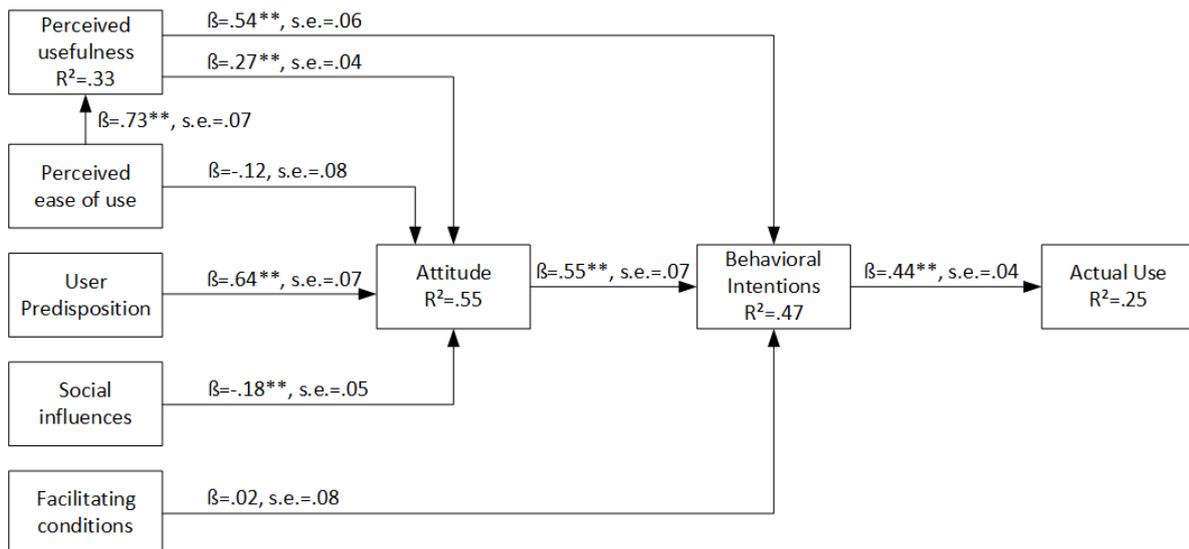


Figure 1: Overview of the relations with the correlations

\* = significant relation

To test the model a quantitative and qualitative study is used. For the quantitative study a survey among all employees was spread. For analysis of the quantitative model (except for the moderating effect), Structural Equation Modeling (SEM) was used. The model was statistically tested with the use of AMOS software package by IMB (Amos, 2013). The moderating effect was analyzed within SPSS (Corp, 2013) with the Hayes process macro (Hayes, 2012). For the qualitative study interviews with managers and focus groups with employees were used. This was done to give more insight into the relations studied. The interviews and focus groups were analyzed according to thematic content analysis.

According to the quantitative study, the attitude towards using has a relation with the behavioral intention to use and the behavioral intention to use has a relation with the actual use of the technology lab. Therefore, the higher the attitude towards using, the higher the behavioral intention to use and the higher the actual use of the technology lab. Therefore, the attitude towards use and behavioral intention should be increased to increase the actual use of the technology lab.

To increase the attitude towards using an IT consultancy company should focus on the strongest construct; user predisposition. By increasing the user predisposition the strongest effect could be realized.

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According to the qualitative study, the first suggestion is to put more effort into the presentation of the technology lab. This can be done by promoting the achievements of the technology lab and give employees the feeling that the technology lab is enjoyable to work in. Enthusiastic promotion of the achievements and workplace can be done by digital signage, newsletters and word of mouth by managers.

Not only the user predisposition is important according to the quantitative study, but also the perceived usefulness. The perceived usefulness was found to have a relation with the attitude towards using and behavioral intention. According to the qualitative study the user predisposition can be enhanced if managers champion the technology lab and lead by example. Managers can champion the technology lab by providing the employees with information, the resources needed and removing bureaucratic barriers. The perceived usefulness can also be enhanced through the perceived ease of use. The perceived ease of use can be enhanced by improving the visibility and accessibility of the technology lab. This can be realized by moving the technology lab to a open and central point in the office.

Next, according to the quantitative study, the social influence with the attitude towards using showed a negative relation. In other words, the more pressure put on employees to work in the technology lab the lower the attitude towards using of the technology lab will be. To avoid this, managers should give employees the freedom to choose whether they want to work in a technology lab or not.

Furthermore, according to the quantitative study, the facilitating conditions with behavioral intention relation was found non-significant. However, from the qualitative findings, it was clear that the facilitating conditions do affect the adoption of the technology lab. The findings showed that both managers and employees state that there is no organizational support to devote time to the technology lab because the focus is on billable hours and short-term targets. Furthermore, results showed that managers and employees state that the visibility of the technology labs influences the adoption of the technology lab. Both the allowance to devote time in the technology lab and the visibility of the technology lab were not part of the survey.

Finally, the findings from the quantitative study showed that age, gender, and educational level do not influence the adoption of the technology lab. This result shows that an IT consultant company should focus on all the employees within the company since all employees have potential to work in the technology lab.

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## Scientific abstract

This article examined the factors which contribute to the adoption of a technology lab. For the study, the technology acceptance model was used and extended to create a new model. To test this model a quantitative and qualitative study were conducted. First, the results of the quantitative study are reported with a sample from a IT consultancy company in the Netherlands (n=466). Results showed that employees with higher levels of perceived ease of use relate with higher levels of perceived usefulness. Next higher levels of perceived usefulness and user predisposition and lower levels of social influence show a higher attitude towards using and behavioral intention. Higher levels of behavioral intention were found to have a positive relation to the actual use. Furthermore, facilitating conditions was found not to have a relation to behavioral intention. Finally, the moderating effect of personal factors (age, gender and educational level) was studied. Only 1 out of 18 moderation effects was found. Second, we report the results of the qualitative study. The qualitative study, 14 managers participated in individual interviews and 26 employees participated in total 11 focus groups. The study was aimed to test the importance of each construct. Altogether, the findings show that perceived usefulness, user predisposition and social influence are related to attitude towards using, behavioral intention and finally actual use. This was in line with the studied literature. It is suggested to do more research on other facilitating conditions such as an inspiring environment and to study the moderating effect of sociographic and psychographic personal factors because the quantitative study and qualitative study showed different results on those constructs. The results of facilitating conditions and personal factors were also not in line with the studied literature.

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# Contents

<b>1</b>	<b>Introduction</b>	<b>6</b>
<b>2</b>	<b>Literature Review</b>	<b>7</b>
2.1	Technology Acceptance Model (TAM)	7
2.2	Extension of the TAM model	9
2.2.1	Facilitating conditions	9
2.2.2	User Predisposition	11
2.2.3	Social Influence	12
2.2.4	Personal Factors	13
2.3	The current study	13
<b>3</b>	<b>Methodology</b>	<b>15</b>
3.1	Research approach	15
3.2	Participants	15
3.3	Procedure quantitative study	15
3.4	Measuring instrument quantitative study	15
3.4.1	Biographical survey	15
3.4.2	User predisposition	15
3.4.3	Perceived Usefulness and Perceived Ease of Use	16
3.4.4	Facilitating conditions	16
3.4.5	Social influence	17
3.4.6	Attitude towards using, behavioral intention and actual use	17
3.5	Statistical analysis quantitative study	17
3.6	Measuring instrument qualitative study	18
3.7	Recording of the data and data analysis of the qualitative study	18
<b>4</b>	<b>Results</b>	<b>19</b>
4.1	Quantitative	19
4.1.1	Hypotheses tests	19
4.1.2	Moderator test	21
4.2	Qualitative	22
<b>5</b>	<b>Discussion</b>	<b>25</b>
5.1	Summary of the findings quantitative study	25
5.2	Summary of the findings qualitative study	26
5.3	Limitations and directions for future research	27
5.4	Managerial implications	27
<b>6</b>	<b>References</b>	<b>29</b>
<b>7</b>	<b>Appendix</b>	<b>34</b>
7.1	Appendix A - Survey questions	34
7.2	Appendix B - Interview questions	42
7.2.1	Interview questions managers	42
7.2.2	Focus group questions employees	42
7.3	Appendix C - Quantitative results	43
7.4	Appendix D - Qualitative results	45

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# 1 Introduction

In a rapidly changing world, firms continuously face new problems, challenges and changes. One of the reasons for a rapidly changing world is the increasing global competitiveness and fast technological development (Elnaga and Imran, 2013). In such environments, a firm should be able to adapt accordingly to meet future challenges and targets (Tai, 2006). For most companies, it is a tough challenge to adapt towards this changing world and be able to continuously improve their knowledge and products (Gascó, 2017). Therefore, it is hard to be a stable and sustainable company. In the IT branch, this is even harder than in more traditional branches like construction since the IT branch is changing quickly. To continuously improve the knowledge and products, companies invest in research, development and innovation (Gascó, 2017). Obviously, for bigger and wealthier companies it is easier to spend more money on research, development and innovation. Even though big IT consultancy companies in the world have enough cash to invest. It is hard to improve and beat the tough competition in consultancy. With thousands of patents and well-educated employees, the company tries to create forward-moving solutions. To enhance this development for the purpose, to support tomorrow, the company created the technology lab. The main purpose of the technology lab is to give pioneers a place to develop new ideas, to provide settlers with a place to create prototypes to prove the value and create a business design and finally, for town planners a place to give demos, hackathons, and boot camps to enhance the business development. In practice, the company created the technology lab in which there is an infrastructure, secure environment, facility and coaches to enhance the innovation. The technology lab is a companywide business unit that works across functional business units. To be able to get the full potential out of the technology lab support from all business units is needed. Within most companies, this is a real challenge since employees do not feel supported, lower managers have to meet their targets, and there is a lack of higher management support. The commitment of the entire staff is needed to let people to actually adopt these innovation centers and make the technology lab actually work. Only a few companies around the world, like Google and Amazon, experience something near the maximal benefits of an innovation lab. Like most companies, this IT consultancy company also faces the challenges and tries to address those challenges. To properly address those problems of why the technology lab is not fully utilized the mechanisms and antecedents should be identified. The purpose of the study is, first, to determine 'how' the adoption process of the technology lab works, and which factors are instrumental. Second, the goal of this study is to determine 'why' the adoption process works that way.

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## 2 Literature Review

Within the IT consultancy company, the adoption of the technology lab is completely new. Employees never worked in such a work environment before and many of them do not exactly know what they can expect. This makes the adaptation process different than, for example, the adaptation into a new workspace of a client. Therefore, the adoption of the technology lab should not be considered as a new workspace, but more as a new environment and technology. The mechanisms and factors leading to the actual use of a new technology are explained in the “Technology Acceptance Model” which is first introduced by Davis et al. (1989). This model was developed to better understand how and why people adopt new technologies.

### 2.1 Technology Acceptance Model (TAM)

The TAM (represented in figure 2) is derived from the Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1977). The TRA can be considered as a general theory and has no specific context, which means it can be used to explain any type of behavior (Rao Hill and Troshani, 2007). The model states that an individual’s actual behavior is determined by a person’s own intention to perform a certain behavior. This intention is influenced by the person’s attitude and subjective norms (Ajzen and Fishbein, 1977). Attitude can be described as a settled way of thinking or feeling about something. Subjective norm is defined as the person’s perception of what most people important to him think he should do (Ajzen, 1991). Attitude and subjective norm can and are different for different situations and contexts. Therefore, the TRA can be used for all types of behavior in different contexts (Davis et al., 1989).

The TAM is specially tailored towards user acceptance towards new technologies. And is therefore described as the adoption of the TRA. It is developed to explain individual system use in the workplace (Davis et al., 1989). According to Davis et al. (1989), the TAM differs from the TRA in two fundamental ways. First, the TRA states that beliefs are new for each context, the resulting beliefs are particular for that specific context (Bandura et al., 1977). This means that an interaction with a technology lab in the past does not influence the opinion of another technology lab now. In the TAM this is not true. Therefore, previous experiences with a technology lab do influence the perception of a technology lab in a new situation. Those previous experiences are used to determine the actual use of the new technology which is the main goal of the TAM. Second, the TAM suggests that perceived ease of use and perceived usefulness are instrumental in explaining the user’s intention to use. In the TRA those two constructs are treated as one construct, namely, beliefs and evaluations. In the TAM the perceived usefulness is described as the degree to which a person believes that using a particular system would enhance his or her job performance (Davis et al., 1989). It should be noted that this is a subjective probability since it is about a person’s belief. Perceived ease of use refers to the degree to which the prospective user expects the target system to be free of effort (Davis et al., 1989). For example, if a user expects that it will cost no additional bureaucratic paperwork, he will be more likely to adopt a certain behavior. Although perceived usefulness and perceived ease of use seem to be correlated, they are distinct dimensions according to statistical analysis (Hauser and Shugan, 1980; Larcker and Lessig, 1980; Venkatesh et al., 2003). Therefore, perceived usefulness and perceived ease of use can both be used in the TAM.

Except for the differences the TRA and TAM also have similarities. The first similarity is that actual usage can be determined by, solely, behavioral intention (Davis et al., 1989). This relation is not only in line with the TRA by Ajzen and Fishbein (1977). But also with later studies such as the Theory of Planned Behavior by Ajzen (1991).

A second similarity is that attitude towards using has a direct effect on behavioral intention (Davis et al., 1989; Ajzen and Fishbein, 1977). The attitude-behavioral intention relationship implies that all else being equal, people form intentions to perform behaviors toward which they have positive affection. Different from the TRA, where the behavioral intention is solely predicted by attitude, is that the TAM also uses perceived usefulness as a predictor of behavioral intention. This relation is based on the idea that, within organizational settings, employees form intentions toward behaviors they believe will enhance their performance of the job (Davis et al., 1989). In other words, if I believe that a new technology is very useful in the job, I will create an intention to use this new technology. Although the perceived usefulness-behavioral intention relationship is not discussed in the TRA on which the TAM is based, other research studied this relation and found theoretical justification (Bagozzi, 1981; Triandis,

1977). Davis (1989) argued that those theoretical justifications were not always statistically validated in previous research (Swanson, 1987; Triandis, 1977), however, all the studies showed the same findings. Therefore, the relation could be used in the TAM (Davis et al., 1989).

Next to the perceived usefulness, behavioral intention relationship the perceived usefulness also has a relation with the attitude towards using. The TAM posits that higher perceived usefulness will result in a higher attitude towards using (Davis et al., 1989). The perceived usefulness affects the attitude towards using through learning mechanisms (Bagozzi, 1981). Those learning mechanisms posit that positively valued outcomes of behavior often increase somebody's intention to rehearse that behavior to obtain the same result (Davis et al., 1989). Not only perceived usefulness is related to the attitude towards using but the perceived ease of use is as well. The perceived ease of use affects the attitude through self-efficacy (Davis et al., 1989). The easier a system is to interact with a user the greater the user's efficacy and personal control (Bandura et al., 1977; Lepper and Chabay, 1985). Efficacy is one of the major factors to underlie in intrinsic motivation (Bandura, 1982). Therefore, the relationship between perceived ease of use and attitude towards using is meant to capture the motivating aspect of ease of use (Davis, 1989).

The perceived ease of use and perceived usefulness are distinct construct (Hauser and Shugan, 1980; Larcker and Lessig, 1980; Venkatesh et al., 2003). At the same time, there is also evidence that the two constructs are related (Swanson, 1987). The TAM states that the perceived ease of use is a predictor of perceived usefulness. Perceived usefulness can be influenced by performance outcomes and the learning effects of certain behaviors (Davis, 1989). For example, when implementing a new tool, people will learn the positive effect of its result. Accordingly, perceived usefulness will increase. In that case, the users will adjust their attitude towards the tool and, accordingly, their behavioral intention (Ajzen and Fishbein, 1977). The perceived ease of use is an important predictor in this case. It can be seen as an enabler to try new technology. If it takes almost no effort to try and use a new tool this improves the perceived usefulness and attitude of trying such a new technology (Davis et al., 1989). For example, if a new tool is easily installed on the computer and is very user-friendly, it takes not much effort to use this new tool and try it. This makes it more likely for people to use this new tool compared to a tool which takes hours to install and is hard to work with.

Finally, both perceived usefulness and perceived ease of use are influenced by external factors. Those external factors can be previous experiences. The TAM states that previous experiences that influence the new experience can be used to predict the perceived usefulness and perceived ease of use in new situations. Not only previous experiences but also other external variables do affect the perceived usefulness and perceived ease of use. Examples of other external variables are job category (Hubona and Geitz, 1997), employment category, age and educational level (Hubona and Kennick, 1996).

To model the attitude towards use, behavioral intention and actual use of the technology lab the TAM will be used. To make sure this is appropriate, the TAM will be tested. Accordingly, the TAM the following hypothesis are made;

- H1a: Perceived usefulness is positively related to attitude towards use
- H1b: Perceived usefulness is positively related to behavioral intention
- H2a: Perceived ease of use is positively related to the attitude towards use
- H2b: Perceived ease of use is positively related to perceived usefulness
- H3: Attitude towards using is positively related to the behavioral intention
- H4: Behavioral intention is positively related to the actual use

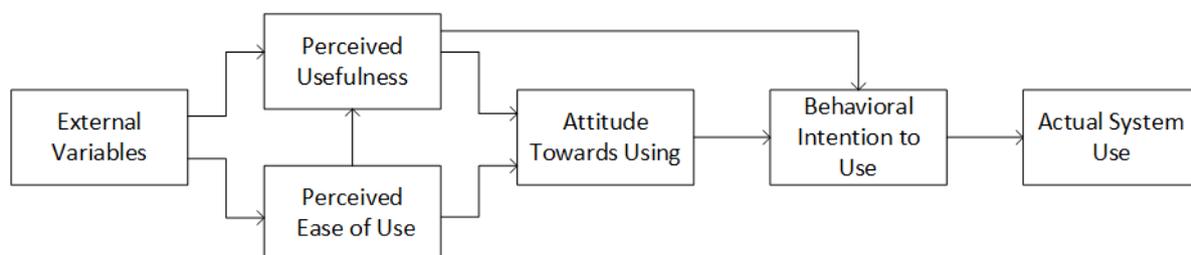


Figure 2: Technology Acceptance Model

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## 2.2 Extension of the TAM model

The original TAM only uses perceived usefulness and perceived ease of use to predict the attitude and behavioral intention towards a new technology (Davis et al., 1989). According to Venkatesh et al. (2003), the application of just perceived usefulness and perceived ease is a major strength and weakness at once. The strength is that the model is easy to apply and adjust to specific situations. The weakness is that the model has limited use in explaining users' behavioral intention to use since it uses only perceived usefulness and perceived ease of use to determine the attitude towards use. Therefore, the accuracy in predicting the attitude towards use is weak, which makes the model less reliable and less usable to predict the adoption of a new technology (Venkatesh and Davis, 2000). According to Lee et al. (2003), the TAM can easily be extended to capture more specific technology and business context. Rao Hill and Troshani (2007) extended the TAM to give it more business and technology context. They added three additional constructs; user predisposition, social influence and facilitating conditions to tackle the weakness of the TAM. Next, they studied the moderating effect of personal factors. The addition of this moderating effect was suggested by Nysveen et al. (2005) to overcome demographic differences. All those extensions of the TAM are examined below in further detail. The adoption of the TAM and the TAM extensions will make the model more viable for modeling the antecedents and processes towards the usage of the technology lab which is the aim of this study (Rao Hill and Troshani, 2007).

### 2.2.1 Facilitating conditions

Facilitating conditions have multiple definitions in the literature. One definition is stated by Venkatesh et al. (2003), who found that facilitating conditions are the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of a system. This infrastructure should be designed to enhance its use. Rao Hill and Troshani (2007) state that facilitating conditions refer to the external variables in the adoption environment which aim to enhance the diffusion of new technology. Facilitating conditions make adoption behavior less difficult in the way that they remove any obstacles to adoption and sustained usage (Rao Hill and Troshani, 2007). Examples of those facilitating conditions are a trusted environment and financial support. The addition of facilitating conditions help to make a more accurate prediction of the attitude towards using (Rao Hill and Troshani, 2007). The opposite of facilitating conditions is hindrance conditions. hindrance conditions refer to external variables that hinder the adoption of a new technology. Important to note is that both facilitating and hindrance conditions are external factors, so the user cannot influence them. In this research we focus on the facilitating and hindrance conditions for employees, in other words, we focus on the facilitating and hindrance characteristics of the employee's job. Therefore, we will call the facilitating and hindrance condition, together, job characteristics.

Job characteristics are also discussed in the job demands resource model of Bakker and Demerouti (2007). It is explained that job characteristics can have a facilitating as well as a restricting effect on job performance. The facilitating effect is explained by job resources and is enhanced by the amount and quality of resources that are available in the job. The negative effect is explained with job demands enhanced by the amount and strength of demands which exist within the job. When a job is well facilitated without too many restricting conditions this will increase the energy and motivation of employees (Bakker and Demerouti, 2007).

Job demands are defined as physical, physiological, social or organizational characteristics of a job (Bakker and Demerouti, 2007). Examples of job demands are; work pace, mental load, emotional load, and change. When those demands are too severe, it can lead to exhaustion and a lack of performance in the job (Schaufeli and Taris, 2014). The situation of exhaustion and lack of performance is most often the combination of too many demands and too little resources to fulfill those demands called "work-overload" or "burnout" (Rapaport and Rapaport, 1976). The experience of work-overload not only has implications on the performance of the job but also on the person (Gashi, 2014). On the person, this can affect the mental and physical health of the employee. A decrease in mental and physical health can then influence personal characteristics such as personal innovativeness (Thatcher et al., 2003).

On the other hand, there are job resources. Job resources relate to the ability of the company to assist individuals in their personal resources (Schaufeli and Taris, 2014). Personal resources enable people to do the job and tend to decrease effects like exhaustion and lack of performance (Bakker and Demerouti, 2007). Next, job resources tend to enhance vigor, dedication, and absorption (Bakker and Demerouti, 2007). The effect of job resources entirely depends on the type of job. For example, colleague support is more important in collaborative jobs than it is in individual jobs (Bakker and Demerouti, 2007). Furthermore, they also tend to enhance the innovative work behavior (IWB) (Masrek et al., 2017).

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Examples of such job resources are Autonomy, Feedback, Colleague support, Supervisor support, Leader Member Exchange and Recognition (Bakker and Demerouti, 2007; Hackman and Oldham, 1976). To give the facilitating conditions enough predicting strength, the inclusion of job resources will be used to extend the TAM with.

The first resource that will be included autonomy. Autonomy concerns the authority employees have in deciding how to execute their work (Hussein et al., 2016). It has already been shown by previous research that autonomy has a positive effect on innovative behavior (Hackman and Oldham, 1980). This effect is enhanced in more complex jobs (Masrek et al., 2017). It is expected that complex jobs support and encourage higher levels of motivation and creativity. The job complexity can be measured by the level of autonomy, skill variety, identity and amount of feedback (Hussein et al., 2016). When a job is complex it is characterized by high levels of autonomy, feedback, skill variety, identity and significance (Hackman and Oldham, 1980).

The second job resource I take into consideration is feedback. Feedback is defined as the information an employee receives about achieving their work goals (Hussein et al., 2016). This information can be provided by an information system, superior, co-worker or peer. This construct is related to the complexity of a job, just as autonomy. Therefore, the more feedback given in the job, the higher the innovative work behavior, motivation, and creativity (Hackman and Oldham, 1980).

The third job resource discussed is colleague support. Colleague support can also be described as supportive peer relations within the job (Bacharach et al., 2005). It refers to the relationship among coworkers that are more than simply casual and involve more task sharing and the exchange of simple work-related information (Blau, 1977). It has been shown that colleague support enhances the organizational citizenship which accordingly enhances the performance of the individual as well as the performance of the group (Podsakoff et al., 2000). The fourth job resource, supervisor support, is closely related to colleague support. Supervisor support exists when a supervisor encourages its employees in their way of working. In a situation where there is enough supervisor support, the role conflict within the job will be reduced since the expectations of the supervisor and employee are more in line (Ladany and Friedlander, 1995). When employees do perceive support from their supervisor their innovative work behavior will increase as well (Janssen, 2005). If there is a lack of supervisor support and this role conflict will arise, and the employee will experience stress and become dissatisfied (Rizzo et al., 1970).

The perceived supervisor support does also depend on the Leader Member Exchange (LMX) (Fredrickson, 2000). LMX is the fifth condition that is used to determine the facilitating conditions. LMX can be characterized by the relationship quality between the employee and the immediate supervisor (Agarwal et al., 2012). A good relationship with the supervisor enhances the positive feeling about work and the creation of new ideas (Fredrickson, 2000). The direct relationship between LMX and Innovative work behavior was studied by (Sanders et al., 2010). They found a positive correlation between innovative work behavior and LMX. So, a higher LMX will result in higher innovative work behavior.

Finally, the last job resource that is considered is recognition. Recognition refers to the amount of credit an employee received for performing something or doing an act (Cannon, 2015). Recognition is related to LMX and perceived organizational support (Cannon, 2015). When employees feel that they are recognized they have higher job satisfaction and have a more positive attitude (Tessema et al., 2013; Cannon, 2015).

When all the facilitating conditions are aggregated a new construct, job demands is found. The other way around, hindrance conditions will form the job demands. By aggregating the job demands and job resources a new construct “job characteristics” is formed (Bakker and Demerouti, 2007). This construct is the first addition to the extended TAM. For the hypotheses, the job characteristics are split to make the hypotheses more clear. Accordingly, we hypothesize that;

H5a: Job Resources are positively related to the behavioral intention

H5b: Job Demands are negatively related to the behavioral intention

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### 2.2.2 User Predisposition

The second construct we use to extend the TAM with is user predisposition. User predisposition refers to the internal factors of a user (Rao Hill and Troshani, 2007). Predisposition and adoption are strongly influenced by individual differences (Rao Hill and Troshani, 2007). According to Rogers (1995), recognizing those individual differences is important to make segments of adopters who are more likely to adopt the technology. The provider of the technology can then address the needs of those adopters. One of the segmentation groups of likely adopters is early adopters. Early individual adopters can act as opinion leaders and change agents to further diffuse the technology. Fast diffusion of technology will improve the chances of innovation to succeed (Rogers, 1995).

Similar to Rao Hill and Troshani (2007) we define user predisposition as a combination of six factors. Those factors are prior knowledge, compatibility, perceived behavioral control, image, personal innovativeness, and intrinsic motivators. Rao Hill and Troshani (2007) identified those six factors from domestication research, innovation diffusion and motivational studies they studied. Each of those six factors will be discussed separately in this section.

The first of the 6 constructs to be discussed is prior knowledge. Prior knowledge is essential for the comprehension of a new technology. Adopters have to be aware of an innovation and gain some understanding concerning its functionality (Rogers, 1995). Existing knowledge is powerful in acquiring an in-depth understanding of the benefits and functionality (Yamauchi and Markman, 2000). A more in-depth, complete and direct understanding of the technology will lead to a stronger impact on the perception and attitude towards using (Rao Hill and Troshani, 2007).

The second construct within user predisposition is compatibility. Compatibility is how consistent the innovation is with the existing values (Rogers, 1995). If the adoption of the new technology interferes with the current situation, it takes more effort to adopt the new technology. Therefore, the likelihood of adoption will decrease. Unfortunately, new technologies most often interfere with the current lifestyle or situation (Saaksjarvi, 2003). In the context of a work environment, if the adoption requires a personal appearance at a particular workplace, there may appear a compatibility conflict in a case that the employee works from a different location. In such a case the adoption requires a change of behavior which will decrease the likelihood of adoption (Davis et al., 1989). The other way around, in a case, that the new technology is compatible in the current situation there is an increase in the attitude towards using and behavioral intention (Chen, 2011).

Third, we discuss the construct perceived behavioral control (PBC). PBC is the belief about the presence or absence of required resources and opportunities (Ajzen and Madden, 1986). In other words, behavioral control is a subjective judgment of the degree of control over the performance of the behavior. This is not the same as the perceived likelihood that a given behavior will produce a given output but rather the input to perform a behavior (Ajzen, 1991). The concept PBC was first widely studied in Ajzen (1991) in which PBC was used to predict the intention to use and actual behavior. On top of that, he stated that the perception of behavioral control is of greater interest than the actual resources and opportunities available to a person. Importantly, PBC differs from other concepts like "locus of control" which remains stable across situations (Lachman, 1986). PBC can and does vary in different situations and actions. A person may believe that it has control over its own job results, yet has the feeling that it has no control over a promotion (Ajzen, 1991). Other studies have shown that people's behavior is also strongly influenced by their confidence in the ability to perform (Bandura et al., 1977). So, if a person has a high PBC and confidence in the ability to perform, that person is more likely to perform a certain behavior than a person who has a low PBC and low confidence.

The fourth construct is image. Image is the amount of adoption regarding the perception to enhance their image or status in their social system (Al-Gahtani and King, 1999). The social system consists of relationships with individuals, groups, and institutions (Merriam-Webster, 2019). Many people adopt behavior because they believe adopting those behaviors will enhance their image and their social status (Mun et al., 2006). Even more, for some people, the desire to gain social status is the most important factor to adopt a new technology (Lee et al., 2003).

The fifth construct perceived enjoyment (PE) is discussed. PE is the perception of how enjoyable the adoption of a product is (Rao Hill and Troshani, 2007). If a user perceives enjoyment through adoption the attitude towards the adoption will be positive. A person will be more motivated to do or repeat an enjoyable activity which is enjoyable compared to the same activity which is not enjoyable (Davis et al., 1989). Brown and Venkatesh (2005) used the term "hedonic motivation" to describe PE. They discovered that hedonic motivation plays an important role in determining the technology acceptance. Evidence can be found in other studies as Teo et al. (1999) which argued that PE is correlated with use and Mun and Hwang (2003) stated that there is an indirect relation between enjoyment and use through

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the constructs attitude and behavioral intentions. Finally, Al-Gahtani and King (1999) state PE must be an intrinsic source of motivation (coming from the person itself), which is a stronger motivator than an extrinsic source of motivation (a person is motivated via other means than himself).

Finally, personal innovativeness is discussed as a factor of user predisposition. Personal innovativeness is the willingness to try or embrace new technologies (Rao Hill and Troshani, 2007), it is also known as technology readiness (Massey et al., 2005). To measure personal innovativeness, Herr et al. (1991) segmented potential adopters into; innovators, early adopters, early and late majority adopters and laggards. The group of innovators with the highest personal innovativeness are described as the first 2.5% to adopt the technology. The group of early adopters is the next 13.5% to adopt the technology, also with high levels of personal innovativeness. If those groups with high levels of personal innovativeness create a positive image about the technology, they are likely to become diffusers of the new technology and change the predisposition of user segments (Rogers, 1995).

Given all the six factors explained above, the user predisposition was determined. Contrary to Rao Hill and Troshani (2007) who studied the impact of all six factors on itself, all six factors will be aggregated to one new factor which is then used as the construct to extend the TAM with. Accordingly, we hypothesize;

H6: User predisposition is positively related to the attitude towards use

### 2.2.3 Social Influence

The third construct the TAM will be extended with is social influence. Social influence refers to the degree individuals perceive that people important to them believe they should use an innovation (Suki and Suki, 2011). This construct is also known by the term “subjective norm” (Malhotra and Galletta, 1999). This construct was first introduced in the Theory of Reasoned Action (Ajzen and Fishbein, 1977) and later used in the Theory of Planned Behavior (Ajzen, 1991) as one of the predicting variables of behavioral intention. Both studies state that the subjective norm is a major determinant of planned behavior and usage through the construct behavioral intention. In both the TRA and the TPB it is argued that individuals learn and adopt behaviors of others in social settings. Moreover, according to the meta-analysis by Schepers and Wetzels (2007), the relation of subjective norm to the attitude towards using is even stronger than the relation with behavioral intention.

There are three different processes of how individuals are affected by social influence in the adoption of a certain behavior: compliance, identification, and internalization (Kelman, 1958). Compliance refers to a situation in which an individual adopts the introduced behavior not because she believes in its content, but with the expectation of gaining rewards or avoiding punishment (Kelman, 1958). Compliance is enhanced in settings in which a superior tells that the adoption of a certain technology might be useful. The perceived risk of adoption, such as failure, is lower and, secondly because the individual might feel that there is a punishment if she does not adopt the behavior (Lu et al., 2003). The second process is identification which occurs when an individual accepts influences because she wants to establish a satisfying self-defining relationship to another group or person (Kelman, 1958). The identification is enhanced in situations in which a trusted person advocates for a certain technology. In that case, the perceived risk that the new technology will fail is lower (Bandura et al., 1977). Not only in situations of single individuals the social influence is important, but individuals also base their behaviors upon what they see in their social groupings. When individuals observe the same behavior among different individuals or groups in their social groups they are likely to copy those behaviors, which is also adoption through the identification process (Bhattacharjee, 2000). Third, internalization refers to a situation in which an individual accepts influence because it is in line with her values which also relates to the attitude of the individual. In this situation, the individual will easily agree with another person (Kelman, 1958). This is the best process of adoption since it is an intrinsic source of motivation where compliance and identification are extrinsic sources of motivation (Al-Gahtani and King, 1999).

Finally, Thompson et al. (1994) state that next to the processes the timing is also important and should be added. In earlier stages in which the adoption can take place social influences play a more significant role than in later stages. The decrease in the significance is because people form their own opinion and intentions about the technology, which take the place of intentions of others (Thompson et al., 1994).

So, for individuals’ different aspects of social influence plays a role in the effect of social influence. All those aspects are expected to contribute to the attitude towards using as an extension of the TAM it is hypothesized;

H7: Social influence is positively related to the attitude towards use

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## 2.2.4 Personal Factors

Finally, personal factors influence the extended TAM. Examples of personal factors are; gender, age, occupation and income (Hammond et al., 2011). These factors result in different attitudes and behavior towards goods and services (Pollay and Mittal, 1993). There is a wide range of personal factors that are suggested to influence the adoption of new technologies (Kim, 2016). Two of the most studied personal factors are age and gender (Hammond et al., 2011). Age and gender were found significant in the User Acceptance of Information Technology Theory (Venkatesh et al., 2003). They showed that the personal factors; gender, age, experience, and voluntariness were moderators on the determinants of behavioral intention. The determinants they used were performance expectancy, effort expectancy, and social influence. In this study of Venkatesh et al. (2003) performance expectancy can be described as perceived usefulness and effort expectancy to perceived ease of use. When doing this, it becomes clear that the model is an extended TAM. Therefore, the findings in this study are a good reference point for this study. In this extended TAM they found that all variables (gender, age, experience, and voluntariness) were related as moderators (Venkatesh et al., 2003) from the previously mentioned determinants to behavioral intention. Those findings are in line with other studies such as Breakwell et al. (1986) who found that men are more likely to adopt new technologies and Brown and Venkatesh (2005) who found that younger people tend to exhibit a higher tendency to seek novelty and innovativeness during early stages of a technology.

Next to gender and age Sim and Koi (2002) reported that educational level is an important determinant of technology adoption. It was stated that higher educated participants are more likely to embrace new technologies. This was later supported by Dakhli and De Clercq (2004) who stated that the education system is a powerful influencing factor for innovation. Because of the wide range of studies in the field of personal factors Hammond et al. (2011) conducted a meta-analysis on the predictors on the individual level of the innovativeness at work. They confirmed the belief of the influence of educational level on innovative performance.

Summarizing this section. Three personal characteristics are discussed to influence the extended TAM. However, those effects may not influence the attitude towards using or behavioral intentions itself. Adoption of a new technology may vary significantly among young users, thus, treating them as a homogeneous group is not appropriate (Rao Hill and Troshani, 2007). Therefore, it is argued that the three personal characteristics moderate all the constructs mentioned in the previous sections. Thus;

H8a: Age moderates the relationship between the antecedents and attitude towards use, such that when age is low, the relationship between the antecedents and attitude towards use is stronger and weaker when age is high.

H8b: Gender moderates the relationship between the antecedents and attitude towards use, such that when the gender is male, the relationship between the antecedents and attitude towards use is stronger and weaker when the gender is female.

H8c: Educational level moderates the relationship between the antecedents and attitude towards use, such that when educational level is high, the relationship between the antecedents and attitude towards use is stronger and weaker when educational level is low.

## 2.3 The current study

The current study is not conducted within a conventional company setting but in a more unusual setting. The setting is unusual because of two reasons. First, a new employee of the company sometimes only spends one day within the IT consultants own office. That one day is only the central introduction day. After the introduction day, most employees start working for a client and will work in the clients office. Therefore, employees create their opinions about the company differently, which may affect the adoption process of the technology lab. Second, the IT consulting company is a matrix-based organization that works project-based. Some of those projects are at the clients place and other projects are within the technology lab. Projects for a client are specific for each business unit where projects for the technology lab works across silos. Accordingly, the process of the technology lab adoption is different in both situations.

To capture the full understanding of the technology lab adoption it is not only important to study how constructs in the adoption of the technology lab are related. But also retrieve the context-specific factors which are important. By adding the context-specific factors the question, why constructs relate can be answered. Examples of context specific-factors are the social context, job demands and job resources. An overview of the relations studied is given in figure 3.

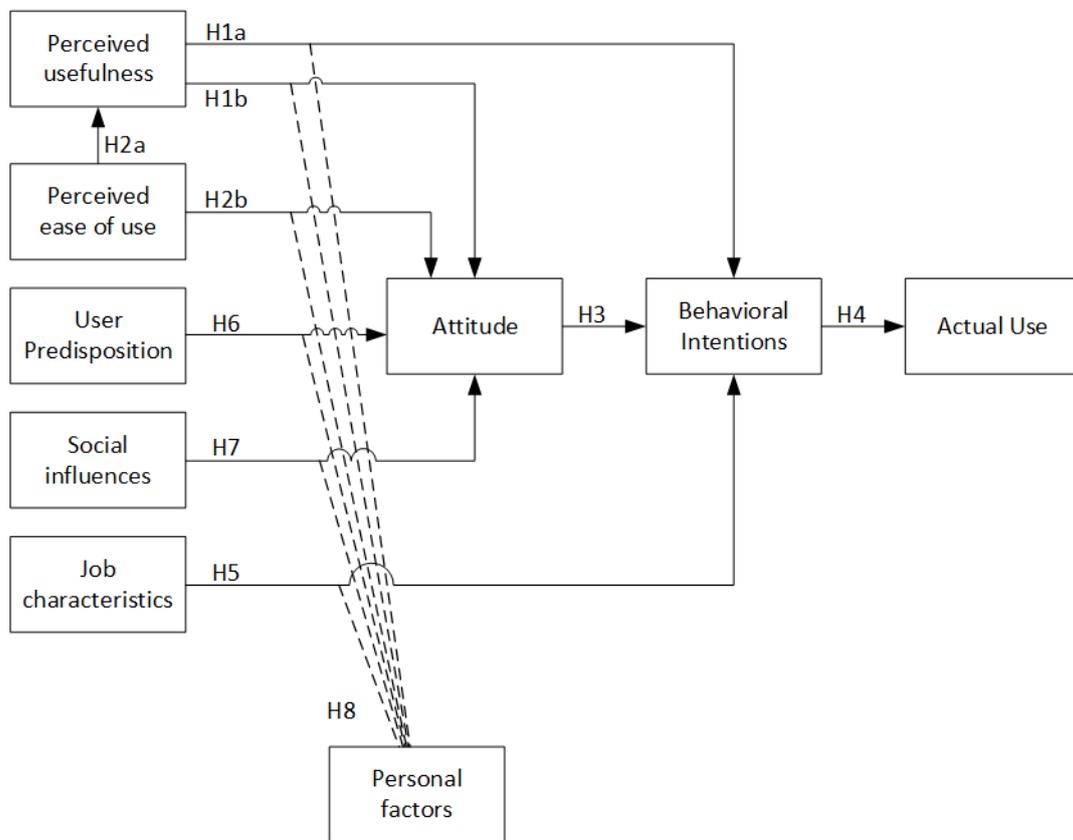


Figure 3: Proposed model of acceptance the technology lab

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## 3 Methodology

### 3.1 Research approach

In this study, a mixed-method was used to test the hypotheses. The mixed-method approach used is a more unconventional approach. The first part is a quantitative research method which consists in which a survey is used to test the hypothesis and answer the question how the constructs are related. The second part of the study is a qualitative research approach. With the qualitative study, researchers try to understand the world from a participants point of view (Kvale, 1996). The qualitative study design is based on thematic content analysis. The study consists of two parts, namely; semi-structured interviews with managers and semi-structured focus groups with employees. With this research approach, the qualitative data argues the outcomes of the study, which is a popular approach within implementation and dissemination research (Palinkas et al., 2011). By doing this, the context specific factors such as social factors are taken into consideration and a deeper understanding why constructs relate is created.

### 3.2 Participants

For the quantitative study, the final size consisted of 369 employees. Data was collected (n=466), however, participants were excluded due the following reason: 97 participants never heard of the technology lab or didn't know what the technology lab was. Participants were on average 50 years old (Median=54, SD=12, min=19 max=67), 85.1% were men, 14.6% were women and .3% filled out "other". Most employees did a bachelor degree (35.7%) or a master degree (32.2%). All the other employees had lower levels of education. In the qualitative study, 14 managers participated in individual interviews and 26 employees participated in total 11 focus groups. Overall, 92.5% of the participants were man en 7.5% were woman. 60% of the participants was 50 years or older and 40% was younger than 50 years. An overview of all biographical details in given in table 1.

### 3.3 Procedure quantitative study

For the data collection of the quantitative study, people were selected by a convenience sampling method. This is a non-probability sampling method in which people were asked to fill out the survey according to the ease of approach (Etikan et al., 2016). All employees within the IT consultant company were asked to fill out the online survey via e-mail. Furthermore, posters, flyers and newsletters were used to attract the attention of employees. Finally, when employees entered the building they were personally asked to fill out the survey.

### 3.4 Measuring instrument quantitative study

All the measurement instruments used were shorter versions of the original versions suggested in the literature. This was done to shorten the complete survey. The items used in the survey are chosen according to their Cronbach's Alpha from the original literature. A complete overview of you survey is listed in appendix A.

#### 3.4.1 Biographical survey

A biographical survey was compiled to obtain data pertaining to participants' gender, age, level of English and level of education. There were questions about their employment within the company, such as the department and years of employment within the company. Further, in order to track participants, a unique code was developed for each participant based on responses to questions, such as "the second letter of the city where you are born".

#### 3.4.2 User predisposition

The six items of user predisposition were individually measured. All items were measured by one item on a 7-point Likert scale ranging from strongly agree to strongly disagree. The six items measured were prior knowledge, compatibility, perceived behavioral control, image, personal innovativeness, and intrinsic motivators. First, prior knowledge was assessed according to by Rao Hill et al. (2011). The item used was "I do not have difficulties in explaining why adopting the technology lab may be beneficial."

Table 1: Overview of the biographical details

Item	Category	Frequency	Percentage
Quantitative study			
Gender	Male	314	85.1
	Female	54	14.6
Age (years)	Other	1	.3
	30-	47	12.7
	31-40	25	6.8
	41-50	55	14.9
	51-60	160	43.2
	60+	81	21.9
	Unidentified	2	.5
	Educational level	VMBO (prep. sec. vocational education)	14
HAVO (senior general secondary education)		28	7.6
VWO (university preparatory education)		26	7.0
Bachelor's degree		132	35.7
Master's degree		119	32.2
Doctoral Degree (Ph.D.)		6	1.6
Other		45	12.2
Qualitative study			
Managers			
Gender	Male	14	100
	Female	0	0
Age	35-50	3	21.4
	51-67	11	78.6
Employees			
Gender	Male	23	88.5
	Female	3	11.5
	31-40	4	15.4
	41-50	9	34.6
	51-60	9	34.6
	61+	4	15.4

Second, compatibility was assessed with one item suggested by Chen (2011) who originally used four items. The item used was “using the technology lab is compatible with all aspects of my job.” Third, perceived behavioral control, image, and personal innovativeness were all measured according to Mun et al. (2006). For perceived behavioral control the item used was “Using technology lab is wise”. For image for example “people in my organization who use the Technology Lab have more prestige than those who do not,” and finally an item example for personal innovativeness was “If I heard about a new information technology, I would look for ways to experiment it”. Finally, perceived enjoyment was measured according to Pikkarainen et al. (2004). The item used was “using Technology Lab is pleasant.” All Cronbach's alphas were in the range between .79 and .94.

### 3.4.3 Perceived Usefulness and Perceived Ease of Use

Perceived usefulness and perceived ease of use were both measured according to a shorter version of Malhotra and Galletta (1999) who measured both constructs with 6 items. Both constructs were measured with 3 items on a seven-point Likert scale ranging from very likely to very unlikely. An example item of perceived usefulness is “I would find the Technology Lab useful in my job.” For perceived ease of use, an example item is “learning to operate Technology Lab is easy for me”. The Cronbach's Alpha for perceived usefulness was .960 and for perceived ease of use, it was .961.

### 3.4.4 Facilitating conditions

In this study facilitating conditions are defined as work overload, feedback, attitude, employee support, supervisor support, LMX, and recognition. To measure the constructs shorter versions of the original

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measurement techniques were used. Work overload was measured with two items on a five-point Likert scale based on Gashi (2014) who used eight items. An example of such an item was “I am pressured to work long hours.” Feedback and attitude were both measured with one item based on Hussein et al. (2016) who used three items for each construct. For the items, a seven-point Likert scale ranging from very little to very much was used. An example item for feedback was “The job itself provides very few clues about whether or not I am performing well. How accurate is the statement in describing your job?” and for autonomy an example item was; “How much autonomy is there in your job? That is, to what extent does your job permit you to decide on your own how to go about doing your work.” The employee support was measured according to Bacharach et al. (2005) who used Caplan et al. (1975) as a source for their questions. One item was used to measure support climate on a seven-point Likert scale ranging from extremely good to extremely bad.

The construct supervisor support was measured with four items on a seven-point Likert scale ranging from strongly agree to strongly disagree. The question was based on May et al. (2004). An example item was: “My supervisor helps me solve work-related problems.” The LMX was measured with three items all with different five-point scale ratings based on Graen and Uhl-Bien (1995). An example item was “how well does your leader understand your job problems and needs”, the answered ranged from not a bit to a great deal. The last job characteristic, recognition, was based on Cannon (2015) who measured the construct on 11 items. In this study one item was used, ranging from strongly agree to strongly disagree on a five-point liker scale. The item used was: “My supervisor appreciates how devoted I am to my job.” From all studies the mentioned Cronbach’s Alpha’s were in the range between .745 and .98.

### **3.4.5 Social influence**

Social influence was measured according to the survey, used by Kulviwat et al. (2009). In the survey, three items were used to measure social influence. They based the items on Pedersen and Nysveen (2002) who constructed the measurement to tap the norms for high tech device usage. The items were measured on a seven-point Likert scale ranging from strongly agree to strongly disagree. An example of the items used was “people important to me think I should use it.” The internal consistency proved to be sufficient with a Cronbach’s Alpha of .81 Kulviwat et al. (2009).

### **3.4.6 Attitude towards using, behavioral intention and actual use**

The constructs attitude towards using, behavioral intention and actual use were based on Malhotra and Galletta (1999). They based their items on previously validated research items as in Davis (1989) and Davis et al. (1989). Actual use was measured with one item. This item was: “how many hours do you use the Technology Lab every week?” This was measured on an interval scale per 5 hours. Second, behavioral intention was measured with four items all having a seven-point Likert scale ranging from strongly agree to strongly disagree. An example item was “I intend to use Technology Lab frequently in my job.” Third, attitude towards using was measured with four items. Each item was a word that should best fit in the sentence “all things considered, my using Technology Lab is my job is a(n) . . . idea”. Items were given on a seven-point Liker scale. Examples were in the range from extremely wise to extremely foolish and in the range from extremely harmful to extremely beneficial. Cronbach’s Alpha’s in Malhotra and Galletta (1999) for attitude were .899 and for behavioral intention .932.

## **3.5 Statistical analysis quantitative study**

Data was processed with IMB SPSS statistics 22 (Corp, 2013), AMOS software package developed by IMB (Amos, 2013) and with the Hayes process macro in SPSS (Hayes, 2012). First, data normality was estimated through the computation of descriptive statistics (means, standard deviations, unstandardized loading and standardized loading) and relationships determined through Pearson correlation coefficients ( $p \leq 0.01$ ). Internal consistencies were checked by a Crobach’s Alpha test ( $\alpha \geq .70$ )

Second, structural equation modelling (SEM) with the maximum likelihood estimator (ML) was employed to assess the model fit for both the measurement model. Based on the recommendations of Wang and Wang (2019), model fit was determined through: absolute fit indices (Chi-square and Root Mean Square Error of Approximation (RMSEA:  $< 0.08$ ). Next the model is tested with Comparative Fit Index (CFI:  $> 0.90$ ), Groningen Frailty Indicator (GFI:  $> 0.90$ ), Normed Fit Index (NFI:  $> 0.90$ ) and Bollen’s Incremental Fit Index (IFI:  $> 0.90$ )

Third, the moderating effect of personal factors was analyzed with the Process Macro tool (Hayes, 2012). A 5000 bootstrap sample and standard errors for the indirect effect assessment at the 95%

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confidence interval limit were used. The Process Macro tool gave the beta, standard error, t-value and p-value. A cutoff score for the Pearson correlation was set ( $p \leq 0.05$ ).

### **3.6 Measuring instrument qualitative study**

For the semi-structured interview with the managers, a set of predetermined questions was used to get guidance in the interviews. Some flexibility was used in case an opportunity arose to probe interesting avenues that emerged from the interview (De Vos et al., 2011). Example questions which ensured guidance in the data collection are: "How do you think that the technology lab contributes to sustainable innovation in the organization?" and "What do you think are the factors that contribute to employees' adoption or optimal utilization of the technology lab? (on an organizational and individual level)". Also in the focus groups with the employees, a set of predetermined questions was used to get guidance in the focus groups. In those focus groups there was a wider window of flexibility to let the focus group talk and gain interesting information (De Vos et al., 2011). Example questions of the focus groups are: "Could you describe what the technology lab is?" and "How do your colleagues think about the technology lab?". A complete overview of all questions of both the interviews and the focus groups can be found in appendix B.

### **3.7 Recording of the data and data analysis of the qualitative study**

For the qualitative study, all focus groups and interviews were recorded on a technical recording device and stored on an external hard drive. For the transcribing an online transcription tool, Amberscript, was used. During the transcribing process, the data was cleaned from unnecessary words (e.g. 'uhm' and '...') (Taylor-Powell and Renner, 2003). The transcripts were stored on a cloud location. Both the focus groups and interviews were transcribed into Microsoft Word documents which were later converted to Microsoft Excel documents.

The transcripts were analyzed using content analysis. According to Maree (2007), content analysis refers to the process of examining data from multiple angles whilst aiming to identify key findings that will result in understanding and interpretation of the raw data. The first step was to read through the transcript documents thoroughly to obtain a general sense of the information. Then, themes and categories were extracted by means of coding. Coding refers to separating the data into significant analytical units and classifying them. Cluster analysis was then used to group together all the similar statements that formed a category for the specific interview questions, after which themes were extracted (Taylor-Powell and Renner, 2003). The themes were then separated for each research question and the occurrences of the themes were noted, after which the themes were ranked in terms of their occurrences. The number of occurrences of themes was constructed as the sum of the number of references to categories belonging to that theme. The tables with the occurrences of the themes and categories were then used for the analysis. Within the tables, a distinction was made between the managers and employees.

## 4 Results

### 4.1 Quantitative

The first step of the analysis is focused on fitting the data to the model. To do so confirmatory factors analysis was used. In table 1 the correlations are given, and the Cronbach's Alpha coefficients are given on the diagonal. In appendix C, a complete overview is given with the unstandardized error, standardized error, mean and standard deviation. The correlations in table 2 show that most constructs are correlated with each other. Only the correlations of facilitating conditions are low and non-significant. All constructs have good internal reliability according to the Cronbach's Alpha tests since all values were above .70. The items from the original TAM (PU, PEOU, A, BI) have even higher internal reliability with all Cronbach's Alpha's above .87.

Table 2: Correlation matrix of the variables. The Cronbach's alpha per scale is rated on the diagonal.

Variable	Mean	S.D.	1	2	3	4	5	6	7	8
1. Perceived usefulness	4.45	1.23	(.94)							
2. Perceived ease of use	4.34	1.03	.48**	(.87)						
3. User predisposition	4.32	.96	.66**	.57**	(.89)					
4. Social influence	3.95	1.18	.51**	.44**	.56**	(.79)				
5. Facilitating conditions	3.75	.60	.05	.07	.09	.11	(.82)			
6. Attitude towards using	4.93	1.03	.69**	.44**	.67**	.38**	.14**	(.96)		
7. Behavioral intention	3.61	1.50	.66**	.54**	.69**	.59**	-.01	.56**	(.92)	
8. Actual use	1.77	1.33	.51**	.39**	.42**	.34**	-.08	.36**	.47**	(-)

\* correlation is significant at the 0.05 level (2-tailed)

\*\* correlation is significant at the 0.01 level (2-tailed)

#### 4.1.1 Hypotheses tests

The dataset with the observations was used to test all hypotheses. The model (except for the moderator effects) was tested with Amos statistics. The model is visualized in figure 2 and had a medium fit to the data ( $\chi^2(615)=1764$ ,  $GFI=.79$ ,  $RMSEA=0.071$ ,  $NFI=.83$ ,  $CFI=.88$ ,  $IFI=.88$ ). The RMSEA was within the cutoff score. However, the GFI, NFI, CFI and IFI were all slightly below the cutoff score. Perceived usefulness showed a strong relationship with attitude towards using ( $B=.27$ ,  $s.e.=.04$ ,  $c.r.=6.20$ ,  $p<.001$ ) as well as with behavioral intention ( $B=.54$ ,  $s.e.=.06$ ,  $c.r.=8.73$ ,  $p<.001$ ). Hypothesis 1a and 1b both addressing the influence of perceived usefulness are, therefore, both accepted. The perceived ease of use showed a strong relationship with perceived usefulness ( $B=.73$ ,  $s.e.=.07$ ,  $c.r.=10.5$ ,  $p<.001$ ) but the relationship with attitude towards using was not as expected ( $B=-.12$ ,  $s.e.=.08$ ,  $c.r.=-1.59$ ,  $p=.113$ ). Accordingly, hypothesis 2a (Perceived ease of use is positively related to the attitude towards use) was confirmed and hypothesis 2b (Perceived ease of use is positively related to perceived usefulness) was rejected. Furthermore, the attitude towards using showed a relationship with behavioral intention ( $B=.55$ ,  $s.e.=.07$ ,  $c.r.=7.56$ ,  $p<.001$ ). According to the strong relations and low p-value, hypothesis 3, that attitude towards using is positively related to behavioral intention, was accepted. Next, the behavioral intention to actual use relationship was found significant ( $B=.44$ ,  $s.e.=.04$ ,  $c.r.=10.54$ ,  $p<.001$ ). Therefore, hypothesis 4 that behavioral intention is positively related to actual use was accepted.

There was no relation found between the job characteristics and behavioral intention ( $B=-.02$ ,  $s.e.=.08$ ,  $c.r.=-.29$ ,  $p=.771$ ). Therefore, hypothesis 5a (job resources is positively related to the behavioral intention of using) and 5b (job demands is negatively related to the behavioral intention of using) was rejected. The two added antecedents (user predisposition and social influence) of attitude towards using showed both a relationship. The relation of user predisposition ( $B=.64$ ,  $s.e.=.07$ ,  $c.r.=9.49$ ,  $p<.001$ ) was significant and, therefore, hypothesis 6 is accepted. On the other hand, social influence ( $B=-.18$ ,  $s.e.=.05$ ,  $c.r.=-3.66$ ,  $p<.001$ ) turned the expectations around. Instead of a positive relation, a negative relation was found. Therefore, hypothesis 7 (Social influence is positively related to the attitude towards use) is rejected. In figure 4 a visual representation of all relations is given.

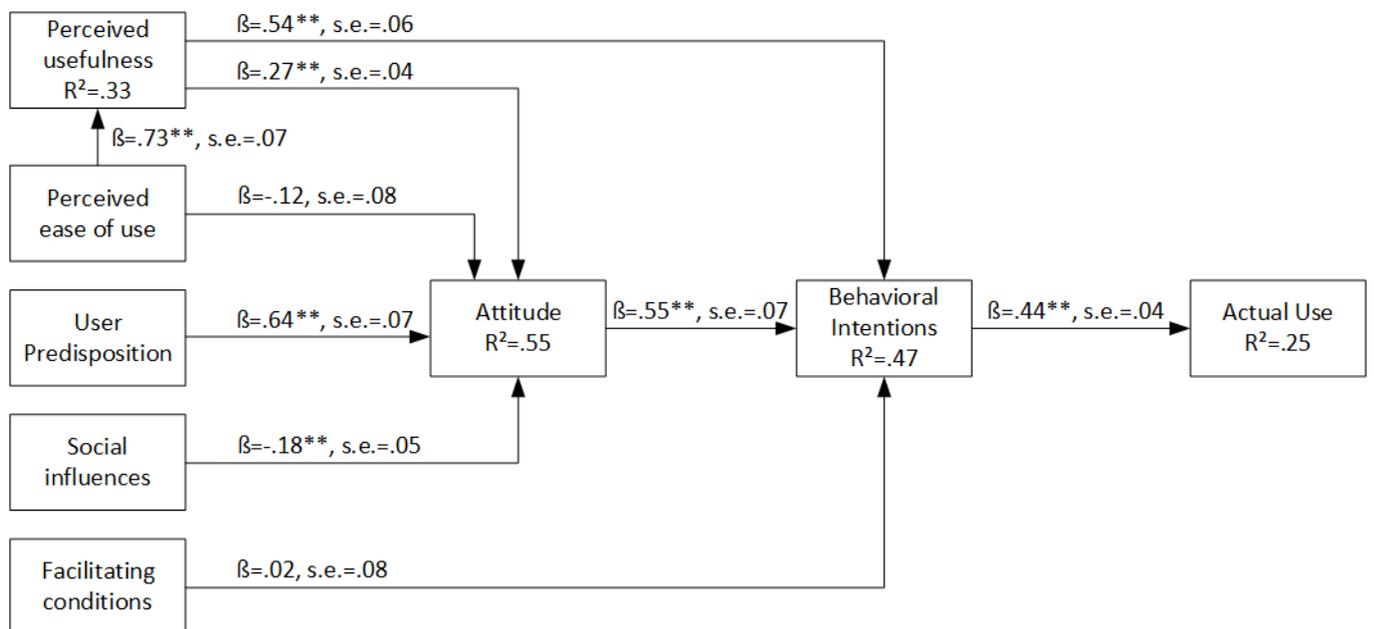


Figure 4: Overview of the research model with standardized coefficients  
 \* correlation is significant at the 0.01 level (2-tailed)

### 4.1.2 Moderator test

To examine the moderator effect of the personal factors (age, gender and educational lever) on the antecedents towards the “attitude towards using” and “behavioral intention” 18 sub-hypotheses were created. In table 3, each sub-hypothesis is listed with the beta (B), standard error (s.e.), t-value and p-value. For the analyses, a bootstrap sample of 5000 is used.

Off all the moderating effects only one turned out to be significant. The user predisposition with attitude towards using relation is moderated by educational level ( $B=.06$ ,  $s.e.=.03$ ,  $t=2.29$ ,  $p=.02$ ). Educational level was measured on a Likert scale ranging from 1 to 6, with VMBO (preparatory secondary vocational education) being the lowest and Ph.D. the highest value. Therefore, the sub-hypothesis that the user predisposition with attitude towards using is moderated by educational level is accepted. The interaction plot of this relation is presented in figure 5 According to the high p-values of all the other 17 sub hypothesis, all other sub-hypothesis were rejected. Overall, most sub-hypothesis were rejected. Therefore, hypothesis 8 which states that the relation between the antecedents and “attitude towards using” and “behavioral intention” is moderated by personal factors is rejected.

Table 3: Overview of moderation variables and their statistical values

Relation	Moderator	B	s.e.	t-value	p-value
Perceived usefulness → Behavioral intention	Age	.001	.003	.45	.65
Perceived usefulness → Behavioral intention	Gender	.06	.10	.65	.52
Perceived usefulness → Behavioral intention	Education	.04	.03	1.34	.18
Perceived usefulness → Attitude towards using	Age	.006	.005	1.22	.22
Perceived usefulness → Attitude towards using	Gender	.26	.15	1.75	.08
Perceived usefulness → Attitude towards using	Education	.007	.037	.20	.85
Perceived ease of use → Attitude towards using	Age	-.003	.004	-.72	.47
Perceived ease of use → Attitude towards using	Gender	.10	.14	.67	.50
Perceived ease of use → Attitude towards using	Education	.06	.04	1.62	.11
User predisposition → Attitude towards using	Age	.001	.003	.33	.74
User predisposition → Attitude towards using	Gender	.17	.11	1.52	.13
User predisposition → Attitude towards using	Education	.06	.03	2.29	.02
Social influence → Attitude towards using	Age	.004	.005	.87	.39
Social influence → Attitude towards using	Gender	.05	.16	.33	.74
Social influence → Attitude towards using	Education	.04	.04	.92	.36
Facilitating conditions → Behavioral intention	Age	.002	.002	1.34	.17
Facilitating conditions → Behavioral intention	Gender	-.002	.06	-.03	.98
Facilitating conditions → Behavioral intention	Education	.01	.02	.74	.46

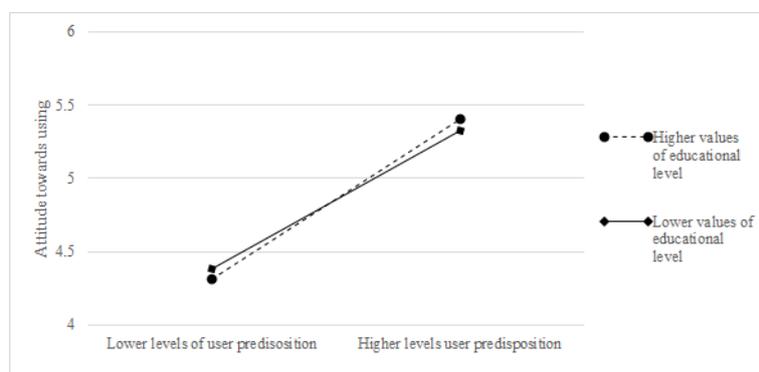


Figure 5: Interaction plot for attitude towards using versus user predisposition and educational level

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## 4.2 Qualitative

Next to the quantitative study, a qualitative study was conducted to test which antecedents were found important according to employees and managers. For the six constructs; perceived usefulness, perceived ease of use, user predisposition, social influence, facilitating conditions and personal factors the frequencies were counted from both the employees and managers perspective. Each construct is split in four categories; leader, organizational, individual and team and social. The categories specify to whom it is related. For example, the organizational category from the perceived ease of use construct represents how the organization influences the perceived ease of use. All the frequencies per category with supportive quotes can be found below in table 4. In this table, N(M) is the frequency of the managers response, N(E) is the frequency of the employees response and N(T) is the total frequency of the managers and employees combined. More detailed table with all the frequencies of the themes per category for each construct with supportive quotes are listed in appendix D.

First, the results are presented in a broad way to capture the broad findings. In total 404 counts were listed among all constructs. The perceived usefulness was counted 64 times which is 15.8% of all counts. The perceived ease of use was mentioned the least of all constructs with 5.0% of all counts. The user predisposition was the single most mentioned construct with 19.8% of the counts. Social influence had 12.4% of the total counts. The facilitating conditions was mentioned the most with 35.6% of the total counts. Finally, personal factors had 10.1% of the total count. According to the percentages, it was found that the perceived ease of use was barely mentioned. On the other hand, the facilitating conditions and user predisposition were mentioned the most. Accordingly, it was concluded that the facilitating conditions and user predisposition are the most important constructs and that the perceived ease of use was the least important construct. Next, to quantify the importance of the constructs, the qualitative study aimed to get deeper insights. On a construct level, managers and employees mentioned what they think is important for adoption of the technology lab. Accordingly, for each construct the most important items listed. For the perceived usefulness it was mentioned that championing the technology lab and lead by example are most important. For the perceived ease of use the accessibility of the technology lab was found to be most important. The user predisposition of the technology can be enhanced with enthusiastic promotion and sharing the achievements of the technology lab. The social influence should be reduced, this can be done by putting no pressure on employees. The facilitating conditions which were found important are the organizational support and the visibility of the technology lab. Finally, it was mentioned that personal factors as intrinsic motivation and curiosity are important in the adoption of the technology lab.

Second, the qualitative results are used to gain a deeper understanding of the constructs. To do so, each construct is explain from a leader, organizational, individual and team and social level point of view.

**Perceived usefulness:** For the perceived usefulness it was found that on a leader level, managers do not always know what the benefit of the technology lab is. Within the organization, people should be presented what the technology lab is doing. On a more individual level, people should be more curious to see what is happening in the technology lab and how it can be beneficial for them. From a team and social perspective, the work behavior of people influences how they value the technology lab.

**Perceived ease of use** On a individual and leader level, the perceived ease of use was not mentioned. But within the organization the technology lab should be perceived as an accessible environment. From a team and social perspective the group should be open to people and shouldn't have boundaries for people to join or not

**User predisposition:** Leaders should champion the technology lab by saying that really nice things happen in the technology lab. The organization can advertise the technology lab in an enthusiastic way. On an individual level, people have to know that the technology lab is enjoyable to work in. They have to see it as an investment in themselves. Teams that work in the technology lab are really enthusiastic which is a good thing.

**Social influence:** The social influence from a leader perspective should be motivating for employees to work in the technology lab. The higher management should participate. Also, the complete organization should emphasize the trust and involvement. On a individual and team and social level, no observations were made.

**Facilitating conditions:** Leaders can make it a big topic in meetings to work in the technology lab. By doing that, everyone is at least listening. On a individual level, people should have time to work in the technology lab. The organization can increase the time for individuals by decreasing the pressure to be billable. From a team and social point of view, people influence each other and if more people work in the technology lab, others will follow.

**Personal factors:** For personal factors, the leader and organizational factor were not mentioned. On a individual level it was mentioned that people should be curious and that it can be expected from a consultant to be curious. On a team and social level it was mentioned that people are more dedicated to the group if the groups remain small.

Overall, it is important to note that the different occurrences refer to the number of times the construct was mentioned and not to the number of participants who mentioned the theme. This includes, that if a participant mentioned the same thing twice during the interview, it was counted twice. It should be noted that the quotations provided by Dutch-speaking participants were translated into English.

Table 4: Summary of the frequencies per construct and category of the qualitative study

Construct	N (M)	N (E)	N (T)	Response
Perceived usefulness	34	30	64	
Leader	12	0	12	[MANAGER8] ‘They don’t really know what is the benefit of the TL’
Organizational	5	21	26	[FOCUS GROUP2] ‘Show people what the TechLab is doing, otherwise people just don’t know’
Individual	15	8	23	[MANAGER1] ‘As experienced people you can bring other values (...) but what’s hindering, I think, not knowing what’s really happening in the TL’
Team and Social	2	1	3	[MANAGER8] ‘The way people in the TL or the other leaders, how they behave, how they work together or like working together or dislike working together, has a major impact on how people value the TL and so therefore it’s crucial’
Perceived ease of use	8	12	20	
Leader	0	0	0	
Organizational	7	12	19	[MANAGER3] ‘I think the TL is an accessible environment’
Individual	0	0	0	
Team and Social	1	0	1	[MANAGER12] ‘The group appears very homogenous. So it’s like we are a group and that’s it. These are our boundaries. They maybe they send out the message we are enough and we don’t need anybody else’
User predisposition	59	21	80	
Leader	12	2	14	[MANAGER3] ‘By saying that there are really nice things happening in TL’
Organizational	24	13	37	[MANAGER5] ‘That helps. Enthusiastic advertising, letters about TL, mails about TL. Really advertising the TL’
Individual	8	1	9	[MANAGER5] ‘They have to see it as an investment in them-selves’
Team and Social	15	5	20	[MANAGER3] ‘The people who work there are really enthusiastic, and that is good I think’

Social influence	38	17	55	
Leader	19	9	28	[MANAGER6] 'Leadership should play a role because you have to motivate your employees to make use of it'
Organizational	19	8	27	[MANAGER2] 'So there you see that the involvement, the trust is not there yet. And I think that's the lack of participation of higher management overall'
Individual	0	0	0	
Team and Social	0	0	0	
Facilitating conditions	87	57	144	
Leader	20	2	22	[MANAGER8] 'I really made it to a big topic on one of the management meetings (...) So at least every-one was listening '
Organizational	51	53	104	[FOCUS GROUP2] 'Pressure on being billable'
Individual	8	1	9	[MANAGER9] ... 'Best is 40 hours out of 40 hours and then of course we can expect from people that they do things in their own time, innovative things, but not everything'
Team and Social	8	1	9	[MANAGER2] 'People influence each other more and more in going to the TL, yes (...) it depends where you are in the organization'
Personal factors	38	3	41	
Leader	0	0	0	
Organizational	0	0	0	
Individual	34	3	37	[MANAGER1] 'The main thing with what I see is, and this also what I expect from a consultant, that he needs to be curious'
Team and Social	4	0	4	[MANAGER5] 'The team is smaller and the team members are more willing to travel'

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## 5 Discussion

This study aimed to investigate which constructs are instrumental for employees in the adoption of the technology lab. The technology acceptance model (TAM) and extensions of the TAM were used to do so (Davis et al., 1989; Rao Hill and Troshani, 2007). From the results, it was clear that the employees' perceptions are most important in the relationship between the actual use of the technology lab. Moreover, user predisposition was found to be the most important construct in relation to the attitude towards using.

### 5.1 Summary of the findings quantitative study

The first objective of the quantitative study was to test the original TAM model. The relations of; perceived usefulness to attitude towards using, perceived usefulness to behavioral intention, attitude towards using to behavioral intention and behavioral intention to actual use were all found to be positively related to each other. This was in line with Schepers and Wetzels (2007) who did a meta-analysis on the TAM relations. Schepers and Wetzels (2007) reported 15 studies on the perceived usefulness to attitude towards relation, all of which showed a positive relation. They reported 38 studies on the perceived usefulness to behavioral intention relation, all showed a positive relation. For the attitude towards using to behavioral intention relation 14 studies were reported, all of which found a positive relation. For the behavioral intention to actual use relation 9 studies were reported, all of which showed a positive relation.

Only the positive relationship between perceived ease of use and the attitude towards using was not found in this study. This unexpected result is contrary to previous research (Davis et al., 1989; Venkatesh et al., 2003; Schepers and Wetzels, 2007). According to the meta-analysis done by Schepers and Wetzels (2007), who documented 16 studies that studied this relation, only one study did not find this relation. No clear reason for this unexpected result was found in the quantitative study.

The second objective was to test the extensions of the TAM. The TAM was extended with three more relations, namely; predisposition is positively related with attitude towards using, social influence is positively related with attitude towards using and facilitating conditions is positively related with behavioral intention. User predisposition was the first construct we extended the TAM with. The construct user predisposition showed a strong positive relationship with the attitude towards using which is in line with the hypothesis. The finding was in line with previous research (Rao Hill and Troshani, 2007).

Social influence is the second construct the TAM was extended with. In the quantitative study, a negative relationship between social influence and the attitude towards using was found. In other words, higher levels of social influence on using the technology lab experienced by employees were related to lower levels of attitude towards using. The effect is the opposite of what was expected in this study since it was hypothesized that higher levels of social influence experienced by employees would enhance the attitude towards using of those employees. The items in the survey with regards to social influence measured how much the use of the technology lab was expected from the employee by managers and coworkers. The effect that higher levels of social influence are related to lower levels of attitude towards using was similar to the study of Oreg (2006). Oreg (2006) found that employees who feel management pressure to adopt new ways of working often create negatives attitudes to that new way of working.

Facilitating conditions was the third and last construct the TAM was extended with. The facilitating conditions studied are work overload, job autonomy, job feedback, supportive climate, supervisor support, recognition and leader member exchange (LMX). No relation between the facilitating conditions and behavioral intention was found. This is contrary to previous research from Rao Hill et al. (2011) who did find a positive relationship between facilitating conditions and behavioral intention. The facilitating conditions studied did not have an impact on behavioral intention. Facilitating conditions are described as "enablers to use the technology" (Rao Hill and Troshani, 2007). There is a wide range of facilitating conditions that could influence the adoption of the technology lab. Therefore, other facilitating conditions that were not measured could have an impact on the technology lab adoption (Rao Hill and Troshani, 2007).

The third objective of the study was to determine if personal factors influence the adoption of the technology lab. In this study three personal factors were taken into consideration namely; age, gender and educational level (Sim and Koi, 2002; Hammond et al., 2011). The moderating effect of personal factors was tested on the relations: perceived usefulness, perceived ease of use, user predisposition and

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social influence to attitude towards using and on the relations: perceived usefulness and facilitating conditions to behavioral intention. On each of those relations the moderating effects of age, gender and educational level were studied. Of all the moderating effects studied, only one positive moderating effect was found. It was found that when educational level is high, the relationship between user predisposition and attitude towards use is stronger and weaker when educational level is low. Since only one of the moderating effects studied was found statistical significant, overall, the moderating effect of personal factors was not supported. Except for the one moderation effect, this was not in line with previous research in which was found that educational level has an positive effect on innovative performance (Hammond et al., 2011). For the effect of age and gender, Sim and Koi (2002) found that younger people and men are more likely to be adopters. This finding was also not in line with the findings in this study. Since the quantitative data consists mostly of older men (67% is 50 years or older and 85% are men), other groups, like young people and women, of the data were minority groups. This lack of data results in less statistical power which results in non-significant relations (Etikan et al., 2016).

## 5.2 Summary of the findings qualitative study

The objective of the qualitative study was to better understand the antecedents of the actual use of the technology lab and to relate this to the quantitative study (Newman et al., 1998). The first objective of the quantitative study was to get more insight in the perceived usefulness and perceived ease of use of the original TAM. From the results of the quantitative study, the perceived ease of use was not mentioned frequently. According to the qualitative study, from the perspective of the employees and managers, the accessibility of the technology lab enhances the perceived ease of use. Combining the quantitative and qualitative study it can be concluded that the perceived ease of use is not instrumental in the adoption of the technology lab. This is contrary to previous research such as Davis et al. (1989) who did find that perceived ease of use is important. In contrary to perceived ease of use, perceived usefulness was found to have a positive effect on the adoption of the technology lab. From the results, it was clear that most employees and managers do not know what the technology lab is doing and if the technology lab is useful for the company. Employees who know why the technology lab was useful to the company, gave more positive quotes towards the technology lab. Moreover, they recognized the potential value of the technology lab and the need to contribute in the technology lab. This is in line with the quantitative study which showed that the perceived usefulness has a positive relationship with the attitude towards using and behavioral intention. Therefore, it can be concluded that perceived usefulness is important in the adoption of the technology lab. This is in line with previous research such as Davis et al. (1989).

Next to the perceived ease of use and perceived usefulness the qualitative study was used to better understand the extensions of the TAM. User predisposition was the first construct the TAM was extended with. In the quantitative study, user predisposition was found to have a strong positive relationship with attitude towards using. This is in line with the qualitative study in which it was found that enthusiastic promotion and sharing achievements would help to enhance the perceived enjoyment and image of the technology lab which are both important factors of user predisposition (Rao Hill and Troshani, 2007). Furthermore, employees mentioned that the technology lab does not always provide the resources necessary. Ajzen and Madden (1986) found that if employees believe that resources and opportunities are provided the perceived behavioral control is enhanced. Perceived behavioral control is a person's expectancy that performance of the behavior is within his/her control (Ajzen and Madden, 1986). Higher levels of perceived behavioral control have a positive relation with user predisposition (Rao Hill and Troshani, 2007). Thus, providing enough resources will enhance the user predisposition.

According to the quantitative study, the second extension of the TAM, social influence on using the technology lab, was found to have a negative relation with the attitude towards using. The negative relationship suggests that the higher the social influence by managers and coworkers on employees to work in the technology lab, the lower the attitude towards the technology lab will be. According to the qualitative study, employees feel that they should be motivated to work in the technology lab, not that they should be pressured to work in the technology lab. Moreover, employees feel that the higher management is not supporting them. Managers stated that they feel they should take a more active part an lead by example. This is in line with previous research. According to Bandura et al. (1977), "lead by example" decreases the perceived risk of adoption and, therefore, enhances the adoption. Bhattacharjee (2000) states that leading by example of managers enhances identification of that behavior. Employees will copy that behavior accordingly, which will probably enhance the adoption of the technology lab.

The last construct the TAM was extended with is facilitating conditions. In the quantitative study, no relation was found between facilitating conditions and behavioral intentions. From the qualitative

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findings, it was clear that the facilitating conditions do affect the adoption of the technology lab. The findings showed that both managers and employees state that there is no organizational support to devote time to the technology lab because the focus is on billable hours and short-term targets. This is in line with previous research like Venkatesh et al. (2003) who stated that if individuals believe there is no infrastructure to support the system, this will negatively influence the use of the system. Furthermore, results showed that managers and employees state that the visibility of the technology labs influences the adoption of the technology lab. The organizational support and visibility of the technology lab were both not part of the survey, therefore, those findings cannot be related to the quantitative study.

The third and final objective was to determine which individual factors influence the adoption of the technology lab. In the qualitative study, no support was found for the moderating effect of age, gender and educational level on the adoption of the technology lab. In the qualitative study the age, gender and educational level were also not found to have an influence in the adoption of the technology lab. In the qualitative study, the findings showed that managers think that curiosity and intrinsic motivation of employees do influence the adoption of the technology lab. The managers also pointed out that if employees have more available time they are more likely to adopt the technology lab. The available time is something that higher management can change to enhance the adoption of the technology lab. However, curiosity, intrinsic motivation and available time to work in the technology lab were not measured in the survey.

### 5.3 Limitations and directions for future research

In the process of gathering data convenience sampling was used. Convenience sampling is a sampling method that samples people who are easy to approach (Etikan et al., 2016). In this study, people who already worked in the technology lab were found easy to approach and were found to be more likely to fill out the survey. Therefore, in the total sample of the data, the technology lab user was over-represented. An over-representation of a group in a study can mask the central issues of internal and external validity and, therefore, limits the study in the generalizability (Etikan et al., 2016). Therefore, the findings may not be used in other situations or among other people.

A second limitation is that this research was a cross-sectional study. In a cross-sectional study, only correlations and no causal relations can be identified (Lomax and Schumacker, 2004). In the case of adoption for the technology lab, a longitudinal study could be beneficial to identify causal relations. For example, it could be studied if higher levels of user predisposition now lead to higher levels of actual use in the future. Moreover, in a longitudinal study, long term changes in the constructs can be identified. This will give the company more useful insights. Future research can focus on a longitudinal study to find causal relations.

Finally, there are two more suggestions. The first suggestion is to study other facilitation conditions. The construct facilitating conditions is a broad construct that can be measured in many ways (Rao Hill and Troshani, 2007). According to interviews, organizational support and visibility are important factors which were not measured in this survey. Future research can focus on the organizational support and visibility as facilitating conditions. The second suggestion is to measure other personal factors than age, gender and educational level since no statistical support was found for those moderating effects. According to the qualitative study, the suggestion is to study the personal factors with; intrinsic motivation and curiosity. Intrinsic motivation and curiosity are both strong motivators (Al-Gahtani and King, 1999). Therefore, it is expected that higher levels of intrinsic motivation and curiosity are related to higher levels of attitude towards using and behavioral intention.

### 5.4 Managerial implications

Today, managers, as well as academics, recognize the importance of a proper adaptation of new technologies (Tai, 2006). To properly adopt the technology labs to enhance the innovation within the company, managers need to understand which antecedents are instrumental in the adoption of the technology lab (Davis et al., 1989). This study tried to identify the factors which are instrumental for the adaptation of a technology lab within an IT consultancy company.

The results of this research show that perceptions of the technology lab are important for the adoption of the technology lab. By changing the perceptions of the technology lab the attitude towards using will increase, which will lead to an increase in behavioral intention (Davis et al., 1989). Finally, an increase in behavioral intention will lead to an increase in actual use (Ajzen and Fishbein, 1977; Ajzen, 1991). To change the perceptions of the employees within Atos, user predisposition was found to have the strongest

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correlation. The strong positive relationship between the user predisposition and the attitude towards using showed that increasing the user predisposition will lead to a strong increase in the attitude towards using. The benefit for managers is that the user predisposition is an individual perception which can be changed (Weber and Weber, 2001). According to the qualitative study, the perceptions of employees can be enhanced with enthusiastic promotion and sharing the achievements of the technology lab. Within the company, the achievements can be shared with the use of digital signage, newsletters and word of mouth by managers. Digital signage can be used to show the latest achievements of the technology lab on all screens in general areas of the company. Next, a predetermined part of the weekly newsletter can be devoted to the technology lab. The predetermined part can be used to show achievements or to promote upcoming events related to the technology lab. Finally, managers can use word of mouth by spending time with their subordinates and telling them what the benefits are of working in a technology lab.

Furthermore, the perceived usefulness showed a clear positive relationship with the attitude towards using and behavioral intention. According to the qualitative study, managers can enhance the perceived usefulness by championing the technology lab and lead by example. Managers can champion the technology lab by providing the employees with information, the resources needed and removing bureaucratic barriers. Timing is important in championing the technology lab if managers wait too long with providing the information, resources and removing the bureaucratic barriers, employees lose motivation and create other intentions than using the technology lab (Thompson et al., 1994). By championing the technology and with the right timing, employees will create a positive image of the technology lab and see the value for the company of the technology lab which will enhance the actual use of the technology lab (Davis et al., 1989). The perceived usefulness can also be enhanced through the perceived ease of use. The perceived ease of use can be enhanced by improving the visibility and accessibility of the technology lab. The visibility can be improved by moving the technology lab to a central point in the office and the accessibility can be enhanced creating an open office without walls and doors. The accessibility can also be enhanced with visiting hours in which an employee of the technology lab is available to answer questions about the technology lab.

Finally, social influence was found to be important. The results of this study showed that if employees feel pressure to work in the technology lab they create a negative attitude towards the technology lab. Managers should avoid this by giving employees the freedom to choose whether they want to work in a technology lab or not. If the employees experience less pressure the social influence will decrease, according to the quantitative study, this is correlated with higher levels of attitude towards using the technology lab. Finally, this will enhance the actual use of the technology lab.

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## 7 Appendix

### 7.1 Appendix A - Survey questions

#### Survey

##### Introduction

Dear employees,

The technology lab is a place where new ideas are born and experiments with new technologies are conducted. The Technology Lab plays a critical role in resolving the digital dilemmas underpinning our 2022 journey.

As such, we want to understand how we can optimize the utility of the technology lab. Our aim is to understand how various work-related factors and individual attributes impacts the utilization of the Technology Lab.

We would therefore like to invite you to take part in a research project to help us understand how we can optimize the Technology Lab and to create a lot of exciting new ideas and technologies to revolutionize industry. The project involves the completion of a short questionnaire. We would like to ask that you kindly complete such before: XX/XX/XXXX.

The questionnaire take no longer than 10 minutes to complete. This will aid us in positioning the TechLab in such a way that it adds value to your life, our company and society. Please read the questions carefully before answering.

This survey is part of the master thesis of Max Obers and Aswin Jongsma, who are both interns at the company from the Technical University Eindhoven.

Questions If you have any questions, at any time, please don't hesitate to contact us via email. We are looking forward to joining you on this journey.

##### Personal code

In order to maintain confidentiality, we will not ask you to provide any distinctive personal information. Rather, we would like you to develop your own unique code for this research. Please complete the following questions:

What is the second letter of your first-name?

\_\_\_\_\_

What is the second letter of the city where you are born?

\_\_\_\_\_

What are the last 4 digits of your cellphone number?

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### Biographical details

Please select your gender

- Male
- Female
- Other

What is your year of birth (e.g. 1986)?

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What is your highest level of education?

- VMBO (preparatory secondary vocational education)?
- HAVO (senior general secondary education)
- VWO (university preparatory education)
- Bachelor's Degree
- Master's Degree
- Doctoral Degree (Ph.D.)
- Other \_\_\_\_\_

What is your level of English proficiency?

- Poor
- Below average
- Average
- Above average
- Excellent

What is your current level of employment?

- Employed (full-time)
- Employed (part-time)
- Intern
- Other \_\_\_\_\_

Which location is your base?

- Amstelveen
- Eindhoven
- Groningen

What is your department of employment?

- B&PS Digital
- B&PS Technology Services
- B&PS EP
- B&PS Consulting
- IDM
- BDS
- Worldline
- Unify
- Sales
- Support (HR, Finance, MarCom, Legal)
- Executive board
- Canary
- Other \_\_\_\_\_

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How many years have you worked for the company?

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### **Technology Lab**

Have you ever heard about the technology lab (TechLab)?

- Yes
- No

Do you know what the Technology Lab is?

- Yes
- No

How did you hear about the Technology Lab?

- On the site exposure
- BlueKiwi
- Social media
- Via a colleague
- Other \_\_\_\_\_

Have you ever worked on a Technology Lab project?

- Yes
- No

Do you currently work on a Technology Lab project?

- Yes
- No

Would you consider yourself:

- An active Technology Lab user
- A passive Technology Lab user
- A non- Technology Lab user

The following questions relate to the perceived ease of use. Please answer the following statements ranging from very likely to very unlikely. If you cannot answer any of the questions please fill in neither likely nor unlikely.

	Extremely likely	Moderately likely	Slightly likely	Neither likely nor unlikely	Slightly unlikely	Moderately unlikely	Extremely unlikely
Learning to operate Technology Lab is easy for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find Technology Lab easy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My interaction with Technology Lab is clear and understandable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following questions relate to the perceived usefulness. Please answer the following statements ranging from very likely to very unlikely.

	Extremely likely	Moderately likely	Slightly likely	Neither likely nor unlikely	Slightly unlikely	Moderately unlikely	Extremely unlikely
I would find Technology Lab useful in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Technology Lab in my job would increase my productivity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Technology Lab would make it easier to do my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How many hours do you believe to use the Technology Lab every week?

- <1 hour
- 1-5 hours
- 5-10 hours
- 10-15 hours
- 15-20 hours
- 20-25 hours
- >25 hours

The following questions relate to the social influence. Please answer the following statements ranging from strongly agree to strongly disagree

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
People important to me think I should use it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is expected that people like me use it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People I look up to expect me to use it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following questions relate to the behavioral intentions. Please answer the following statements ranging from strongly agree to strongly disagree.

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I intend to use the Technology Lab to communicate with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I intend to use the Technology Lab frequently in my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I intend to use the Technology Lab in doing my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I intend to use Technology Lab for planning meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following questions relate to your attitude towards using the technology lab. Please answer the following statements ranging in the given parameters. Please check your response about using the Technology Lab on the following 4 scales based upon what you think is the most appropriate response for filling in the blank is.

All things considered, using the Technology Lab in my job is a(n) \_\_\_\_\_ idea.

- Extremely foolish
- Quite foolish
- Slightly foolish
- Neither foolish nor wise
- Slightly wise
- Quite wise
- Extremely wise

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All things considered, using the Technology Lab in my job is a(n) \_\_\_\_\_ idea

- Extremely negative
- Quite negative
- Slightly negative
- Neither positive nor negative
- Slightly positive
- Quite positive
- Extremely positive

All things considered, using the Technology Lab in my job is a(n) \_\_\_\_\_ idea

- Extremely harmful
- Quite harmful
- Slightly harmful
- Neither harmful nor beneficial
- Slightly beneficial
- Quite beneficial
- Extremely beneficial

All things considered, using the Technology Lab in my job is a(n) \_\_\_\_\_ idea

- Extremely bad
- Quite bad
- Slightly bad
- Neither good nor bad
- Slightly good
- Quite good
- Extremely good

The following questions relate to user predisposition. Please answer the following statements regarding prior knowledge, ranging from strongly agree to strongly disagree.

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I do not have difficulty in explaining why adopting Technology Lab may be beneficial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the Technology Lab is compatible with all aspects of my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I heard about a new information technology, I would look for ways to experiment it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People in my organization who use the Technology Lab have more prestige than those who do not	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Technology Lab is pleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Technology Lab in my work is wise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following questions relate to job characteristics. The questions regarding job characteristics are divided is multiple construct, namely; work overload, autonomy, feedback, support climate, supportive supervisory relation and leader member exchange.

The following questions relate to Work Overload. Please answer the following statements ranging in the given parameters.

	Never	Seldom	Sometimes	Often	Always
I am pressured to work long hours	<input type="radio"/>				
I have unachievable deadlines	<input type="radio"/>				

The following questions relate to Autonomy. Please answer the following statements ranging in the given parameters.

	Very little	Little	Somewhat little	Moderate	Somewhat much	Much	Very Much
How much autonomy is there in your job? That is, to what extent does your job permit you to decide on your own how to go about doing your work?	<input type="radio"/>						

The following questions relate to Feedback. Please answer the following statements ranging in the given parameters.

	Very little	Little	Somewhat little	Moderate	Somewhat much	Much	Very Much
To what extent does doing the job itself provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing—aside from any feedback coworkers or supervisors may provide?	<input type="radio"/>						

The following questions relate to Support climate. Please answer the following statements ranging in the given parameters.

	Extremely good	Moderately good	Slightly good	Neither good nor bad	Slightly bad	Moderately bad	Extremely bad
When things get tough at work, how much can you count on your coworkers to listen, show understanding or show that they care?	<input type="radio"/>						

The following questions relate to Support climate. Please answer the following statements ranging from strongly agree to strongly disagree.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I feel my supervisor appreciates how devoted I am to my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following questions relate to supportive supervisor relations. Please answer the following statements ranging from strongly agree to strongly disagree.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
My supervisor helps me solve work-related problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor keeps informed about how employees think and feel about things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor encourages employees to participate in important decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My supervisor encourages employees to speak up when they disagree with a decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following questions relate to leader member exchange. Please answer the following statements ranging from rarely to very often

Do you know where you stand with your leader and do you usually know how satisfied your leader is with what you do?

- Rarely
- Occasionally
- Sometimes
- Fairly often
- Very often

How well does your leader understand your job problems and needs?

- Not a bit
- A little
- A fair amount
- Quite a bit
- A great deal

How well does your leader recognize your potential?

- Not at all
- A little
- Moderately
- Mostly
- Fully

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## 7.2 Appendix B - Interview questions

### 7.2.1 Interview questions managers

1. Self-Introduction
2. Purpose of the study
3. Explaining interview procedure
4. Informed consent
5. Interview
  - (a) Could you describe what the Technology Lab is and what function it plays within the company?
  - (b) How do you think that Technology Lab contributes to sustainable innovation in the company?
  - (c) How do you think that (your) leadership plays a role in the adoption of Technology Lab?
  - (d) What do you think are the factors that contribute to employees' adoption or optimal utilization of Technology Lab? (on an organizational and individual level)
  - (e) What do you think are the factors that hinder employees' adoption or optimal utilization of Technology Lab? (on an organizational and individual level)
  - (f) How do team related factors play a role in the adoption or optimal utilization of Technology Lab?
6. Stop/start/continue document
7. End of interview

### 7.2.2 Focus group questions employees

1. Self-Introduction
2. Purpose of the study
3. Explaining interview procedure
4. Informed consent
5. Interview
  - (a) Could you describe what the Technology Lab is?
  - (b) What function does the Technology Lab play within the company?
  - (c) How do you think that Technology Lab contributes to sustainable innovation in the company?
  - (d) What do you think are factors that contribute to the usage of the Technology Lab? (on an organizational and individual level)
  - (e) What do you think are factors that hinder the usage of the Technology Lab? (on an organizational and individual level)
  - (f) How do team related factors play a role in the usage of the Technology Lab?
  - (g) How do your colleagues think about the Technology Lab?
    - i. How do colleagues influence you on the Technology Lab usage?
  - (h) How does your manager think about the Technology Lab?
    - i. How do you think this influences your Technology Lab usage?
6. Stop/start/continue document
7. End of interview

### 7.3 Appendix C - Quantitative results

Item	Unstan- dardised loading	Stan- darised loading	Mean	Standard devia- tion
<b>Perceived ease of use</b>			4.34	1.03
Learning to operate Technology Lab is easy for me.	.97	.81	4.66	1.61
I find Technology Lab easy to use.	.98	.87	4.34	1.55
My interaction with Technology Lab is clear and understandable.	1.00	.80	4.33	1.61
<b>Perceived usefulness</b>			4.45	1.23
I would find Technology Lab useful in my job.	.94	.87	4.53	1.42
Using Technology Lab in my job would increase my productivity.	.97	.93	4.21	1.35
Using Technology Lab would make it easier to do my job.	1.00	.93	4.27	1.49
<b>User Predisposition</b>			4.32	.96
I do not have difficulty in explaining why adopting Technology Lab may be beneficial	.89	.64	4.31	1.66
Using the Technology Lab is compatible with all aspects of my job	1.00	.79	3.82	1.50
If I heard about a new information technology, I would look for ways to experiment it	.69	.55	4.79	1.50
People in my organization who use the Technology Lab have more prestige than those who do not	.30	.35	3.56	1.32
Using Technology Lab is pleasant	.57	.61	4.90	1.11
Using Technology Lab in my work is wise	.90	.80	4.51	1.33
<b>Social influence</b>			3.95	1.18
People important to me think I should use it.	1.00	.88	3.94	1.63
It is expected that people like me use it.	.88	.78	4.16	1.61
People I look up to expect me to use it.	.95	.90	3.75	1.51
<b>Facilitating conditions</b>			3.75	.60
I am pressured to work long hours	-.07	-.06	2.65	.96
I have unachievable deadlines	-.17	-.16	2.43	.88
How much autonomy is there in your job? That is, to what extent does your job permit you to decide on your own how to go about doing your work?	.34	.22	5.43	1.27
To what extent does doing the job itself provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing—aside from any feedback coworkers or supervisors may provide?	.44	.25	4.37	1.42
When things get tough at work, how much can you count on your coworkers to listen, show understanding or show that they care?	.50	.35	5.41	1.15
I feel my supervisor appreciates how devoted I am to my job.	.90	.78	3.74	.93
My supervisor helps me solve work-related problems.	.94	.78	3.68	.98
My supervisor keeps informed about how employees think and feel about things.	1.00	.82	3.52	.99
My supervisor encourages employees to participate in important decisions.	1.00	.81	3.55	1.00
My supervisor encourages employees to speak up when they disagree with a decision.	.99	.82	3.72	.98

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Do you know where you stand with your leader and do you usually know how satisfied your leader is with what you do?	.95	.70	3.37	1.08
How well does your leader understand your job problems and needs?	.86	.68	3.40	1.09
How well does your leader recognize your potential?	.86	.64	3.52	1.02
<b>Personal factors</b>				
Please select your gender	X	X	1.15	.37
What is your year of birth (e.g. 1986)?	X	X	1969.22	12.15
What is your highest level of education?	X	X	4.38	1.43
<b>Attitude towards using</b>				
<i>All things considered, using the Technology Lab in my job is a(n) ... idea</i>			4.93	1.03
Extremely foolish - Extremely wise	.97	.87	4.87	1.17
Extremely negative - Extremely positive	1.00	.93	4.94	1.12
Extremely harmful - Extremely beneficial	.86	.92	4.96	.98
Extremely bad - Extremely good	1.00	.96	4.94	1.10
<b>Behavioral intention</b>			3.61	1.50
I intend to use the Technology Lab to communicate with others	.92	.83	3.77	1.71
I intend to use the Technology Lab frequently in my job	1.00	.93	3.68	1.67
I intend to use the Technology Lab in doing my job	1.00	.90	3.71	1.71
I intend to use Technology Lab for planning meetings	.76	.73	3.26	1.61
<b>Actual use</b>			1.77	1.33
How many hours do you believe to use the Technology Lab every week?	X	X	1.77	1.33

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## 7.4 Appendix D - Qualitative results

Perceived usefulness

Construct	N (M)	N (E)	N (T)	Response
Leader	12	0	12	
Awareness of the nature, purpose, function and possibilities within the TL	9	0	9	[MANAGER8] 'They don't really know what is the benefit of the TL'
A tool to achieve organization's vision	3	0	3	[MANAGER6] 'Of course, you have your own targets, but you also have to look at the long term (...) I think the TL is facilitating in a long term vision'
Organizational	5	21	26	
No to little knowledge about TL	0	5	5	[FOCUS GROUP2] 'Show people what the TechLab is doing, otherwise people just don't know'
Low connection TL and rest company	0	5	5	[FOCUS GROUP5] 'Need more connection to rest of the company'
Low coordination	0	7	7	[FOCUS GROUP5] 'The guy who coordinates everything should enhance the connectivity which in the end should lead to connection on a regular base'
Projects leading to new products/services and competence development	3	0	0	[MANAGER2] 'By aligning it that you say it will lead as well to revenue. So you have an idea that will show in the end some money to the organization'
Continuity within TL	2	4	6	[MANAGER2] 'I think one of the factors is that some of these people who are actually working in the TL are there just a short term. They dive into it and then they get pulled out because they need to go to an assignment'
Individual	15	8	23	
Awareness of the nature, purpose, function and possibilities within the TL	15	8	23	[MANAGER1] 'As experienced people you can bring other values (...) but what's hindering, I think, not knowing what's really happening in the TL'
Team and Social	2	1	3	
Successes within TL	1	1	2	[MANAGER11] 'If there are successes in the TL, people get involved and get more enthusiastic than when they have to go there by themselves'
Work behavior in TL influences valuation of TL	1	0	1	[MANAGER8] 'The way people in the TL or the other leaders, how they behave, how they work together or like working together or dislike working together, has a major impact on how people value the TL and so therefore it's crucial'

Perceived ease of use

Construct	N (M)	N (E)	N (T)	Response
Leader	0	0	0	
-	-	-	-	
Organizational	7	12	19	
Creating a platform	0	3	3	[FOCUS GROUP9] 'Have a platform to work'
Easy accessible for learning	4	1	5	[MANAGER3] 'I think the TL is an accessible environment'
Accessibility of the TL	3	5	8	[MANAGER5] 'The most important one I think, and that is not a no-go, is the traveling distance (...) Then he has a traveling time of two hours and then it is difficult story'
Bureaucracy	0	3	3	[FOCUS GROUP5] 'Let technicians be technicians not bureaucrats'
Individual				
-	-	-	-	
Team and Social	1	0	1	
Openness of groups working in TL	1	0	1	[MANAGER12] 'The group appears very homogenous. So it's like we are a group and that's it. These are our boundaries. They maybe they send out the message we are enough and we don't need anybody else'

User predisposition

Construct	N (M)	N (E)	N (T)	Response
Leader	12	2	14	
Providing employees with information about TL	7	0	7	[MANAGER3] 'By informing employees what people are doing in the TL'
Promoting the nature and functions of the TL	5	2	7	[MANAGER3] 'By saying that there are really nice things happening in TL'
Organizational	24	13	37	
Promoting the functions, benefits and value of the TL	24	9	33	[MANAGER5] 'That helps. Enthusiastic advertising, letters about TL, mails about TL. Really advertising the TL'
To little communication/ amateurism	0	4	4	[FOCUS GROUP6] The TechLab is amateuristic
Individual	8	1	9	
Employee image of the TL and its activities	6	1	7	[MANGER5] 'They have to see it as an investment in themselves'
Prior experiences with TL	2	0	2	[MANGER7] 'Only those people who are physically almost seen or experienced the TL know what to use it for and when to use it'
Team and Social	15	5	20	
Enthusiasm about TL of employees	4	2	6	[MANGER5] 'The employees who manage the TL, are they enthusiast? That helps'
The presence of opinion leaders	2	1	3	[MANGER4] 'I want to think that if the role models have a role in the TL that everybody follows the role models. But, do we have role models? I don't know'
Positive ambiance around TL	5	1	6	[MANGER1] 'I also see (...) consultants like that and feel the energy and are sitting next to it'
TL as social environment (for working)	4	1	5	[MANGER4] 'At the end they know each other. And that builds team spirit, that grows by being there'

Social influence

Construct	N (M)	N (E)	N (T)	Response
Leader	19	9	28	
Encouraging Employees to Engage with the TL	10	9	19	[MANGER6] 'Leadership should play a role because you have to motivate your employees to make use of it'
Active involvement in the TL	5	0	5	[MANGER9] 'I join it (...) That's my contribution to the TL'
Lead by example	4	0	4	[MANGER6] 'Lead by example is very important'
Organizational	19	8	27	
Input from leaders, employees and customers	9	2	11	[MANGER2] 'What helps is an openness involvement. So really get people involved in the things that need to be developed'
Organizational climate and culture stimulating innovation and exploration	3	2	5	[MANGER5] 'Maybe better participation from our partners, our technology partners'
Open support and involvement of top management	4	3	7	[MANGER2] 'So there you see that the involvement, the trust is not there yet. And I think that's the lack of participation of higher management overall'
Top management belief in and recognition of value TL	3	1	4	[MANGER2] 'I think high level management is overall convinced of the impact of the TL in a positive sense'
Individual				
-	-	-	-	
Team and Social				
-	-	-	-	

Facilitating conditions

Construct	N (M)	N (E)	N (T)	Response
Leader	20	2	22	
Leader prioritization of the TL	5	2	7	[MANAGER8] 'I really made it to a big topic on one of the management meetings (...) So at least everyone was listening'
Activation of employee intrinsic motivation	7	0	7	[MANAGER9] 'In my leadership the main word is 'empowerment' and that means that when always the leaders are talking to the people to do something, it's like more a rule instead of that it is coming out of yourself'
Facilitation of employee participation	6	0	6	[MANAGER8] 'It is making sure that I give the support and the freedom to the team'
Leader openness	2	0	0	[MANAGER8] 'Is to be open, listen, explore and to invest in new ideas'

Organizational	51	53	104	
Physical visibility of TL	6	12	18	[MANAGER3] 'I don't think it is visible as a TL. There is no sign post that says "this is the TL, you have to know it'
Adaptation of TL into business processes	6	4	10	[MANAGER2] 'This could be improved by embedding the TL more into the business that we conduct on a daily basis'
Organizational support of time, education and resources	10	10	20	[MANGER4] 'What contribute are a good infrastructure and the possibilities to try (...) there must be a process or something that you get in hours what you want and not in weeks or months'
Place of TL in the organizational set up	3	0	0	[MANGER1] 'And give it a central role in developing new knowledge and also hiring people'
Platform for people	0	6	6	[FOCUS GROUP9] 'Have a platform to work in'
Inspiring TL environment	1	4	5	[MANGER5] 'Yes, an inspiring environment'
Billable hours and targets	12	12	24	[FOCUS GROUP7] 'There is no time by WBS'
High job demands for employees	6	2	8	[MANGER1] 'They have other obligations (...) So they spend their energy at other things'
Collaboration between different organizational divisions	1	0	1	[MANGERS8] 'I don't think that our other two divisions (...) are really actively working together within the TL. So I think that we need to also push more to create to get the next level'
Virtual TL environment	2	1	3	[MANGER12] ... 'The use of the TL or the facilities in in a virtual way. When you're at home, you should be able to go to the TL facilities and play around with the technologies'
Clear strategy and financial plan for TL	1	0	1	[MANGERS8] ... 'By having a clear strategy in place to know what are the competencies you want to build up and secondly build a financial plan against it'
Long term vision on investments	1	0	1	[MANGERS8] 'We need to know clearly where we want to invest before we then can take the time and the agreements for people to spend that time on training or spend the time on TL. It will not materialize directly into revenue or profit in the next month'
Formal and Informal rewarding and recognition for advancing innovation	2	2	4	[MANGER7] 'There is no pressure, no incentive currently to send people to the TL and to participate'
Individual	8	1	9	
Available time of employee	8	1	9	[MANGER4] ... 'Best is 40 hours out of 40 hours and then of course we can expect from people that they do things in their own time, innovative things, but not everything'
Team and Social	8	1	9	
Mutual communication	5	0	5	[MANGER2] 'People influence each other more and more in going to the TL, yes (...) it depends where you are in the organization'
The climate within teams	3	1	4	[MANGER2] 'So on the moment that you are working in a team or I'm working in a team or work together with the TL, my behavior is of influence of the team behavior'

Personal Factors

Construct	N (M)	N (E)	N (T)	Response
Leader				
-	-	-	-	
Organizational				
-	-	-	-	
Individual	34	3	37	
Intrinsic motivation	11	2	13	[MANGER3] 'You can try to make employees enthusiastic about the TL without bringing it as an obligation'
Curiosity	11	0	11	[MANGER1] 'The main thing with what I see is, and this also what I expect from a consultant, that he needs to be curious'
Age of employee	2	1	3	[MANGER10] 'The older generation doesn't have the connection anymore'
Family situation of employee	1	0	1	[MANGER5] 'If you can go to the TL, that is then at the end of the day, however, if your family situation does not allow that, then it will be a hindering factor'
Affection and experiences with technologies	5	0	5	[MANGER9] 'I think that the more functional people or (...) managers are less interested in that because it is called 'technology' in that sense'
Capability of keeping up with innovation	2	0	2	[MANGER1] 'So learning and discovering need to be a process like cycling. You have to keep it up. So young people are still in the learning mode, old people stopped somewhere because they got children or something else. It's difficult to get them in that mode again'
Self confidence	2	0	2	[MANGER1] 'The fear of feeling not good enough is hindering people from going to the TL'
Team and Social	4	0	4	
Age gap between members of teams TL and employee	2	0	2	[MANGER1] 'At this moment it is really young and happening and I see that some of my older consultants have some difficulties with that'
Composition of teams	2	0	2	[MANGER5] 'The team is smaller and the team members are more willing to travel'