

Improvement of the current Service Level Agreement of Denko-ICT



Stijn Korfage

Graduation Thesis

September 2023



I Research information

Title

Improvement of the current Service Level Agreement of Denko-ICT

Company

Denko – ICT

Eekboerstraat 28b

7575 AX, Oldenzaal

Author

Stijn Korfage

S2615606

s.a.korfage@student.utwente.nl

Bachelor program

Industrial Engineering and Management

Institute

University of Twente

Drienerlolaan 5

7522 NB Enschede

Supervisor of Denko

Dr. H. Beernink

Security Officer

Supervisors of University

Dr. Ir. E.A. Lalla-Ruiz (First supervisor)

Dr. M.N. Reuter-Oppermaann (Second supervisor)

II Preface

Dear reader,

You are currently seeing the report I wrote for my Industrial Engineering and Management bachelor's thesis at the University of Twente. The research has been carried out at Denko-ICT, an ICT company that is located in Oldenzaal, The Netherlands. The goal of this thesis is to improve the current Service Level Agreement(SLA).

I am appreciative of all the support I received and the opportunities that were handed to me. Denko gave me the chance to carry out my research and to pick up some professional experience. I would like to express my gratitude to everyone at Denko for taking the time to assist me and for allowing me to understand what it is like to work with the Denko team. I want to express my gratitude to Harald Beernink in particular for serving as my supervisor and putting in many hours to support me and my study.

I also got assistance from the university. I would like to thank Eduardo Lalla for serving as my first supervisor. Along with receiving a ton of insightful criticism, I also found it to be quite helpful to discuss the issues I was running into with my study and to get help with determining the next steps. Additionally, I want to thank Melanie Reuter for serving as my second supervisor and taking the time to provide me with feedback on my work.

Lastly, I would like to thank all people around me that supported me during the time of this research.

Enjoy your time reading this thesis!

Stijn Korfage

September 2023

III Management summary

This research has been conducted at Denko in Oldenzaal. Denko was started in 2001 with the reparation of computers and electronica. Later Denko grew into a powerful Information Communication Technology (ICT) company. The company kept growing and more staff joined the company. In 2009 Denko found a new location, because the old location was too small for all the staff and services they provided. They sell software and hardware to their customers, and Denko also maintains these software and hardware. Examples of hardware are printers, monitors, workstations, routers, etc. Examples of software are online storage, Office 365, VoIP services, etc. The company is mainly focused on customers in the Netherlands, and at the moment the team of Denko consists of around 20 staff members of a mix of experienced and young talent.

In today's ICT environment, the security of information, standard procedures, and agreements between companies and customers have become more and more important. It is indicated that Denko did not have clear and up-to-date agreements about their service levels. These agreements are stated in a so-called Service Level Agreement (SLA). Denko made use of one standard SLA. This SLA was used for every customer, and also for every software and hardware the customers have from Denko. These not clear and outdated agreements caused that there occurred communication errors between the company and customers and also internally at Denko. Another issue that was the result of having a not clear and outdated SLA, is that the SLA could not be reported and monitored to the customers of Denko and the management of Denko. To solve this problem, this research focused on how the SLA of Denko could be (re-)designed in order to improve communication and increase customer satisfaction. So, the main research question covered by this thesis is expressed as follows:

How can Denko improve its SLA, to increase customer satisfaction and improve communication with customers and internal communication within the company?

To understand the current situation at Denko better, there is executed a context analysis. With the help of the company analysis, stating the restrictions that the SLA had to meet according to Denko, and the conducting of a survey, we were able to create better insights into the current situation. With the help of the survey, we were able to get more insights into what the customers opinions are about the current SLA. We also got more insights into what the customers needs are (in terms of what kind of agreements to include in an SLA) and what they expect from an SLA. By analyzing these answers from the customers, we were able to state the possible improvement points.

After conducting the context analysis, a literature review was executed to find techniques that are used to improve the design of an SLA. We need to know which methods were available in order to design the new SLA(s) as best as possible for the situation at Denko. Two design techniques were evaluated: The template/framework of Huai (2010) and the second one is the Enhanced Deep Reinforcement Learning Agent (EDRLA) model of Edinat et al (2021b). The template/framework of Huai (2010) was selected as the design technique to be applied in this research.

To solve the problem at Denko, we designed three new SLAs. These SLAs are called: SLA bronze, SLA silver, and SLA gold. The SLA bronze is the standard SLA that a customer gets and when the customer wants to have an SLA silver or gold, an extra payment has to be made. These SLAs exist out of three new parts: The added and adapted aspects, the use of configuration items, and the use of the client portal.

The solution design of this thesis is evaluated using the technique known as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The new SLAs increase customer satisfaction, and also the communication with the customers and communication internally at Denko

improves when using the new SLAs constantly and correctly according to our evaluation. The new SLAs scored for the construct 'performance expectancy' an average score of 4,25 out of 5. Within this construct the change in communication and customer satisfaction after the implementation of the new SLAs is also evaluated. So it is agreed on that the implementation of the new SLAs will have a positive influence on the performance at work, and on the communication and customer satisfaction.

How the new SLAs can be implemented into the current system of Denko is also included in this research. This means the implementation of: The added and adapted aspects, the configuration items, and the client portals.

Based on the performed research, recommendations are made for Denko. The main recommendations are as follows:

- Attach a price to the SLA silver and the SLA gold. The attaching of a price to the SLAs silver and gold was out of the scope of this thesis.
- Organize a meeting when all staff members of Denko are available. In this meeting, the new SLAs need to be explained, and also the way Denko is going to work with the SLAs needs to be explained.
- The staff members from sales at Denko need to stimulate the customers with the use of SLAs after the meeting that is discussed in the previous points.
- For the staff members internally, we specifically recommend using the ticket & task statuses and the configuration items constantly and correctly.
- Another recommendation for the staff members who work in the 1st line is to correctly write the cause, resolution plan, and solution in the ticket.
- The last recommendation for Denko is to report and monitor constantly the SLAs.

Contents

- 1. Introduction..... 8
 - 1.1 Company description..... 8
 - 1.2 Service Level Agreement 8
 - 1.3 Problem context 8
 - 1.4 Problem cluster 9
 - 1.5 Research methodology..... 10
 - 1.5.1 MPSM and research cycle 10
 - 1.5.2 Research questions..... 11
- 2. Context analysis..... 13
 - 2.1 Company analysis 13
 - 2.2 Current SLA..... 13
 - 2.3 Constraints from Denko 15
 - 2.4 Survey 16
 - 2.4.1 Survey’s setup..... 16
 - 2.4.2 The questions 16
 - 2.4.3 Results and insights 17
 - 2.5 Conclusion 20
- 3. Literature review 21
 - 3.1 Service Level Agreement 21
 - 3.2 Structure of a Service Level Agreement 21
 - 3.3 Design of a Service Level Agreement 22
 - 3.4 Quality of Service parameters 22
 - 3.5 EDRLA Model 23
 - 3.6 Conclusion 24
- 4. Solution design 25
 - 4.1 Requirements of our new SLA(s) 25
 - 4.2 Solution generation 26
 - 4.3 Meeting with Denko 28
 - 4.4 Final solution 29
 - 4.4.1 Added and adapted aspects 31
 - 4.4.2 Configuration item 34
 - 4.4.3 Client portal..... 35
 - 4.5 Conclusion 36

5. Solution evaluation.....	37
5.1 Workload change after implementation.....	37
5.2 Evaluation of the improved SLAs.....	38
5.2.1 Unified Theory of Acceptance and Use of Technology	38
5.2.2 The evaluation survey	39
5.2.3 Evaluation results	39
5.3 Conclusion	42
6. Conclusion	43
6.1 Main conclusion	43
6.2 Recommendation	44
6.3 Limitations.....	44
6.4 Future research	45
Reference list.....	46
Appendix.....	50
Appendix 1- MPSM Steps	50
Appendix 2 – Invitation for the survey (In Dutch).....	52
Appendix 3 - The complete survey (In Dutch).....	53
Appendix 4 – Contacted companies for survey.....	56
Appendix 5 - The survey questions with goals	57
Appendix 6 – Results of the survey	60
Appendix 7 - Systematic Literature Review.....	65
Appendix 8 – Final Design of the SLA (Bronze).....	69
Appendix 9 – Implementation of the solution	83
A. - 9.1 Implementation of the SLAs.....	83
A– 9.2 Implementation of the configuration items.....	86
A. - 9.3 Implementation of client portal.....	87
A. - 9.4 Implementation towards customers.....	88
Appendix 10 – The questions for the evaluation survey.....	90

1. Introduction

1.1 Company description

The company where the thesis is conducted is Denko. Denko is located in Oldenzaal and started in 2001 with the reparation of computers and electronica. Later Denko grew into a powerful ICT company. The company kept growing and more staff joined the company. In 2009 Denko found a new location, because the old location was too small for all the staff and services they provided. At the moment Denko consists of a skilled team of around 20 people of a mix of experienced and young talent. Denko has put itself on the map by thinking ahead and being innovative especially in Twente over the past 20 years. Denko works from a passion to offer great solutions in the field of home automation, ICT, and telecom to the latest trends and developments.

1.2 Service Level Agreement

Having more knowledge about what a Service Level Agreement (SLA) is will result in a better understanding of the project. So, an SLA is a contract between a service provider and their clients. It outlines the standard of service that a customer expects from a supplier. The most typical SLA requirement is that the customer receives the services in accordance with the terms of the contract. Within the process of addressing a ticket from a customer, the SLA has a role. The SLA determines where in the queue the ticket of a customer will be placed and how much time Denko has to solve the problem. Currently, at Denko this is only based on how much impact the problem has on the company where the problem occurred. In Figure 1 the process of how Denko addresses a ticket is shown. In this figure there can be seen where an SLA influences this process, this is to give a better insight into what an SLA is and the kind of impact an SLA has.

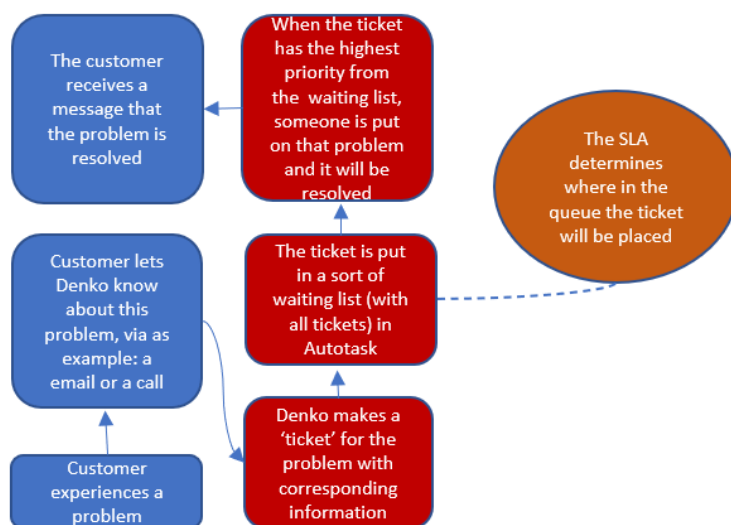


Figure 1 – The process of how Denko addresses a ticket

1.3 Problem context

Denko has one general SLA for all their customers that has not been changed in quite some years. The result of keeping the SLA not up to date over the years is that the SLA is now outdated. Agreements are included in the SLA that do not make any sense anymore. The consequence of that is that the SLA cannot be reported and monitored to the customers of Denko and the management of Denko. The agreements are unclear for customers and the management of Denko which cause communication

errors between the company and customers and also internally at Denko. An internal example is that certain staff members are informed differently about the amount of time that Denko has to solve a problem from a customer. This causes a discussion between the staff members about what the correct amount of time is that Denko has to solve the problem. These communication errors result in the action problem of this project which is that it takes extra time and effort for Denko when discussing agreements (that are included in the SLA) with customers and internally at Denko. This is time that a company does not want to use for conversations like this, it is just wasted time. These unnecessary conversations could be prevented by having a clear and up-to-date SLA. The reality of this action problem is that there is time and effort lost at Denko, because of an outdated and unclear SLA. The norm of the action problem would be that there is not any time or effort lost at Denko, because the management and customers of Denko have a good understanding of the clear SLA. The communication errors between Denko and customers together with the fact that the current SLA does not meet the current needs of some customers, causes that the customers are less satisfied with the services that Denko provides. This problem must also be taken into account when doing this project, because possibilities for an increase in customer satisfaction must always be taken into consideration.

1.4 Problem cluster

With the help of the problem context and writing down the problems that are present at Denko, the problem cluster is made (see Figure 2) to give a better insight into the problems at Denko. From this problem cluster, it has become known what the core problem is. The core problem is that 'There is only one SLA that Denko refers back to all customers for all services and products.' This SLA does not fit every customer and not every product/service Denko provides to their customers. This problem is also the starting point from the problem cluster. Denko introduced only one SLA a time ago and they use this SLA for every consumer and service they have/offer. This SLA is not changed or expanded in quite some years. As can be seen in the problem cluster, causes the outdating of the SLA three problems: The SLA no longer meets the needs of the customer, there is no different SLA for more important customers or services/products and the agreements that are made with the customers are sometimes unclear for customers themselves and management from Denko. The unclarity comes from that the agreements that are stated in the current SLA do not have any impact in some cases. So, in some cases, the company and/or the customer do not know what they have agreed on together. This results in difficult conversations internally at Denko and between Denko and the customer, about what is agreed upon between the company and the customer. Eventually, this will lead to the action problem of this project: It takes extra time and effort when discussing agreements with the customer and internally at Denko, because Denko cannot easily refer back to the SLA.



Figure 2 – An overview of the problem cluster at Denko

1.5 Research methodology

This chapter provides more information about how the problem at Denko is going to be tackled. It includes: How the MPSM is going to guide the project in Section 1.5.1 and the research questions that need to be answered to solve the problem of this project in Section 1.5.2.

1.5.1 MPSM and research cycle

The Managerial Problem Solving Method (MPSM), according to Heerkens and Winston (2017), together with the research cycle is used to guide the project. The MPSM is a method that consists of seven steps from problem identification to solution evaluation. It helps to get an idea of how to approach the problem. When the researcher is in a step of the MPSM cycle and there is missing information to correctly do this step, then there can be made use of the research cycle. The research cycle guides the process of finding the missing information. Every step of how the MPSM is going to guide this project is explained in Appendix 1.

1.5.2 Research questions

In order to solve the problem at Denko, the main research question has to be answered, which is:

How can Denko improve its SLA, to increase customer satisfaction and improve communication with customers and internal communication within the company?

The main goal of this research is to find a way to improve the current SLA that Denko uses at the moment. It happens in some cases that the customer is not quite informed about what types of agreements they have made with Denko. Which causes communication errors between Denko and the customer. Internally at Denko, there can also occur communication errors between staff members. Certain staff members can be informed differently about the agreements that are made with the customer. These errors result in time-consuming conversations or meetings and lower customer satisfaction. Another reason for the lower customer satisfaction is that the current SLA does not meet the needs of some customers.

Some research (sub) questions have to be answered, in order to solve the main research question:

- Context analysis

1. *How do the different agreements of the current SLA influence the relationship between Denko and the customer?*

We are interested in knowing what the opinions are of the customers about the current SLA. Getting information about what they think are positive and negative aspects of the agreements that are currently stated in the SLA. The result will be that we get insights into where certain improvements are possible and which type of agreements are liked by the customers. This will be investigated by sending a survey to certain customers, where questions will be asked about the current SLA.

2. *Considering the customer needs, what aspects need to be included in the new SLA(s)?*

In this research question, we are interested in knowing what the customers' needs are (in terms of what kind of agreements to include in an SLA) and what they expect from an SLA, because in the end their opinion also influences how the current SLA is going to change. This will be investigated at the same time as research (sub) question 1, so within the survey, questions will also be asked about the needs of certain customers. This will result in insights into what the customers expect from (a) new SLA(s) and what they think is important to include in (a) new SLA(s).

- Literature review

3. *What are known techniques that improve the design of an SLA?*

This question is about getting insight into what are known techniques that are used to improve the design of an SLA. These techniques can be interesting to improve/change our design of the SLA at Denko. These techniques will be analyzed to see what aspects of the techniques can be helpful and what aspects of the techniques will not have a positive influence on the current situation at Denko. These techniques will be found by doing a literature review.

- Solution design

4. *Taking into consideration the current SLA and the new insights, how should the new SLA(s) be designed?*

This stage is about improving the current SLA, we have to make certain changes to the current design of the SLA and possibly add new aspects. The decisions will be based on new insights that we made in the context analysis and literature review.

- Solution evaluation

5. *How can the solution (the improved SLA) be implemented in Autotask?*

We are interested in knowing how to develop and implement the new SLA(s) in Autotask, since the new SLA(s) need to be implemented in this program. This stage will include the making of the new SLA(s) with its/their corresponding aspects in Autotask.

6. *Taking into account the new design of the SLA(s), how will the amount of work for staff members that solve the 'tickets' change?*

In this research question, we are interested in evaluating the solution design in terms of how the amount of work will change for staff members that solve the tickets. It is important to see what is achievable for Denko because Denko can agree on (a) certain SLA(s), but it does not make sense if Denko cannot verify these agreements. This evaluation will be done by analyzing what kind of influence the agreements in the new SLA(s) will have on the staff members that solve the tickets.

7. *How are customer satisfaction and communication changed after the implementation of the improved SLA?*

Since in the main research question is stated that we want to increase customer satisfaction and communication, we want to get insights into whether this has been achieved or not after the implementation of the improved SLA. This will be analyzed through the comparison of the situation before the SLA change and the situation after the SLA change. For this evaluation, a scientific approach will be used together with a survey.

- Recommendations and conclusions

8. *What conclusions and recommendations can be made from conducting this thesis at Denko?*

This question is about giving conclusions and recommendations to the company. This is also what the company is most curious about and most interested in. The conclusions and recommendations will be given in Section 6.

2. Context analysis

This chapter contains the context analysis of the company. This is done by answering the first two research questions.

- 1- *How do the different agreements of the current SLA influence the relationship between Denko and the customer?*
- 2- *Considering the customer needs, what aspects need to be included in the new SLA(s)?*

These questions are answered with the help of a survey, this survey is conducted with a number of customers from Denko. In Section 2.1 there is given firstly some more context about Denko and also with regard to their customers. In Section 2.2 there is given an overview of parts of the current SLA of Denko. In Section 2.3 there will be given the constraints to the (re-) design of the new SLA(s) according to Denko. In Section 2.4 there is given information about the conducting, the questions, and the answers of the survey.

2.1 Company analysis

Denko is an ICT company that provides software and hardware to its customers. Denko wants to provide high quality software and hardware to their clients to have high customer satisfaction and of course, also want to be profitable. Being and staying a profitable company is the most important factor to keep a business 'alive.' Examples of software that Denko provides to its customers are: Online storage and backup, Office 365, VoIP services, connections, and cloud-based services. And examples of hardware that Denko provides to its customers are: Backups, monitors, computers (components), headsets, smartphones, routers, and printers. The customers of Denko are very different in size, there are big customers that for example are very dependent on the software/hardware of Denko. Also, some small customers only have 1 or 2 software/hardware from Denko. Denko not only sells this software/hardware to their customers, but also provide the service to their customer when a customer makes a complaint about something that is not working (probably), then Denko has to help this customer and come up with a solution to solve this problem. The people in the so-called first and second line are the people within the company that help these customers with their problems. Denko also provides maintenance to some customers, if they want to make use of this service.

When a customer has something that is not working (probably), then this person always wants to have his problem solved as fast as possible. But for Denko, it is not possible to help every customer directly, because they simply do not have the number of staff for that. Denko can structure for themselves with the help of an SLA how much time they have to solve a problem, in which order customers need to be helped, and also to give customers insight into how long it can take before they receive a solution. The result of a clear SLA is then also that the customers are informed of how certain problems will be tackled and when they can expect a reaction from Denko. So in short, the monitoring and reporting of the SLA. Denko does not take advantage of these benefits these days, this is also the reason Denko wants to have an improved SLA.

2.2 Current SLA

In this section, some parts of the SLA that Denko currently is using are explained. An explanation of what kind of influence some parts have on the current situation is also added in this section. This is to get a main idea of how the current SLA is looking and to get insights into the current situation. The parts will be explained per article, because the current SLA is divided into eight different articles. Not every article will be addressed in this section, because some articles do not influence the current situation at Denko.

Article 1. Nature, content and duration of the agreement

In Article 1.7 from the current SLA, it is explained that there are no additional costs associated with this SLA from Denko. In today's ICT environment, a lot of money is made from offering SLAs to the customer. In most cases, an ICT company offers multiple SLAs to their customers, and the better the services offered in the SLA the more the customers have to pay. Denko associates no additional costs with their SLA, so they miss out on quite a bit of money.

Article 3. Priority levels and error handling

In Figure 3 (Article 3.2 from the current SLA), the four different priority levels are explained with a small explanation about the priority levels (in Dutch). The small explanation of the priorities together with to less of knowledge about the problem, causes that the staff members of Denko in most cases not know what priority to connect to the problem of the customer. The effect is that the staff members choose priority 'Normal' for a ticket when they do not know what priority to connect to the problem. When the staff members of Denko choose in almost every case the priority 'Normal', the positive effects of having and using different priorities for problems will have no influence.

3.2. De Fouten, mits vatbaar voor verdere behandeling door Opdrachtnemer, worden ingedeeld in de volgende prioriteitsniveaus:

Niveau	Omschrijving	Toelichting
1	Critical	Het geheel niet beschikbaar zijn van de Dienst.
2	High	Gedeeltelijk onderbroken / verminderde prestatie van de Dienst.
3	Normal	Problemen met relatief storende gevolgen voor Opdrachtgever.
4	Low	Fouten die niet direct storend zijn voor de Opdrachtgever.

Het prioriteitsniveau wordt redelijkerwijs, naar aanleiding van de melding door Opdrachtgever, bepaald door de supportmedewerker van Opdrachtnemer, die de Fout in behandeling neemt.

Figure 3 – The four different priority levels from the current SLA

In Figure 4 (Article 3.3 from the current SLA), the four different priority levels are stated with the corresponding reaction and resolve times (in Dutch). The times are outdated, the times are not changed in quite some years. The ICT environment is changing very quickly, so as an ICT company you also have to keep up with the trends in the ICT environment. The problem that the staff members do not know what priority to connect to a problem, has also influence on the communication. It can be the case that certain staff members are different informed about the priority of a problem, which causes that these staff members are also different informed about the time they have to solve the problem. This can cause different types of communication errors.

3.3. In onderstaande kolom wordt de inspanningsverplichting van Opdrachtnemer weergegeven bij het omgaan met Fouten, per prioriteitsniveau:

Prioriteitsniveau	Reactietijd*	Hersteltijd*
1	8 Business Hours	24 Business Hours
2	8 Business Hours	28 Business Hours
3	8 Business Hours	32 Business Hours
4	8 Business Hours	36 Business Hours

*Er mag maximaal 10% worden afgeweken.

Figure 4 – The priorities with their corresponding reaction and solve times from the current SLA

In Article 3.4 from the current SLA, it is explained that Denko has to provide the customer within 8 business hours by e-mail with the priority of the problem. It is also stated that Denko has to provide the customer by e-mail or via telephone with the cause and solution of the problem within the resolve time.

Article 4. Availability

In article 4.1 from the current SLA, it is explained that Denko aims at achieving an availability of 99.8% throughout the year. In the current SLA available means that the service can be accessed and used by the provider. Not included are malfunctions of the connections and/or equipment that are beyond the control of the contractor, including the connection and/or equipment of the client itself.

Article 8. Definitions

In Article 8.k from the current SLA, it is explained that a workday at Denko is from 08:30 – 18:00. This is also outdated, because nowadays a workday at Denko is from 08:30 – 17:00. This can cause problems if there is a discussion with the customer about the business hours of Denko.

2.3 Constraints from Denko

In this section, the constraints that the new SLA(s) must meet to be implemented are explained. These constraints are obtained together with Denko's supervisor. When these constraints are not met, then the SLA will probably not be implemented.

- The agreements that will be stated in the new SLA(s), need to be able to be implemented in Autotask. As explained earlier, Autotask is the application that Denko uses for its ticketing system and its dashboards. Most of the things can be implemented in Autotask, but not everything is possible or is out of the scope of this thesis. The new SLA(s) must be able to be implemented in Autotask, because Denko needs to be able to report and monitor the SLA in Autotask.
- The agreements that will be stated in the new SLA(s), need to be achievable for Denko. The meaning of this is that Denko needs to be able to fulfill the agreements that are stated in the new SLA(s). It cannot be the case that Denko provides a new SLA to their customers and that they cannot fulfill these agreements that are made between the customer and Denko. This would also not be good for the customer satisfaction, because the customer then expects certain services from Denko, but then these expectations will be little or not satisfied at all.
- Denko also has suppliers for certain services that Denko provides to its customers, so this means that Denko is sometimes dependent on its suppliers. These suppliers also have an SLA with Denko. This means that it should not be possible for the SLA of the suppliers to ensure that agreements that Denko has made with its customers cannot be met. So for example, Denko cannot include in their SLA that they give a solution to their customer within 4 hours, if the dependent supplier of Denko has included in their SLA that they give a solution within 8 hours. Then the supplier of Denko may provide a solution in 8 hours, but then the 4 hours that is agreed on with the customer of Denko is already 4 hours exceeded. So when designing the agreements in the new SLA(s), there has to be checked whether this/these SLA(s) is/are possible with regards to the SLAs that suppliers of Denko have with them.
- The agreements that will be stated in the new SLA (s), need to have a positive influence on both the customers and Denko. This is the goal that we are aiming for, that both the customer and Denko will benefit from the improved SLA.

2.4 Survey

2.4.1 Survey's setup

In this section, we explain the setup of the survey. So such things as the goal, form, and sample of the survey are explained.

The survey that is conducted is made in Autotask, which is also the application that Denko uses for its ticketing system and its dashboards. So, the survey was an online survey. The questions that are stated in the survey are in Dutch, because most of the customers have too little knowledge about the English language. When the survey was made, the sample of the survey had to be picked. The researcher received an overview of the customers and how much revenue they have generated in the last 1.5 years (Jan 2022 – Jun 203) for Denko. The sample was chosen based on the revenue that the customer generated in that period for Denko. The 24 customers that generated the most revenue in the period of Jan 2022 – June 2023 were selected, together with 17 smaller customers (see Appendix 4 for the companies that were contacted). These smaller customers were included in the sample to get a more diverse sample group. When these customers were chosen, a contact person for this company was picked. Together with Denko's supervisor the contact persons were selected from these companies, because the persons to whom the survey is sent need to have knowledge about SLAs and tickets. When all the contact persons were selected, the survey (see Appendix 3) was sent to them in an email with the URL link to the survey (see Appendix 2).

The goal of conducting the survey is to get insights into the opinion of the customer. The opinion of the customer is important to take into account, because we also want to increase customer satisfaction with this project and if the goal of the project is to increase customer satisfaction it is helpful to include the customers in the research. So we need to receive certain information from the customer about Denko in general, the current SLA, the current performance of Denko, and their opinion about including or excluding certain agreements in an SLA. With this information, we can answer the first two research (sub) questions.

2.4.2 The questions

In this section, there is given an overview of what type of questions we have asked the customers (see Table 1). The whole list of 11 questions that are asked with their corresponding goals can be found in Appendix 5.

	Answer: Scale 1-5	Answer: Open	Subject of the question
Question 1	X		Services of Denko
Question 2	X		Communication in general
Question 3	X	X	Communication of tickets
Question 4	X	X	Insight in performance indicators
Question 5	X		Miscommunications
Question 6		X	Priorities of tickets
Question 7		X	Response and solving time of tickets
Question 8		X	Extra payment
Question 9		X	Hardware and software
Question 10		X	Having of more insights
Question 11		X	Additional agreements

Table 1 – Overview of the questions in the survey

2.4.3 Results and insights

After a waiting time of two weeks, a total of 9 people completed the survey. Due to the limited time of this thesis, there is not waited for a longer period. The complete answers of the nine customers are stated in Appendix 6 translated into English. In Section 2.4.3.1, a table is given for questions 1 up to 5, with the answers given and the interpretation of these answers. In Section 2.4.3.2, a table is given for questions 6 up to 11, with the answers given and the interpretation of these answers.

2.4.3.1 Question 1 up to 5

As could be seen in Table 1, the first five questions can be answered on a scale from 1 up to 5, and questions 3 and 4 could also be answered with open answers. In Table 2 the questions together with the answers that are given to these questions can be seen. Also what we can interpret/conclude from the given answers is provided in Table 2.

Question	Answers	Mean	Interpretation
1. How satisfied are you with the services that Denko provides you with in general?	2-3-4-4-4-4-4-4-5	3.778	The customers are in general satisfied with the services that Denko provides. There is only one outlier that is not satisfied with the services that Denko provides.
2. How satisfied are you with the communication between you and Denko in general?	2-2-3-3-3-3-4-4-4-5	3.333	The customers are in general satisfied with the communication, but the score is not as high as in question 1. The answer is almost an average score of 3, so there are improvement possibilities in the communication between the customer and Denko.
3. How satisfied are you with the amount and manner in which you get informed about the status of a ticket? And why?	2-2-3-3-3-3-4-4-4-4	3.222	The customers are in general satisfied with the information about the status, but there are given some interesting points where improvements are possible: <ul style="list-style-type: none"> “We do not really read the tickets because there is little useful information in them” “I do not think the feedback is always sufficient. It sometimes remains open-ended. In addition, I find the ticket system does not always clearly show how it is solved”
4. How satisfied are you with the insights that you get into how Denko performs, for example, if you get insight into certain KPIs from Denko? Why?	1-1-1-1-1-1-1-1-3-4	1.556	The main conclusion of this question is that the customer does not have any insight into some performance indicators of Denko. They do not receive any report that for example shows how fast a ticket on average is solved at Denko.
5. Occurs a miscommunication between you and Denko often, if we talk about the agreements that are made between you and the company?	1-2-2-2-2-2-3-4-4-4 (In this case: 1 is the best answer and 5 the worst)	2.667	So from the customer’s point of view, miscommunications do not occur often in general, but it did happen a few times. In the most optimal scenario, there are no miscommunications in general, so there are improvement possibilities here.

Table 2 – Results and insight from question 1 up to 5

To summarize Table 2, Denko scores in general well on the first five questions, especially for questions 1,2 and 5. For these questions Denko has a good score. For question 3 the customers do see some improvement possibilities. The customer especially thinks that the tickets just contain too little or no useful information. The customers see the most improvement possibilities for question 4, at the moment there are just no insights into performance indicators of Denko.

2.4.3.2 Question 6 up to 11

As again can be seen in Table 1, questions 6 up to 11 can be answered with open answers. In Table 3 the questions together with the positive and improvement points/answers are given. Also what we can interpret/conclude from the given answers is provided in Table 3.

Question	Positive points	Improvement points	Interpretation
6. Were you aware of the priority differences that a ticket can have? And what is your opinion about the time Denko has to solve a ticket is only based on the priority of a ticket?	-) "I think it is good that the solving times are only based on the priority of the ticket" -) "I was aware of this, and I understand that prioritization precedes solving a problem."	-) "The priority is now determined only by Denko. Added value would be to be able to determine this priority based on impact on the company."	In general, some customers did know about the priority differences and some customers did not know about the priority differences of the tickets. And most of the customers think that it is fine that the solving time of a ticket is only based on the priority.
7. Were you aware of the differences in the maximum solving time of a ticket? And what do think about the response time and solving time, are the times in combination with the priority too long, or do the times fit well with the priority?	-) "I think the response and solving times are fine."	-) "I was not aware of the different priorities of tickets. Depends on the problem, when the mail or phone is out, everything must be done to solve this." -) "I find a period of 8 working hours for a response of how to solve the problem is a lot." -) "I was not aware of that. With external influences, I can imagine that a solution is not always easy to come up with. In the event of a complete system failure, a faster (temporary) solution is necessary."	In general, the customers think that the response times of 8 hours for the different priorities are too long. As a customer, they want to know as soon as possible that it has been picked up and that it is being worked on. For the resolve time, customers understand that they are dependent on external parties. But for problems such as a complete system failure, a faster solution is necessary.
8. Would you be willing to pay extra for a shorter response time and solving time	-) "In our opinion, the rates that are applied are fine"	-) "As long as the need is high enough" -) "Yes, interested, but only for really specific	The opinions of the customers are against each other, on one side the customers say

		cases (company-wide failures). Then it should be solved as soon as possible”	that shorter response and solving times should be a standard service. On the other side, customers say that they would be interested in specific cases, such as company-wide failures.
9. If it were possible, would you want to have a different response and solving time for the different software/hardware you have?	X	-) “Yes, shorter response times for service-related products. Cause problems at supplier than as a service fast response times. Own caused ICT problem, then longer response times or higher service premium to solve this.” -) “Shorter times with regard to failure of workplaces/servers.”	In general, the customers did not give a useful answer or that they were not interested in such a possibility.
10. Would you find it interesting to get insight into how Denko performs? So this means getting informed about certain KPIs from Denko and/or more insight into the status of a ticket? And why?	-) “Yes, then I also have an answer to other people within my team about why it happened, how it was solved, and possibly how to avoid it. (and of course, if I am asked every day by colleagues if there is already an update, I can also answer that)”	-) “I would like to see some info when person X visits our company. What is on the agenda and what still needs to be done”	Most of the customers think that it is fine as it is now. But there are also customers that see the advantages of getting more informed
11. If you were able to add a certain agreement in the SLA, what kind of agreement would you add?	X	-) “Agreement with an explanation of invoices, structure, and where the prices come from. It is and remains unclear.” -) “When agreements are written down very concretely, it is also possible for Denko ICT to report on this in a targeted manner and then assess	Some interesting agreements are mentioned by the customer that they would see in the SLA (see improvement points)

		compliance with the customer.” -) Annual planning	
--	--	--	--

Table 3 – Results and insights from question 6 up to 11

To summarize Table 3, the customers of Denko are generally satisfied with the possibilities in services that Denko offers and the certain agreements that are stated in the current SLA. There are some aspects of the SLA that the customer has commented on or sees improvements in. The feedback that is most given is that the response and resolve times are too long, especially in some cases when the whole company is affected by the problem. Some customers are also willing to pay extra for shorter responses and resolve time in such specific cases, as a company-wide failure.

2.5 Conclusion

To summarize, Denko strives for a clear SLA, because this brings a lot of advantages. Currently, they do not have a clear and up-to-date SLA. Before creating a new SLA some constraints have to be considered. These constraints have to be taken into account, because otherwise this SLA will probably not be implemented. With the help of conducting the survey, we can answer the first two research questions and be able to get a better understanding of the current situation.

The conclusion of the first research question is: The agreements have in general a good influence on the relationship between Denko and the customer, but the customers do see some improvement possibilities and have some complaints. For the second research question, we have made Table 4 to give an overview of what the wishes of the customer are in terms of what aspects to include in the new SLA(s)?.

Category	Wishes of the customer
Priority of tickets	<ul style="list-style-type: none"> • Problems without priority should also always be addressed • Let the customer influence the determining of the priority of a ticket
Response and resolve times	<ul style="list-style-type: none"> • Shorter response times for service-related products. Cause and/or problem at supplier than as a service fast response times. Own caused ICT problem, then longer response times or higher service premium to solve this. • The response time of 8 hours is too long and needs to be shorter • For big problems such as complete system failure, the solving time needs to be shorter • For such problems as a company-wide failure, some customers are willing to pay extra for a shorter response and solving time
Communication	<ul style="list-style-type: none"> • The tickets that the customers can read should contain useful information • More insights into the status of a ticket, and receive more information on the cause and solution of the problem
Additional agreements	<ul style="list-style-type: none"> • Have solved problems beyond our control of a delivered product/service free of charge (or even indemnified) • Agreement with an explanation of invoices, structure, and where the prices come from. It is and remains unclear • When agreements are written down very concretely, it is also possible for Denko ICT to report on this in a targeted manner and then assess compliance with the customer • Annual planning • Addition of a piece of the warranty part

Table 4 – Wishes of the customers subdivided into categories

3. Literature review

In order to solve the main research question, we also need to analyze if there are already solutions in the literature for the communication errors that occur and the lower customer satisfaction that result from an unclear and outdated SLA. In this section such solutions that we have found in the literature are analyzed, with that information that is found we were able to answer the third research (sub) question:

3- What are known techniques that improve the design of an SLA?

In Section 3.1, it is explained what an SLA is according to the literature. In Section 3.2, information is given on how to structure an SLA. In Section 3.3, an overview is given of how an SLA can be designed. In Section 3.4, there is explained why the use of Quality of Service parameters is important in the design of an SLA. In Section 3.5 the EDRLA model is explained, this is a model that can be used in the process of (re-)designing an SLA. And in Section 3.7, the literature review is summarized, to answer the third research (sub) question.

3.1 Service Level Agreement

A Service Level Agreement (SLA) is a legal agreement outlining the terms and circumstances under which a service may be used between a user and a service provider. An SLA typically outlines the agreed-upon level of availability, serviceability, performance, and operation of services in measurable terms, the services that the service provider will provide, and the penalties that will be applied if the service provider is unable to meet the predetermined goals.

An outsourcing vendor's service levels and the penalties for not meeting them are specified in an SLA. In the context of outsourcing, SLAs have been seen as acceptable compensation for the corporation if the outsourcing service provider does not meet performance criteria. For outsourcing contracts to be successful, SLAs must be effective. SLAs from the company outsourcing service assist in defining what they expect as a manner of ensuring they get from the outsourcing. From the standpoint of the outsourcing provider, it stops the client from having irrational expectations. That is to say, the outsourced, not either side, benefits from a clear SLA.

An SLA often includes a list of service indicators and metrics, quality-of-service promises with associated rewards and penalties, price guidelines, authorization guidelines, and negotiation guidelines. Some SLAs provide bonuses if the outsourcing vendor surpasses service levels as a carrot in addition to a stick. A strong SLA should explicitly outline each party's obligations and cover escalation and remedial action. (Huai, 2010)

3.2 Structure of a Service Level Agreement

Service components and management aspects are typically included in a good SLA. The services offered, the terms of service availability, service standards, and parties' obligations are all clarified by service aspects, along with pricing and escalation methods. The management elements concentrate on things like monitoring the service, reporting service data, settling service-related disputes, and amending the contract. A successful SLA must have both service and management components. An SLA has not been working as the outsourced parties had hoped when used alone.

Key terminology in the SLA should have clear definitions, and specific service levels should be explained. Weighting for important service levels should be based on severity or importance. These service levels offer an objective way to gauge performance in crucial areas for outsourcing businesses and may bring to light any issues. If the outsourced vendor does not reach certain important service levels at the agreed-upon frequency, the outsourcing parties should agree that the customer company

may cancel the outsourcing contract. As a result, SLAs should specify the crucial service levels and the conditions under which they may be terminated. This removes any doubt regarding the circumstances that constitute a major breach of a contract and warrant its termination for cause. (Huai, 2010)

3.3 Design of a Service Level Agreement

An exceptionally powerful communication strategy for establishing a shared understanding between outsourcing parties is an SLA. SLAs must be made in a style that works for the outsourcing firm in order to accurately describe the outsourcing service. The parties to the outsourcing arrangement work together to create a successful SLA. The SLA that is created should be challenging to manage efficiently if the outsourcing business has little control over its content. The following essential phases are included in designing an SLA according to Huai (2010):

Step	Explanation
1-Gathering information	Information gathering gives a strong foundation on which to construct the agreement. Customers who outsource should carefully consider and specify the degree of service they require. Vendors who offer outsourcing services should evaluate their track record of delivering services and assess the kind of service they can deliver.
2-Ensuring agreement	By holding an open discussion to ensure that they have a fundamental understanding of the agreement, outsourcing parties can ensure agreement. The SLA negotiation may fail if they hold divergent opinions regarding the agreement's function.
3-Establishing ground rules	Setting ground rules for collaboration is essential when creating an SLA. The process of creating an SLA is neither quick nor easy. The agreement will be created in collaboration between the two parties. The distribution of responsibilities for development tasks and scheduling concerns must be exact, down to the last nuance.
4-Developing agreement	To establish an agreement on the terms of the agreement, the parties engaged in the outsourcing process first develop the framework for the service level agreement document. This process yields a draft of the agreement, not the finished document.
5-Generating buy-in	Creating buy-in offers chances to enhance the service level agreement's quality. Before the agreement is put into effect, those individuals from both parties who are accountable for its success should have the chance to evaluate the draft. They might ask queries and provide recommendations.
6-Completing pre-implementation	Pre-implementation tasks need to be identified and finished before SLAs can be implemented, which is what pre-implementation tasks comprise.
7-Implementing agreement	Designing an SLA is focused on and intended for implementation. Without implementation, the agreement is a useless paper. Managers must continuously uphold agreements with other parties and undertake service reviews throughout the implementation phase. It is crucial to evaluate and document how the two parties might improve their working relationship.

Table 5 – Phases of designing an SLA(Huai, 2010)

3.4 Quality of Service parameters

The quality of service (QoS), which is used to manage the resources for the offered cloud services, is defined by the SLA. The negotiation, establishment, validation, monitoring, and termination steps are all a part of SLA management. Cloud customers, who depend on providers to meet their claimed needs, and cloud providers, who must strike the right balance between QoS levels and operating costs, need QoS to function well. Because there are SLAs that include QoS targets and financial penalties for SLA

violations, choosing the right trade-off can be challenging. Due to the fluctuating quantity of incoming consumers, it is especially challenging to satisfy SLA targets while keeping costs reasonable for such business systems.

For service providers to satisfy customer expectations, effective management of QoS parameters, including their definition and forecast, is necessary. In particular, the prediction of QoS parameters helps service providers achieve their service-level goals. This helps achieve a balance between meeting QoS requirements and lowering cloud service prices. (Labidi et al., 2022)

Numerous cloud service providers offer a wide range of cloud services with varying prices and functionalities. Finding the ideal cloud service providers to satisfy their QoS needs can be challenging for cloud clients due to the growing range of cloud services and the potential to own and manage virtually limitless cloud account resources. As a result, customers must have a strategy or technique for evaluating the critical performance standards for QoS, which is required for their programs, to be able to choose the best provider among several cloud service providers based on the best selection of QoS needs. (Edinat et al., 2021)

It becomes also increasingly important to routinely modify the SLA due to the dynamic nature of QoS parameters, the goal to continuously change both the condition of cloud service providers and clients, as well as the constantly changing corporate policy regarding cloud computing. These issues are sure to expand more widely among cloud computing businesses. The SLA negotiation level, SLA control level, and SLA enforcement level are the three levels of the proposed SLA. The effectiveness of the QoS in SLAs is mostly dependent on performance, availability, dependability, and bandwidth. (Al-Ghuwairi et al., 2016)

Multicollinearity presupposes that performance, usability, and security may be used to represent availability, which accounts for the emphasis on availability in the majority of cloud SLAs. As independent variables, performance and availability have a significant impact on cost. Because of this, maximizing performance and availability results in lowering cost. The cost of cloud service can be reduced by using this information to develop an SLA that satisfies both our customers' needs and the provider's objectives. (Labidi et al., 2022)

3.5 EDRLA Model

In this section, the EDRLA (Enhanced Deep Reinforcement Learning Agent) model is explained. Reinforcement learning is based on the premise that an agent would pick up information from its surroundings by interacting with it and obtaining incentives as feedback for taking action. Deep neural networks are used in Deep Reinforcement Learning to address issues with Reinforcement Learning. According to Edinat et al (2021b) increase this EDRLA model customer satisfaction. We also want to increase customer satisfaction with this project, which is the reason this model can be valuable for us to use for the (re-) designing of the SLA.

Through SLA management, scaling and automating SLA can assist in adjusting to dynamic changes in the environment. The EDRLA model seeks to identify the most prevalent QoS metrics and parameters for both parties in the cloud while also taking into account the customer's interest and how the agent will manipulate those parameters to determine the best resource for the customer by which his or her needs will be fully met. The steps in the suggested paradigm are described in Table 6 according to Edinat et al (2021b):

Steps	Explanation
Step 1	The first step is for a cloud customer to compile a list of prospective QoS needs, which the customer then reviews and narrows down to a possible set of cloud QoS.
Step 2	The customer sends a list of prospective QoS requirements from the QoS list in step 2, and the CSP (Communication Service Provider) presents the QoS offers to the SLA manager. The negotiation and compromise of the customer's QoS need with the offers made by the CSP as well as the collection of both the customer's QoS and the CSP's QoS offers are all part of managing SLAs. The manager drafts an SLA and sends it to the DRL (Deep Reinforcement Learning) representative after haggling and reaching an agreement with the client.
Step 3	The third step is with the use of the enhanced deep Q-learning agent, the EDRLA will choose the best course of action with the highest rewards, which represents the choice of the QoS that satisfies the customer's needs. After then, the first SLA will start.
Step 4	Step four is that the three parties can make any necessary changes during this procedure. Due to the monitoring process, the customer or the CSP can ask for any necessary adjustments to be made or the introduction of new QoS parameters. If one of the parties disagrees with any of the revisions after they have been made, the process will restart from the point where the SLA manager negotiates and reaches a solution with the two parties.
Step 5	The fifth step is if both parties accept the changes, the monitoring process will begin by comparing the QoS values to the mutually agreed-upon SLA.
Step 6	Step six is if the monitoring process finds any QoS violations, they are recorded in the database, the penalty is applied following the SLA, and the new QoS parameters are submitted for modification under the agreed-upon SLA.
Step 7	And the last step is, a QoS report detailing QoS violations and values will be supplied during the monitoring process to the customer and CSP for modification following the established SLA. If the contract is about to expire or needs to be renewed, a QoS report will also be delivered to them.

Table 6 – Steps of the EDRLA model

3.6 Conclusion

In this literature we have found two key templates/frameworks that can be used for the (re-) designing of the new SLA(s). The first one is the template/framework of Huai (2010), this template/framework includes the essential phases that are included in the designing of an SLA. The second one is the Enhanced Deep Reinforcement Learning Agent (EDRLA) model of Edinat et al (2021b). The EDRLA model seeks to identify the most prevalent QoS metrics and parameters for both parties in the cloud while also taking into account the customer's interest and how the agent will manipulate those parameters to determine the best resource for the customer by which his or her needs will be fully met.

The most fitting one is the template/framework of Huai (2010). The reason that no choice was made for the template/framework of Edinat et al (2021b), is that Denko prefers not to work with an enhanced deep Q-learning agent and is not used to using such agent for their designing of an SLA. That is why we have chosen to use the template/framework of Huai (2010) for the (re-)design of the new SLA(s).

4. Solution design

The aim of this thesis is to improve the current SLA, by doing this communication and customer satisfaction need to improve/increase. In this section, the solution is presented, and it is explained why certain decisions are made. The fourth research question is answered in this section:

- 4- *Taking into consideration the current SLA and the new insights, how should the new SLA(s) be designed?*

In Section 4.1, the requirements of our new SLA(s) are discussed. In Section 4.2, the possibilities of how these requirements can be fulfilled are discussed. In Section 4.3, the most important points are discussed from a meeting intern at Denko. In Section 4.4, the final solution is presented how the current aspects of the SLA are going to change and what aspects are going to be added, to improve the current situation.

4.1 Requirements of our new SLA(s)

In Sections 2 and 3 (the Context analysis and Literature review) we were able to conduct step 1, Gathering information, and step 2, Ensuring agreement, of the framework of Huai (2010). For step 3, Establishing ground rules, we introduce first in this section the aspects that can be improved or added in the current SLA, that we have found with the help of step 1 and 2. In Section 4.2, step 3 of the framework of Huai (2010) is further developed.

Improved/Changed

1. The priorities of the tickets → The four priorities of the tickets (low, normal, high, and critical) are currently only based on how much impact the problem has on the company and/or person(s) where the problem occurred. There will be seen if these priorities need to be expanded or if there must be fewer priorities than four.
2. The response and resolve time of the different priorities → In the current situation the four priorities have all the same response time of 8 hours, and all have their own resolve time (the more critical the ticket, the shorter the resolve time). There will be seen if these times need to change in order to improve the current situation for the different priorities.
3. Communication → In the current SLA is stated that within the response time of 8 hours, Denko has to provide the customers via email with the priority that the ticket has received. And within the resolve time, the customers will be contacted via email or telephone with the cause and solution of the problem. There will be looked if these times need to be adapted and/or if the agreements need to be tightened up.
4. Availability → Currently the aim is to achieve an availability of 99.8%. When the SLA is going to be changed in certain ways, there will be looked if the availability of 99.8% is achievable or if this must be adapted.

Added

5. Extra paying → For a very big problem, such as a company-wide failure. It can be advantageous for the customer to pay some extra to get the problem solved faster. There will be seen if this is possible for the company to agree on.
6. Third parties/suppliers → The company is dependent on its suppliers for certain services. So this needs to be included in a certain way in the SLA. Also, it can be interesting for customers to get a faster response when the company has to wait for their supplier. Then the customer knows that Denko cannot do anything about it, and it is waiting for the supplier to take action.

7. Insight into the status of ticket → At the moment, the customer does not have a lot of insights into the status of a ticket. There will be seen if it gives a lot of advantages when the customers get more insights into the status of a ticket.
8. Reported/Monitored → The current SLA and ticketing system that Denko has, cannot be reported or monitored. It gives a lot of advantages when this is possible. So it is a pity that this is not possible for Denko. There will be looked, if there exists a way to monitor and report the SLA and the ticketing system, and to see if this way does not cause too much difficulties when implementing this.
9. Advice/Input from customers → At the moment it is not possible for the customers of Denko to give advice/input on how the SLA can change. Customer satisfaction can increase when Denko takes into account the advice/input of the customers. There will be investigated if this would also be advantageous for Denko self.

4.2 Solution generation

In this section, we work further on step 3, Establishing ground rules. For all nine aspects from Section 4.1 we give the possibilities of how we can convert these aspects into agreements in the new SLA(s). We provide these possibilities, to give ideas on how the different aspects can be adapted or added in the new SLA(s). With this, we want to give insights into what ideas may not make any sense to include in the new SLA(s) and which ideas can be considered to include in the new SLA(s) for Denko. These ideas come from the insights that we got with the help of steps 1 and 2 of the framework of Huai (2010), and from the knowledge that we have about what ideas are possible for Denko to include in the new SLA(s) and what ideas not. The possibilities of how aspects 1,8 and 9 can be converted into agreements in an SLA are also supported with the help of literature. The consequences of changing or adding the different ideas that are mentioned in this section are come up by predicting how Denko and their customers will experience the implementation of the new or adapted ideas, together with the knowledge that we have about Denko and their customers. In Section 4.4.1, step 3 of the framework of Huai (2010) will be finalized.

1. Priorities of the tickets

According to Huai (2010), the weighting for important service levels should be based on severity or importance. These service levels offer an objective way to gauge performance in crucial areas for outsourcing businesses and may bring to light any issues. There are possibilities to increase or decrease the number of priorities of tickets at Denko. When the number of priorities increases, then even more distinction can be made in how much influence the problem has on the company and/or on the people where the problem occurs. The difference between the priorities would then be smaller when looking at the size of the problem. The result can be that it becomes clearer why a certain priority is chosen for that problem, because these priorities will then often come with specific problems. It can also be the case that it becomes less clear for the customers, because it can become cluttered when there are more priorities. It may become unclear why Denko chose a certain priority one time and with almost the same problem a different priority was chosen the next time.

Denko can also choose to decrease the number of priorities of tickets. The result will be that there are only 2 or 3 priorities that a ticket can have. A lot of problems with different sizes will then fall under the same priority. The purpose of different priorities will fall away because you put many different problems with different sizes under the same priority. And the use of priorities for tickets gives a lot of advantages, also the customers like the way of working with priorities. It would be a pity if the functionality of different priorities were not used.

2. The response and resolve times of the priorities

The response and resolve times of the priorities can be changed in order to improve the current situation. First looking at the response time of 8 hours for all four priorities. When the response times will not change, then of course the current situation will not change, and some customers will not be satisfied with these response times. Especially for the more urgent priorities, do some customers expect a faster response time. When there is an urgent problem occurred, then the company and/or persons want to know as fast as possible that Denko is going to start working on the problem. When there is a failure that influences the whole company, a reaction of Denko after 8 hours is quite long. When the problem that occurred has not a big influence on the company, then a reaction from Denko after 8 hours is fine. Often a company with a problem that has a low priority can work further easily. So a faster reaction than 8 hours is often also not necessary. Increasing the reaction time of 8 hours will only have a negative influence on customer satisfaction. A lot of customers will not accept a longer response time than 8 hours.

Then looking at the resolve time of the four different priorities. The priority that is the most urgent, has a resolve time of 24 hours and then every priority lower has 4 extra hours. Some customers think the solving time is fine, but some customers want to have a faster resolve time for problems such as complete system failure. So when the resolve time will be lower, the effect will be that some customers will be more satisfied. Especially for the problems that have a high priority, customers want to have a faster resolve time. But these resolve times must be achievable for Denko to satisfy.

3. Communication

Denko can focus on improving its communication with customers. For example, providing clearer information about why a ticket has a certain priority and what the cause and solution are of the ticket. This will result in more clarity for the customer. The response and resolve times are already discussed in point 2. When these response and resolve times will decrease, customer satisfaction will increase as mentioned above. Also, a result of this is that communication will improve because the customer is faster aware of the details of the problem.

Focusing on decreasing the quality of communication does not make any sense, because at the end of this project, we want to have a higher quality of communication than currently.

4. Availability

As mentioned earlier in Section 2.2 (Current SLA) Denko currently aims at achieving an availability of 99.8%. When they will increase their availability to 99.9%/99.95%, then as a company you show to your customers that you want to achieve a very high availability. In case of an increase in the availability of Denko, they will probably more often a year does not achieve this goal. When Denko is going to decrease its goal of achieving an availability of 99.8% to maybe around 97%, then as a company you aim still for a high availability, but probably Denko is going to achieve this availability more often or almost always. The only negative effect of decreasing your availability is that you show to your customers that you are going to aim for a lower availability, which causes that the customers can be less satisfied.

5. Extra paying

There can be asked for some extra money from the customer, and in return for the extra pay they can receive a faster response and/or resolve time, maybe in the form of another SLA than a standard SLA. If this aspect is added to the new SLA(s), this will probably influence customer satisfaction. Customers see the advantages of having a problem solved faster such as company-wide failure and will be happy with the addition of this aspect. For customers that do not see the advantages in this, it also has no

disadvantages at all, because they will stay just at the normal response and resolve time and do not have to pay extra.

6. Third parties/suppliers

At the moment, the suppliers of Denko are not taken into account in the SLA. Denko can include the suppliers within their SLA. When including the suppliers in the SLA in a certain way, Denko will avoid that the SLA is not met due to the influences of the suppliers. It should be excluded in such a way that the time Denko has to resolve the problem is not dependent on the suppliers of them. When the customers are also aware that the problem they have currently is not in the hands of Denko self, but in the hands of the supplier of Denko, the communication will also increase. When not including the suppliers in the SLA, the suppliers may take so long to solve the problem that Denko itself does not meet the solving times in the SLA.

7. Insight into the status of a ticket

Denko can give more insights into the status of a ticket, so this means giving more insights into which department is currently responsible for the problem, whether Denko has already started working on the problem, if Denko needs to wait for something/someone, etc. When providing this information to the customer, the effect will be that communication will improve. Also, some customers do not need to have more insights into the status of a ticket. But they will not experience any negative effects if more insights are given. They cannot look at it, if they do not want to.

8. Reported/Monitored

When Denko can report and monitor the SLA and their ticketing system, the result will be that they improve according to the current situation. Denko will then build a kind of history, for example: They will get insights into if Denko can follow the agreements that they have stated in the SLA, what kind of problems occur most often at a certain customer, and also report such things to their customers and internally. Most of the customers like to receive such information and this will also increase customer satisfaction. Denko will miss a lot of advantages when they will not be able to report and monitor their SLA and their ticketing system. According to the literature, monitoring and reporting of the SLA is also important: The management elements concentrate on things like monitoring the service, reporting service data, settling service-related disputes, and amending the contract in a good SLA. (Huai, 2010)

9. Advice/Input from customers

At the moment there is no moment when Denko evaluated the SLA and see where certain adjustments are possible according to the actual situation and wishes. This evaluation moment can be done together with the customers, so that also the SLA will be evaluated from the point of view of the customers. When having a lot of evaluation moments, the customers can give fast input if they think there can be made certain adjustments, but this will also have the consequence that Denko is quite some time lost to these evaluation moments. When having one evaluation moment in 1 or 2 years, the customer can give probably a lot of feedback at one time, but maybe then some rules are already outdated. According to Al-Ghuwairi et al (2016) it is also important to sometimes change the SLA: It becomes also increasingly important to routinely modify the SLA due to the dynamic nature of QoS parameters, the goal to continuously change both the condition of cloud service providers and clients, as well as the constantly changing corporate policy regarding cloud computing.

4.3 Meeting with Denko

In this section, the meeting with the work supervisor and director/owner of Denko to discuss some points from Section 4.1/4.2 is explained. The purpose of this meeting was to receive the opinion from

Denko about these points, to get insights into what Denko thinks about these points. This is also because some points from Section 4.1/4.2 come from the opinions of the customers. The result of this meeting is that we received information about whether Denko agrees with the opinions of the customers. This can help to ensure to add an agreement to the SLA, which seeks a middle ground between the customer and Denko. It is also good to include the opinion of Denko in the research, because in Section 2.4 (Constraint from Denko) we have mentioned that the implementation of the new SLA(s) has/have to have a good influence on Denko. Including the opinion of the Denko, will help with making sure Denko benefits too from implementing the new SLA(s). The benefits of these points are that they also help with finishing step 3 and 4 of the framework of Huai (2010).

We will sum up the most interesting points that have come out of the meeting:

- Priority of a ticket: The researcher found in Autotask that almost every ticket that is created nowadays has the priority normal. Denko mentioned that the reason for this is that the people that created the tickets have too little knowledge about choosing the corresponding priority that belongs to the ticket. More use should be made of the various priorities because this gives advantageous for Denko and also for the customer. The person who creates a ticket needs to know which priority has to be chosen for a certain problem in software or hardware.
- Customers: Denko said that the customers expect from them, that they always receive a fast response or solution. But because most of the customers are not aware of the SLA that Denko has, they are going to call or email, with the question if it is possible to receive a fast response or solution, or how long it is going to take for Denko to solve the problem. When Denko then refer back to their SLA, to show how much time they have for the problem, most of the time the customers did not know about any of the agreements that are stated in the SLA.
- Different hardware/software: They mentioned that it can be helpful for Denko to have included in the SLA, that a certain hardware/software has a specific priority or maybe another SLA with a different agreement than the standard SLA. It should therefore be clear to the people who create tickets which priority or SLA belongs to a certain software/hardware.
- Extra payment: Some clients are not willing to pay extra money for faster services of Denko, so this means faster response and solving time. Denko mentioned that these customers are often the customers who do not keep up with the new times.
- Suppliers: Denko also thinks that it is important to include the suppliers in such a way in the SLA, so that the customers know that Denko is dependent on their suppliers. So Denko sometimes does not have any influence on solving the problem.
- First line: The people in the first line (persons that solve the problems), often do not describe in the ticket how the problem is solved. This is a waste of time that this is not used. It can save a lot of time in the future if the customer is well aware of how the problem has been solved.
- Status of a ticket: It must come into view for a customer when a status of a ticket changes. But in the past, the customers received a lot of emails or messages about when a status of a ticket changed, and the customers found this very annoying. So this has to be prevented.

4.4 Final solution

With the help of finishing Section 4.4.1(Added and adapted aspects) beforehand, which means also finishing Step 3 of the framework of Huai(2010). We were able to make the final design of the new SLAs. In Appendix-8 the final design of the new SLAs can be found. This means that we directly finished step 4, Developing agreement, of the framework of Huai (2010). This step is finished, because we have the design of the new SLAs. The SLAs that will be provided to the customers are in Dutch, but for this project, we have translated the SLAs into English. In the new situation, we have in total three different SLAs, these three SLAs are not all included in Appendix-8, because the only differences in the SLAs are the times Denko has to respond, make the resolution plan, and resolve the problem together with the

success rates (explained in Section 4.4.1). The rest of the design of the SLAs and the agreements included in the SLAs are the same for each.

The new SLAs consist of three new parts. The added and adapted aspects, the use of configuration items, and the use of the client portal. See Figure 5 below for an overview of these new parts.

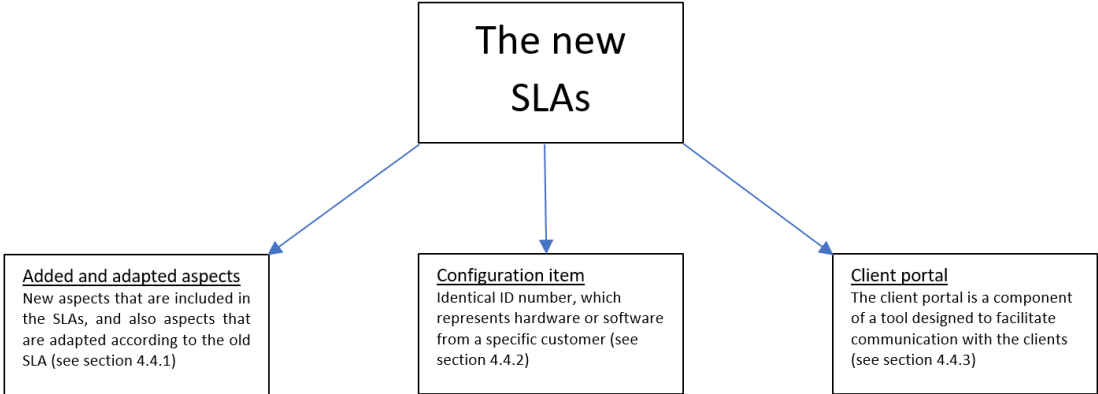


Figure 5 – The new parts of the new SLAs

In Table 7 an overview is given of the components that are included in the new SLAs in comparison with the current SLA. This is to give an overview of how the new SLAs differ from the current SLA in terms of components and/or features included in the SLAs.

	Current SLA	New SLAs
Content and duration of the agreement	X	X
Contact information	X	X
Four different priority levels for a ticket	X	X
Corresponding reaction and resolve times for the priorities	X	X
Availability of Denko	X	X
Information about maintenance	X	X
Information about back-up	X	
Evaluation meeting one time a year		X
Contact persons		X
Responsibilities of customer/provider/suppliers		X
List of suppliers		X
Delimitation of the service		X
Assumptions and frameworks conditions		X
Documents that can be delivered on request		X
Priority scheme		X
Including activities that are beyond Denko’s reach		X

What happens in escalation		X
Factors of measurement		X
Method of measurement		X
Agreed service levels		X
Consequences of failure		X
Three SLAs that differ from each other		X
Stimulating the use of configuration items		X
Stimulating the use of the client portal		X
Stimulating of providing useful information to the customers		X

Table 7- Comparison between the current SLA and the new SLAs

4.4.1 Added and adapted aspects

In this section, as mentioned before we finalize step 3, Establishing ground rules, of the framework of Huai (2010). This is done by listing the added and adapted aspects that Denko wants to have included in the new SLAs. We have listed these aspects, so that we were able to have an overview of what aspects to include in the new SLAs and were able to design the new SLAs.

Bronze, silver, and gold SLA

According to Lee & Ben-Natan (2002) allows the availability of many SLA tiers (platinum, gold, silver, bronze, and so on) for the same product or service the client to balance competing priorities inside his or her own organization and comprehend how their requirements relate to those of other companies. These choices help the client in properly allocating financial resources: For the least important links, he or she may choose to accept a lower level of service while choosing to pay more for better levels of availability or faster reaction times

In our case at Denko, some customers are also interested in faster response, resolution plan, and solving times. That is the reason that instead of just one SLA, there are three SLAs introduced in the new situation. We have chosen for three SLAs, because we think in that case the differences in SLAs are perfect. The differences are not too small when for example providing four or five SLAs, and the differences in SLAs are also not too big when providing for example two SLAs. In the new situation, the customer can make a pleasant consideration between the three SLAs. Also when evaluating SLAs of other ICT companies, it has been noted that other companies also use three different SLAs that they offer to their customers in most cases. The differences in the new SLAs are that they contain different response, resolution plan and solving times, also the success rates are different in the three SLAs. The bronze SLA is the standard SLA that customers have for their software/hardware, the silver SLA contains faster times and higher success rates, and the gold SLA contains the fastest times and success rates that a customer can have for their software/hardware. When a customer wants to have a bronze SLA for their software/hardware, no extra money has to be paid. When a customer makes the choice that a certain software/hardware needs SLA silver or gold, extra money has to be paid. What the amount of this extra payment needs to be is out of the scope of this project. The staff members of Denko will determine this.

In the tables underneath where we explain the different times included in the new SLAs we talk about business hours. Business hours means the hours that are included in a workday from Monday up to Friday, so this means from 08:30-17:00 (with a break from 12:30-13:00). When a customer has a problem outside these business hours, they can get in contact with the breakdown service from Denko.

The bronze SLA will contain the following times and success rate within brackets:

Priority	Response time(93%)	Resolution Plan time(93%)	Solving time(90%)
1	8 Business Hours	18 Business Hours	24 Business Hours
2	8 Business Hours	20 Business Hours	28 Business Hours
3	8 Business Hours	24 Business Hours	32 Business Hours
4	8 Business Hours	28 Business Hours	36 Business Hours

The response times and the solving times of the bronze SLA are the same as the times that are stated in the current SLA. The reason is that Denko does not want to provide other times to the customers who not are going to pay extra for an SLA silver or gold. This will mean that for the customers that are not going to pay for an SLA silver or gold, the situation regarding the response and solving times is not going to change. The SLA bronze has become the new standard SLA for customers. The resolution plan times, and the success rates come from consultation with Denko, when was discussed what is available for Denko and what would suit Denko best.

The silver SLA will contain the following times and success rate within brackets:

Priority	Response time(96%)	Resolution Plan time (96%)	Solving time(95%)
1	4 Business Hours	6 Business Hours	8 Business Hours
2	4 Business Hours	10 Business Hours	14 Business Hours
3	4 Business Hours	12 Business Hours	18 Business Hours
4	4 Business Hours	14 Business Hours	24 Business Hours

For the silver SLA, we have increased the success rates and decreased the response, resolution plan, and solving times when compared with the bronze SLA. These times and success rates come also from consultation with Denko, when was discussed what is available for Denko and what would suit Denko best. There is chosen for big differences in times when looking at the bronze and silver SLA, because this difference needs to convince the customer to choose for an SLA silver, instead of an SLA bronze.

The gold SLA will contain the following times and success rate within brackets:

Priority	Response time (99%)	Resolution Plan time(98%)	Solving time(98%)
1	2 Business Hours	4 Business Hours	6 Business Hours
2	2 Business Hours	10 Business Hours	12 Business Hours
3	2 Business Hours	12 Business Hours	16 Business Hours
4	2 Business Hours	14 Business Hours	20 Business Hours

For the gold SLA, we have again increased the success rates and decreased the response, resolution plan, and solving times when compared with the silver SLA. These times and success rates come also from consultation with Denko, when was discussed what is available for Denko and what would suit Denko best. The difference between bronze and silver SLA is bigger than the difference between silver and gold SLA when looking at the times. The reason is that for Denko it will not be available to achieve even faster times in the gold SLA. The difference between the SLA silver and gold is big enough to convince the customer to buy an SLA gold for their most important software and hardware.

Different software and/or hardware

To make it possible for the customer of Denko to have different SLAs for the different hardware they have from Denko, we will introduce the use of configuration items. So for example the customer can have an SLA gold for a laptop and an SLA bronze for a router. The concept, configuration item, is explained in Section 4.4.2, because the use of a configuration item has more advantages than only making it possible for the customer to have different SLAs on different hardware. For specific software it is not possible to make use of configuration items, how this will be tackled is also explained in Section 4.4.2.

Priorities

As mentioned in Section 4.3 (Meeting with Denko), the persons that created the tickets have too little knowledge about choosing the corresponding priority that belongs to the ticket. That is the reason that in the new SLAs, there is created a scheme where can be seen when to choose a certain priority. This scheme is based on how many people in the company are been affected by the problem, and what kind of business processes are being affected. The effect will be that the people that created the tickets can better choose which priority belongs to the ticket.

Suppliers

In the current situation, the 'timer' in Autotask that Denko has to solve a problem, is stopping with counting down in some scenarios. For example in the situation: Waiting customer or awaiting materials. In the new SLAs, it should be made clear that this 'timer' also stops with counting down when the problem lies in the hands of Denko's supplier. That is, in the scenario when Denko themselves cannot do anything to solve the problem. By including this, Denko prevents the suppliers from ensuring that Denko does not meet its solving times. Additional to this, also the other events that ensure that this 'timer' is stopping with counting down, needs to be added in the SLA. This is not included in the current SLA, it is only included in Autotask.

Communication

In the current SLA it is stated that the customer receives information about the priority, cause, and solution of a ticket. But in reality, this is not always the case, or the information is poorly described or contains little useful information. So this agreement will be changed to guide the staff members with what kind of information they have to provide the customers or/and there must be communicated well to the staff members that the information that is provided to the customers just needs to be clearer. When you agree with your customers on the SLA, then you also have to follow the agreements that you have agreed on together. Also if the customer is well aware of the solution and cause of the problem, this customer may solve or prevent the problem himself the next time when the same problem occurs. This will mean that this customer no longer has to call or email Denko when the same problem occurs, this can save a lot of time for Denko.

Insight in ticket

To satisfy the customer with more insight into the tickets and also more insights into more relevant information, the client portal of Autotask will be introduced and stimulated to the customers. How this customer portal works and what the advantages are of using this portal are explained in Section 4.4.3.

Availability

The required availability within the opening hours is aimed at 99% in the new SLAs. Beforehand in the old SLA, this was 99.8%. The goal of achieving an availability of 99.8% was too high. Denko was unable to achieve this availability every year. The availability in the new SLAs would amount to a maximum of 5 hours of loss per quarter. In the old situation this was a maximum of 1 hour of loss per quarter, so the effect is that Denko can have 4 more hours of loss per quarter. The new goal is achievable for Denko and also for the customer this is a nice goal to strive for. It is important to keep availability included in the SLA, according to Huai (2010): The services offered, the terms of service availability, service standards, and parties' obligations are all clarified by service aspects, along with pricing and escalation methods are included in a good SLA.

Consequence of failure

In the new SLAs, there is a chapter included that explains the consequences of failure from certain aspects of the SLAs. As seen in a lot of SLA examples, there is often a section or chapter included that explains the consequences of SLA violations or failure. The literature that was founded explains also that explaining the consequences of failures is a key aspect that needs to be included in an SLA. For example, according to Huai (2010): An outsourcing vendor's service levels and the penalties for not meeting them are specified in an SLA.

Evaluating the SLA

In order to let the customers of Denko give advice/input on how the SLA can change, there will be arranged minimal one time a year, a moment when the entire SLA is evaluated and is adapted as much as possible to the current situation and wishes. Amendments are discussed at the time of the review meeting. At that moment, the parties involved make a decision. As a result of the decision, the SLA will be adjusted. The adjustment of the SLA is only valid after all the parties involved agree to a signature on the new SLA. These review sessions will only be arranged if the customer wants this. As mentioned before, it is important to routinely modify the SLA due to the dynamic nature of QoS parameters, according to Al-Ghuwairi et al (2016).

4.4.2 Configuration item

As explained in Section 4.4.1 has a configuration item more advantages than only making it possible for the customer to have different SLAs on their different hardware. In this section, it is explained what a configuration item is and also the advantages of using a configuration item are explained.

A configuration item is an identical ID number, which represents specific hardware from a customer. Configuration items are used differently for software, this is explained after this explanation of configuration items for hardware.

A configuration item can be created in Autotask when a customer buys certain hardware. When a staff member (probably most often the person that sells the hardware) is creating the configuration item, some corresponding information needs to be filled in. Such as: Corresponding company, serial number, reference number, reference name, product, warranty, etc. The result is that the identical ID number (the configuration item), contains all the necessary information about that specific hardware. When creating a configuration item, the SLA that belongs to that hardware can also be selected. So this means that when a salesperson of Denko sells hardware to a customer, this employee needs to communicate with the customer which SLA (bronze, silver, or gold) he/she wants to have on that specific hardware. As mentioned earlier, a customer has to pay extra per hardware, if he/she wants to have an SLA silver or gold for that hardware.

The use of configuration items has the following advantages when it is used correctly and constantly:

- Denko will get a clear overview of the specific hardware that a certain customer has, and also the corresponding SLA that all the different hardware has.
- It becomes possible for Denko to connect a ticket with the configuration item of the hardware. This means when a customer has a problem with a certain hardware, the employee of Denko can search for that hardware with the help of the reference number or serial number. Then make a ticket connected to the configuration item. This effect will be that directly in the ticket, the hardware (with all corresponding information) is added where the problem occurred. Then for example also the employee can directly see which SLA (bronze, silver, or gold) this hardware has.
- Denko built a kind of history on the hardware that they sell, because the tickets are connected to the configuration item. The effect will be that Denko can report and monitor the hardware that they sell better. For example: Denko can monitor that a certain printer is already broken or received errors 5 times in the last month, and also that printer is already 10 years old. Then

Denko can report this back to that customer and try to sell them a new printer. Also, the customer most often thinks that this is interesting information to receive. According to Huai (2010), monitoring and reporting of the SLA is also important to do, as mentioned earlier.

We are not going to connect every hardware to a configuration item. Only the most important and 'bigger' hardware, because it is not that interesting to monitor and report back information about 'small'/less important hardware. So we are especially going to connect a configuration item with the following hardware: Workstations/Desktops/Notebooks, printers, routers/firewall, peripherals, monitors, and telephones.

Software

It is not possible to connect a configuration item with specific software. The reason for this is that software is not a physical 'thing' that can be held. Software in most cases also does not have a serial number, reference number, or reference name, which is the reason a specific software cannot be connected to a configuration item. We want to make it available for customers to have different SLAs for the different services/software they have from Denko. We will do this by adding a configuration item for the general software and connecting this to the corresponding company that makes use of this software. So for example we can make a configuration item for Office 365 for a certain company and connect this configuration item with an SLA (bronze, silver, or gold). The customer then can choose which SLA he/she wants to have for this service, and it is then also implemented in Autotask. The effect is that the employees are also aware internally of which SLA this service has. It becomes then also possible to connect a ticket with that configuration item of that service. The effect will be that it becomes visible what tickets are made for that service in that specific company. The payment will be the same as for hardware. There must be paid for every SLA silver or gold, that a service has. So if the customer has 10 Office 365 accounts, and he/she wants to have an SLA silver or gold on the services of Office 365. Then this customer has to pay 10 times an X amount of money. The determination of the amount of money the customer has to pay per service will be determined by Denko self. This is again out of the scope of this project.

4.4.3 Client portal

As explained in Section 4.4.1 has using the client portal advantages. In this section, it is explained what the client portal is and also what the advantages are of using the client portal.

Company and their clients can work together on tickets and projects, service desk operations, and even portal management activities through the client portal, a secure web portal. Customers can submit tickets, check the status of their projects, run reports, track the status of previously submitted tickets and see the timesheets and notes taken by our workers and view their invoices on the portal. Denko can set restrictions on what the client can see and provide access to particular items in their Autotask knowledge base. The knowledgebase has articles that are devoted to providing fixes for the issues and difficulties detailed in tickets. Everyone who might run across the problem will be interested in the solution, so that information has the potential to be of interest to a large audience.

When the customers are going to use the client portal actively, this will result in many advantages. To start with when customers will submit their tickets via the portal. The consequence will be that customers do not have to call or email Denko when they have a problem. They can just login into the client portal, fill in the ticket with the corresponding information, and at Denko it will come in as a ticket. This will save a lot of time, but there is a requirement that the customers have to fill in the tickets with useful information about the problem. If for example, the problem is very poorly explained, this will result in the staff members of Denko still having to call or email the customer to ask for clarification. Then the whole idea of saving time will not be the case.

In the client portal, customers can also check the status of their projects and previously submitted tickets. This is a great solution for customers that want more insights into such information about the ticket and projects. If they want to know how Denko is doing with their ticket, customers can just open the client portal, select the ticket that they are interested in, and see the status of that ticket. Customers then also do not have to call or email Denko, with the question of how they are currently doing with the ticket. This will again also save time for Denko. Some customers are not interested in such information about the projects or tickets, but promoting the use of the client portal will not have any negative influence on these people, because for them it is just possible to not look into the client portal.

It is for the customer also possible to run reports and see the planning in the client portal in Autotask. Some customers were interested when a certain staff member of Denko came to the company to perform maintenance. This sort of information is also available in the client portal, so the use of the client portal is a useful solution to inform customers with this kind of information about the planning. For some customers it can also be interesting to run reports, which can contain interesting information about the number of tickets they have submitted, the average solving time of a ticket, etc.

Another aspect of the client portal that will improve the current situation is the knowledgebase. The knowledgebase contains articles that are devoted to providing fixes for the issues and difficulties detailed in tickets. When customers experience a small problem and they do not know how to solve it, they will call or email Denko about the current situation. For a small problem, there are often a few steps or little information necessary to solve this problem. Such information is included in the knowledgebase. When a customer experiences a small problem, he/she can search in the knowledgebase and try to solve the problem by themselves. The consequence will be that this will save time for Denko, because then they can fix the problem by themselves with the help of the knowledgebase. Also for the customer this can be helpful because it can be the case they fix the problem faster by themselves than when they would call or email Denko and have to wait for a response.

4.5 Conclusion

In this section, the research question *“Taking into consideration the current SLA and the new insights, how should the new SLA(s) be designed”* is answered. With the help of the framework of Huai (2010), three new SLAs are designed. The new SLAs consist of three new parts. The added and adapted aspects, the use of configuration items, and the use of the client portal. The added and adapted aspects consist of:

- Bronze, silver, and gold SLA
- Enabling to have different SLAs for different software and/or hardware
- Priority scheme
- Including suppliers in the SLA
- Focusing on communication
- Improving the insight into tickets
- Changing the availability of Denko
- Including consequences of failure
- Including of evaluation of the SLAs

The new SLAs should ensure that the communication between Denko and the customer improves and that internally communication improves. Also, should the new SLAs ensure that customer satisfaction increases.

5. Solution evaluation

The implementation of the SLAs and so the answering of research (sub) question 5 is included in Appendix 9. Answering this research (sub) question, result in the completion of step 6 of the framework of Huai (2010), which is: Completing pre-implementation.

In this section, the solution that we have created in Section 4 is evaluated. The sixth and seventh research (sub) questions are answered within this section:

6 - Taking into account the new design of the SLA(s), how will the amount of work for staff members that solve the 'tickets' change?

7 - How are customer satisfaction and communication changed after the implementation of the improved SLA?

In Section 6.1 there is explained which aspects of the new SLAs influence on the amount of work for staff members, and what kind of effects these changes have on Denko. With this information, we can give an answer to research (sub) question 6. And in Section 6.2 the improved SLAs will be evaluated.

5.1 Workload change after implementation

To evaluate how the total amount of work will change, there must be looked at the aspects that influence the amount of work for the staff members that solve the tickets (the staff members of the 1st line). So every new or adapted aspect in the SLA that influences the workload of these staff members will be discussed. The SLAs are not implemented yet towards the customers, so in this section we make a prediction how these aspects will change the amount of work for staff members that solve the tickets.

Bronze, silver, and gold SLA

The effect of the introduction of three new SLAs on the workload of staff members is fully dependent on how many customers and how much software and hardware they want to have an SLA silver or gold for. The total amount of work will not change with the new SLAs, because a consequence of the new SLAs is not that there will occur more problems at the customer. The consequence can be that in some cases the workload is more than normal, because for example there occurred 5 problems with software or hardware that have an SLA gold. Then at that moment, there needs to be worked harder, but also the effect is that these problems are solved faster. The consequence of the fact that these problems are probably solved faster is that there can be more time spent on other tickets or there is time over that can be spent on other activities.

Configuration item

Using configuration items in Autotask will not have a big influence on the amount of work for the staff members in the 1st line. The only difference is when certain hardware or software does not have a configuration item yet, the staff members have to make a configuration item, which takes a little time. But when certain hardware or software already has a configuration item, this will save time. The staff members can select this configuration item and have directly in the ticket all the necessary information about the software or hardware. So in the end the amount of work will not change very much, for the use of configuration items.

Priority scheme

The inclusion of the priority scheme will save time for the staff members of the 1st line. Because they have to think less long about which priority to connect to a certain ticket. They can look at the priority scheme, and conclude which priority belongs to the ticket.

Client portal

The effect of customers that use the client portal, will be that it saves a lot of time. Customers can submit tickets, check the status of their projects, run reports, track the status of previously submitted tickets and see the timesheets and notes taken by our workers and view their invoices on the portal. All these aspects that can be done in the client portal will save time for the staff members of the 1st line. Also as mentioned earlier if the customer is well aware of the solution and cause of the problem, this customer may solve or prevent the problem himself the next time when the same problem occurs. This will mean that this customer no longer has to call or email Denko when the same problem occurs, this can also save a lot of time for Denko.

Availability

The change of availability from 99.8% to 99% will cause a small decrease in the amount of work for the staff members of the 1st line. This availability in the new SLAs would amount to a maximum of 5 hours of loss per quarter. In the old situation this would be a maximum of 1 hour of loss per quarter, so the effect is that Denko can have 4 more hours of loss per quarter.

To conclude, when comparing all the aspects that influence the workload of the staff members of the 1st line. The using and implementation of the new SLAs will not cause an increase in workload. The prediction is that the workload will decrease or will not change at all when the new SLAs are used constantly and correctly.

5.2 Evaluation of the improved SLAs

In this section, the solution of this research is evaluated. This is done with the help of a method that uses surveys to evaluate solutions. Since the main research question is stated that we want to increase customer satisfaction and improve communication between the customer and Denko, and also internally at Denko, it is important to also evaluate whether this has been achieved or not after the implementation of the new SLAs. Other aspects of the solution will also be evaluated, in order to expand the range of the evaluation and to get more insights into how the SLA (will) perform.

5.2.1 Unified Theory of Acceptance and Use of Technology

The solution design of this thesis is validated using the technique known as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). This strategy is especially applicable since new SLAs are offered in the solution design in the form of models, and the client portals are also presented in the form of dashboards. This technique estimates the likelihood that novel technical artifacts, such as models, dashboards, or other user-technology, will be successful. The procedure is shown in Figure 6 and involves using a questionnaire with 6 constructs:

1. **Performance expectancy:** The degree to which a person expects that using the system would enable him or her to improve their performance at work is known as performance expectancy.
2. **Effort expectancy:** Effort expectancy is defined as the level of comfort entailed in system usage.
3. **Social influence:** The degree to which a person believes that significant individuals think they should use the new method is known as social influence. This construct is not relevant for this research, is up to the user whether to use this or not.
4. **Facilitating conditions:** The degree to which a person thinks that an organizational and technological infrastructure exists to facilitate the use of the system is known as the "facilitating condition."

5. **Behavioral intention:** This has to do with having the aim to use the object and integrate it into routine tasks.
6. **Use behavior:** This has to do with how the users will use the system.

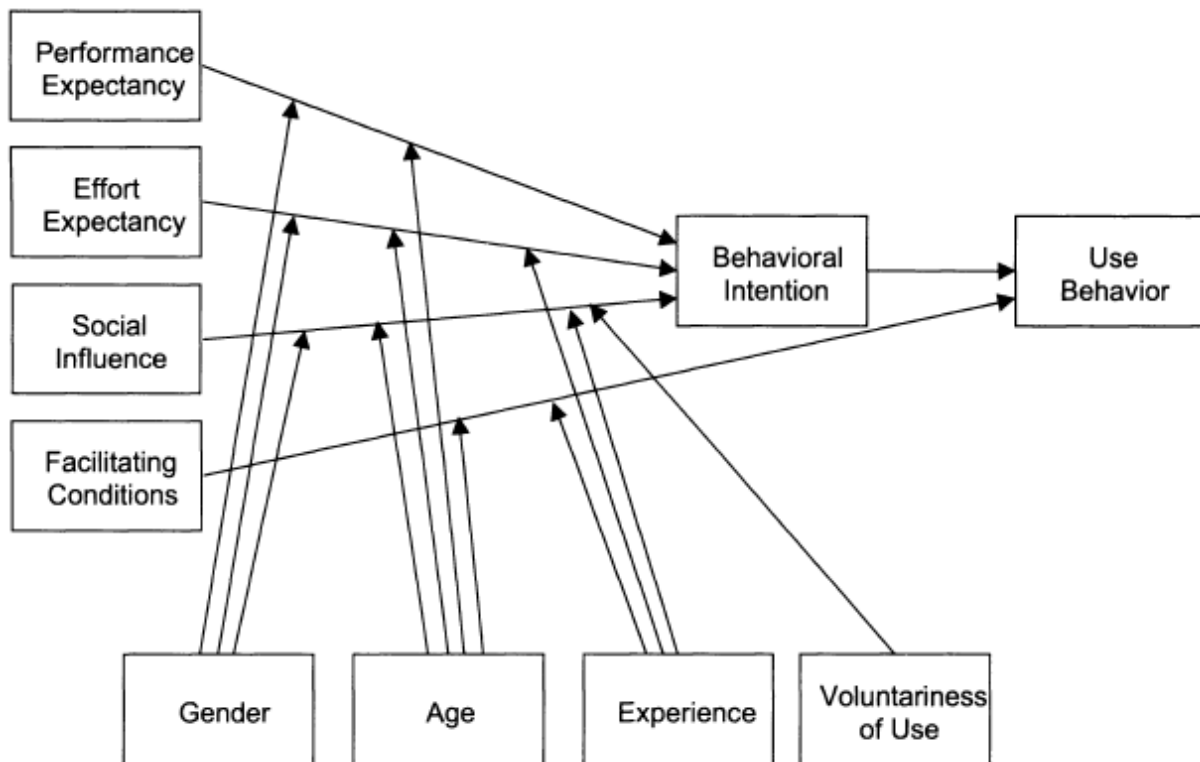


Figure 6 - The UTAUT model (Venkatesh et al., 2003)

As noted in Figure 6 above, the approach also makes use of 4 additional variables that affect the 6 constructions listed above. To comprehend the perspective of an interviewee, these four criteria are used. Gender, age, experience, and voluntariness of use are these criteria (Venkatesh et al., 2003).

5.2.2 The evaluation survey

To evaluate the solution with a survey, first a presentation was given in which the results and solution from this project were explained. In this presentation, we also showed how the SLAs, configuration items, and client portal can be implemented within Autotask. After the presentation, the survey was given to the listeners. Multiple questions were asked in this survey, following the UTAUT model. There were 2 participants for this survey, the work supervisor and the director/owner of Denko. The number of participant was limited to 2 given a company decision of not informing or surveying staff members and customers about the new SLAs so to prevent that certain staff members and/or customers have different levels of knowledge about the new SLAs and the way of working with the new SLAs. If certain staff members and/or customers have different levels of knowledge about the new SLAs, then this can cause communication errors.

5.2.3 Evaluation results

The director/owner of Denko and the work supervisor were requested to assign marks ranging from 1 to 5 to each statement. These ratings reflect a viewpoint. The grades stand for 'strongly disagree', 'disagree', 'neutral', 'agree', and 'strongly agree', respectively. The strongly disagree response received a 1, and the strongly agree response received a 5. As a result, scores from 1 to 2 represent negative feedback, 3 represents neutral feedback, and 4 through 5 represent good feedback.

The complete list of the questions that are asked in the survey can be found in Appendix 10. In Table 7 an overview of the answers from the survey can be found.

Question	Answers supervisor	Answer director/owner	Mean
1. PE-1	4	3	3,5
2. PE-2	4	5	4,5
3. PE-3	4	5	4,5
4. PE-4	4	5	4,5
5. PE-5	4	4	4
6. PE-6	4	5	4,5
7. EE-1	4	4	4
8. EE-2	4	4	4
9. EE-3	3	5	4
10. ATT-1	5	5	5
11. ATT-2	4	4	4
12. ATT-3	4	3	3,5
13. FC-1	4	3	3,5
14. FC-2	4	4	4
15. FC-3	4	4	4
16. SE-1	4	3	3,5
17. SE-2	4	3	3,5
18. SE-3	4	3	3,5
19. BIU-1	5	5	5
20. BIU-2	5	5	5
21. BIU-3	5	5	5
Average Performance Expectancy	4	4,5	4,25
Average Effort Expectancy	3,667	4,33	4
Average Attitude Towards Technology	4,33	4	4,16
Average Facilitating Conditions	4	3.667	3,83
Average Self-Efficacy	4	3	3,5
Average Behavioral Intention of Use	5	5	5
Average of total score	4,14	4,14	4,14

Table 8 – Results of evaluation survey

In Table 8 the answers that are given are shown together with the mean. The mean value shows the average opinion of the participants.

The mean value for the questions has a range from 3,5 up to 5. The mean of the questions was six times 3,5, seven times 4, four times 4,5, and four times the mean of the questions was 5. We can also conclude that there is never given an answer of 1 or 2 and that the average score in total is 4,14. This shows that there is a (very)positive opinion of the new SLAs and that they will be accepted. The questions that had the most positive feedback were ATT-1 and the last three questions of the survey, so BIU-1,2,3. There are no specific questions that scored more negative than others. An overview of the means for every question of the evaluation survey can be seen in Figure 7.

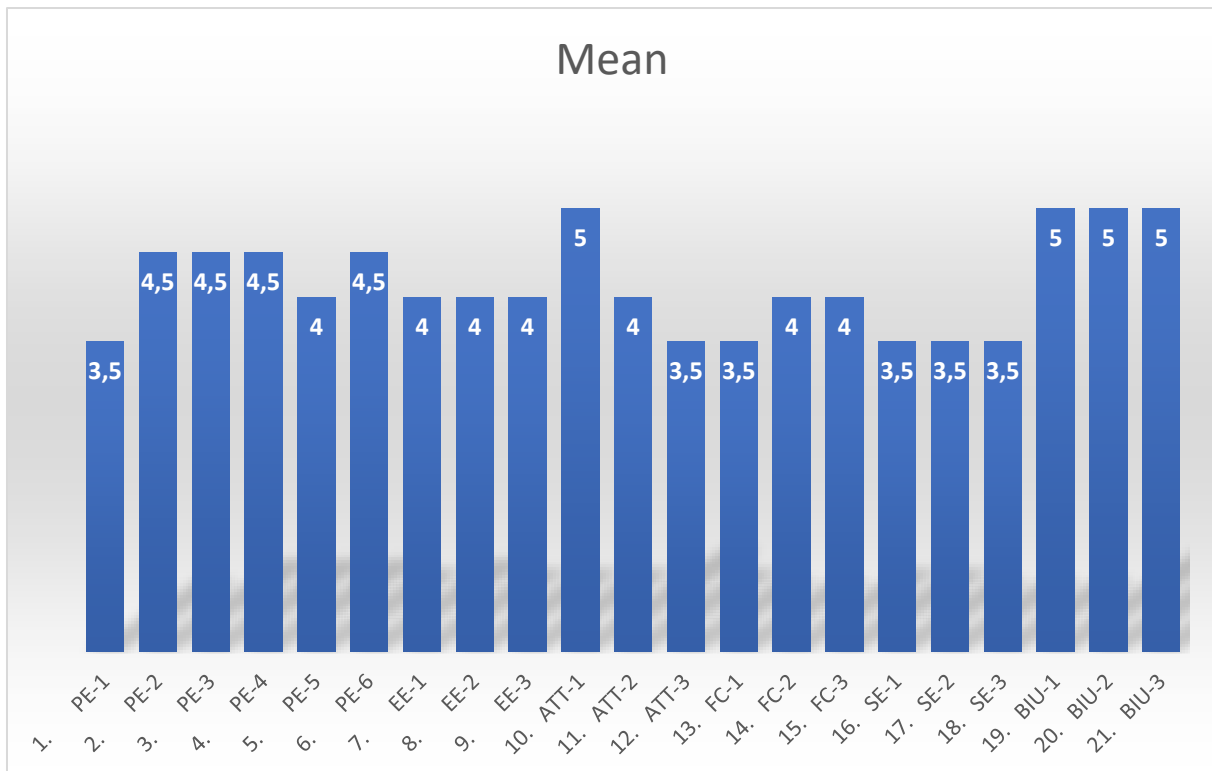


Figure 7 – The means of the evaluation questions

We will now discuss what we can conclude from the evaluation survey per construct of the UTUAT (Venkatesh et al., 2003):

Performance expectancy

The score of the performance expectancy is on average 4,25. So it is agreed on that the implementation of the new SLAs will have a positive influence on the performance at work, this construct has the second highest score when looking at the mean of this construct. Specifically looking at PE-4,5,6, these three statements also score high. These three statements represent the three aspects that needed to improve in order to give an answer to the main research question. Stated as: How can Denko improve its SLA, to increase customer satisfaction and communication with customers and internal communication within the company?

So according to the UTUAT model (Venkatesh et al., 2003), we answered to the main research question with the new designs of the SLAs that are explained in Section 4.

Effort expectancy

As explained before was effort expectancy defined as the level of comfort entailed in system usage. With an average score of 4 on this construct, it can be concluded that the new SLAs can be used easily in general.

Attitude towards technology

The score of the attitude towards technology is on average 4,16, which is a high score. This construct is about Denko's attitude toward the SLAs. The participants agreed that the new SLAs make the work more interesting and that the use of the new SLAs is fun. The score of ATT-1 is on average 5, this means that Denko strongly agrees that the use of the new SLAs is a good idea. They are therefore fully committed to using the new SLAs. Based on the answers to the ATT questions we can conclude that the attitude towards the new SLAs is perceived as positive.

Facilitating conditions

As explained before is facilitating conditions the degree to which a person thinks that an organizational and technological infrastructure exists to facilitate the use of the system. The mean of this construct is 3,83. This is less than the average of the total score (4,14), but still the participants agreed that they are positive about this construct, because it scores higher than an average score of 3. In general we can conclude that the participants have the required knowledge and resources in order to use the new SLAs.

Self-efficacy

This concept has the lowest mean of all six concepts, the mean is 3,5. This means is still a score higher than an average score of 3, but in this survey it has the lowest mean of all concepts. The reason for a lower score than the other concepts can be that the participants believe that with any assistance or more time, they can complete their jobs.

Behavioral intention of use

This concept scored really high, the mean of the three statements of Behavioral Intension of Use is 5. The score of this concept could not be higher. So in general, we can conclude that the participants expect to use the new SLAs within a period of 6 months.

5.3 Conclusion

In this chapter, we have evaluated the final design of the new SLAs. The solution design of this thesis is validated using the technique known as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The number of participants for the evaluation was limited to 2 given a company decision of not implementing or surveying staff members and customer. Concluding the evaluation, the overall opinion of the participants was really positive about the new SLAs, and they expect to start using the SLAs within a short time. We did not receive any negative feedback or comments about the new SLAs in this evaluation survey. The average score in this evaluation about the new SLAs was 4,16 out of 5, so that is a good score.

We can also conclude that customer satisfaction is increased and communication with the customers and internal communication at Denko is improved after the implementation of the new SLAs according to our evaluation.

6. Conclusion

In Section 6.1, the main conclusion is given of this research. In Section 6.2, the recommendations that resulted from the research are explained. So, in these two sections, an answer is given to the last research (sub) questions:

What conclusions and recommendations can be made from conducting this thesis at Denko?

In Section 6.3, the limitations of the thesis will be reviewed. And in Section 6.4, future research is reviewed.

6.1 Main conclusion

With the help of the context analysis, we can conclude that in the current situation at Denko the SLA has in general a good influence on the relationship between Denko and their customers. The SLA defines a good level of service that is expected by the customers. The customers from Denko do see some improvement possibilities and have some complaints. The customers think for example that the response time of 8 hours is too long, and they want to have a shorter response time. We can also conclude that for big problems such as a complete system failure or a company-wide failure, customers want to have shorter solving times and some customers are also willing to pay extra in order to get shorter solving times. Another key wish of the customers is that they would like more insights into the status of a ticket and receive more information on the cause and solution of the problem.

Out of the literature review, the framework of Huai (2010) is selected and used for the (re-) designing of the new SLAs. With the help of the context analysis and the literature review, we were able to design three new SLAs: SLA bronze, silver, and gold. We can conclude that the new SLAs consist of three new parts: The added and adapted aspects, the use of configuration items, and the use of the client portal.

The solution of the research needed to be implemented into the current system of Denko. It can be concluded that the implementation consists of three steps: The adding of the three SLAs into Autotask, the connecting of the different ticket & task statuses to their correct SLA event, and the implementation of the client portal and configuration items in Autotask.

When the new SLAs are going to be implemented to the customers of Denko, we can conclude that the prediction is that the use and implementation of the new SLAs will not cause an increase in the workload of the staff members of the first line. The workload will decrease even when the new and adapted aspects of the new SLAs are used constantly and correctly, or the workload will not change at all. From the evaluation, we can conclude that the implementation of the improved SLAs will have a positive influence on customer satisfaction, communication internally, and the communication between Denko and the customer. So coming back to the main research question:

How can Denko improve its SLA, to increase customer satisfaction and improve communication with customers and internal communication within the company?

We can conclude with the information that we received from the research (sub) questions, that the answer to the main research question is: Using and implementing the new SLAs.

6.2 Recommendation

In this section, the recommendations for Denko are listed. These recommendations come out of the stated conclusions and the performed research.

1. The first recommendation towards Denko is to attach a price to the SLA silver and the SLA gold. When there is no price attached to the SLAs silver and gold, these SLAs can also not be offered and sold to the customer. The attaching of a price to the SLAs silver and gold was out of the scope of this thesis.
2. To complete the framework of Huai (2010), step 7: Implementing agreement has to be completed. It is recommended to organize a meeting when all staff members of Denko are available. In this meeting, the new SLAs need to be explained, and also the way Denko is going to work with the SLAs needs to be explained. So this included: The three new SLAs, the use of ticket & task statuses, the SLA events, the use of configuration items, and the use of the client portal. From that moment on, the old SLA is no longer used, and only the new SLAs need to be used.
3. The staff members from sales at Denko need to stimulate the customers with the use of SLAs. The customers need to be familiar with the new SLAs from Denko, this will prevent emails or calls from the customer when they need to know something about what is agreed on together. This can save a lot of time; this time can then be used for other activities. The sales department of Denko also needs to stimulate and convince the customer to buy the SLA silver or gold for certain software or hardware. Additionally, the staff members from sales also need to stimulate the customers to use the client portal and when the customers have questions about the client portal, they must be open to help the customers with this.
4. For the staff members internally, we specifically recommend using the ticket & task statuses and the configuration items constantly and correctly. If these two aspects will be used constantly and correctly, Denko will build a kind of database and history. Then it also becomes possible to report and monitor the SLAs and the ticketing system.
5. Another recommendation for the staff members that work in the 1st line is to correctly write the cause, resolution plan, and solution in the ticket. The information that is attached to the ticket needs to be useful.
6. The last recommendation for Denko is to report and monitor constantly the SLAs. If for example it is concluded that the success rates are in most cases not achieved, then consideration should be given to taking on additional staff. Also, it becomes possible for Denko to publish performance reports towards customers.

6.3 Limitations

The first limitation is set by the University and that is that the bachelor thesis has to be finished within ten weeks, causing that we could not do endless research. Accordingly, choices must be made regarding the research's scope.

A consequence of the fact that this research had to be finished in ten weeks is that the SLAs could not be tested in real situations. The reason for this is that Denko wanted to wait to use the SLAs until everyone of the staff members was informed of the new SLAs. So the evaluation of the new SLAs was limited.

Another limitation of the fact this research had to be finished in ten weeks is that we could not include step 5 of the framework of Huai (2010), which is 'generating buy-in'. In this step, there is a chance for those individuals from both parties who are accountable for its success to evaluate the draft version of the SLA. Instead, we have included in the new SLAs, that the SLAs have a notice/renewal period of 3 months. After these 3 months, the SLA can be evaluated and certain adjustments can be made. After these 3 months, both parties know how satisfied they are about the way of working with the new SLAs,

then the SLAs can even be better evaluated than when both parties do not know what their opinion is about the way of working with the new SLAs.

The researcher of the project has a past where he did not use ICT/IT, the researcher also did not have a previous internship/workplace in the ICT/IT world. This resulted in that the researcher did not have a lot of prior knowledge about ICT/IT and SLAs.

The researcher also had no access to all the data of Denko, because of ISO 27001 (standard for information security management systems).

Another limitation is that studies on SLAs are not the most common studies that are done. This caused that there are not a lot of academic sources that are useful for this research. The result of this is that it took a lot of time to find good and useful academic sources that could be used for a literature review.

The last limitation is that other (ICT) companies often do not have their SLA published, so this gives limitations when searching for SLAs of other companies.

6.4 Future research

In ten weeks, this bachelor's thesis was completed. Therefore, an extensive investigation was not feasible. This is why in this section we sum up possible future investigations:

- For future research, it is advised to do more extensive research into the opinion of the customers. This is to get better insights into what the customers' needs are and what they expect from an SLA. This can be done by conducting a survey or interview with more customers, or by asking more specific questions. The result could be that customer satisfaction even more would increase.
- We also recommend doing more extensive literature research in order to find more techniques that improve the design of an SLA. When there are found more techniques, then it can be the case that there will be chosen a better technique that improves the design of an SLA even more than it is the case now.
- For future research, it is advised to do more extensive research on SLAs from other ICT companies. As a researcher, you get interesting insights when reading other SLAs. There are found only a few SLAs from other ICT companies, so we did not get a lot of insights into other SLAs. When there was more time, it is advised to do more investigation into this.
- To kind of complete the research, we recommend also doing research on the pricing of the SLA silver and gold in future research. For this research, the pricing of the SLA silver and gold was out of the scope. When there was more time for doing research, it is recommended to do an investigation into the pricing of an SLA.

Reference list

- Al-Ghuwairi, A., Khalaf, M. N., Al-Yasen, L., Salah, Z., Alsarhan, A., & Baarah, A. H. (2016). *A Dynamic Model for automatic Updating cloud computing SLA (DSLAs)*.
<https://doi.org/10.1145/2896387.2896442>
- Asosheh, A., & Hajinazari, P. (2012). Towards improving enterprise performance with Service Level Agreements. *International Symposium on Telecommunications*.
<https://doi.org/10.1109/istel.2012.6483116>
- Bhandari, P. (2022). Ethical Considerations in Research | Types & Examples. *Scribbr*.
<https://www.scribbr.com/methodology/research-ethics/>
- Bragg, S. (2022). Professional ethics definition — AccountingTools. *AccountingTools*.
<https://www.accountingtools.com/articles/professional-ethics>
- City, University of London. (z.d.). *Principles of research ethics | City, University of London*.
<https://www.city.ac.uk/research/support/integrity-and-ethics/ethics/principles>
- Cooper, D. R., & Schindler, P. S. (2013). *Business Research Methods*. McGraw-Hill Education.
- Crossman, A. (2020). The Major Theoretical Perspectives of Sociology. *ThoughtCo*.
<https://www.thoughtco.com/theoretical-perspectives-3026716#:~:text=A%20theoretical%20perspective%20is%20a,or%20distort%20what%20we%20see.>
- DeFranzo, S. E., & DeFranzo, S. E. (2023). Advantages and Disadvantages of Surveys. *Snap Surveys Blog*. <https://www.snapsurveys.com/blog/advantages-disadvantages-surveys/#:~:text=Respondents%20may%20not%20feel%20encouraged,the%20subject%20or%20even%20boredom.>
- Denko. (2022, 12 January). *Denko - De totaaloplosser van ICT, Telecom en Domotica*.
<https://denko.nl/>

- Edinat, A., Al-Sayyed, R. M. H., & Hudaib, A. (2021). A Survey on Improving QoS in Service Level Agreement for Cloud Computing Environment. *International journal of interactive mobile technologies*, 15(21), 119.
<https://doi.org/10.3991/ijim.v15i21.26379>
- Faisal, T., Lucena, J. a. O., Lopez, D. R., Wang, C., & Dohler, M. (2023). How to Design Autonomous Service Level Agreements for 6G. *IEEE Communications Magazine*, 61(3), 80–85. <https://doi.org/10.1109/mcom.001.2200131>
- Home page. (z.d.).
https://ww4.autotask.net/help/Content/1_General_Landing/MAIN_LANDING_PAGE.htm
- Huai, J. (2010). *Design Service Level Agreements in Outsourcing Contracts*.
<https://doi.org/10.1109/icmss.2010.5577788>
- Indeed Editorial Team. (2022). 12 Tips for How To Show Respect in the Workplace. *Indeed Career Guide*. <https://ca.indeed.com/career-advice/career-development/respect-in-the-workplace>
- Labidi, T., Sakhrawi, Z., Sellami, A., Mtibaa, A., & Bouassida, N. (2022). On the use of OLS regression algorithm and Pearson correlation algorithm for improving the SLA establishment process in cloud computing. *Innovations in Systems and Software Engineering*. <https://doi.org/10.1007/s11334-021-00424-4>
- Lee, J., & Ben-Natan, R. (2002). Integrating Service level Agreements: Optimizing your OSS for SLA delivery. In *John Wiley & Sons, Inc. eBooks*.
<https://dl.acm.org/citation.cfm?id=863037>
- Liu, Z., Squillante, M. S., & Wolf, J. L. (2001). *On maximizing service-level-agreement profits*. <https://doi.org/10.1145/501158.501185>

Middleton, F. (2023). Reliability vs. Validity in Research | Difference, Types and Examples.

Scribbr. <https://www.scribbr.com/methodology/reliability-vs-validity/#:~:text=are%20also%20valid,-.How%20are%20reliability%20and%20validity%20assessed%3F,other%20relevant%20data%20or%20theory.>

Professional ethics and codes of conduct - Immigration Advisers Authority. (2018, 17 May).

Immigration Advisers Authority. <https://www.iaa.govt.nz/for-advisers/adviser-tools/ethics-toolkit/professional-ethics-and-codes-of-conduct/>

Research Guides: Research Methods: Ethics in Research. (z.d.).

<https://libguides.library.cityu.edu.hk/researchmethods/ethics>

Sauve, J., Marques, F. J., Moura, A., Sampaio, M. V., Jornada, J., & Radziuk, E. (2005). SLA

Design from a Business Perspective. In *Lecture Notes in Computer Science* (pp. 72–83). Springer Science+Business Media. https://doi.org/10.1007/11568285_7

Venkatesh, V., Morris, M., Davis, G. B., & Davis, F. D. (2003). User acceptance of

information Technology: toward a unified view. *Management Information Systems Quarterly*, 27(3), 425. <https://doi.org/10.2307/30036540>

What is Scientific Knowledge? (2022, 4 April). [Video]. Study.com.

<https://study.com/learn/lesson/scientific-knowledge-overview-examples.html>

What is Social Impact and How Do I Measure It? | Good Finance. (z.d.).

<https://www.goodfinance.org.uk/latest/post/what-social-impact-and-how-do-i-measure-it#:~:text=Social%20impact%20can%20be%20defined,%2C%20project%2C%20programme%20or%20policy.>

Wikipedia contributors. (2022). Interactionism. *Wikipedia*.

<https://en.wikipedia.org/wiki/Interactionism#:~:text=Interactionism%20is%20micro%20sociological%20perspective,goal%20of%20communicating%20with%20others>.

Wright, G., & Lavery, T. (2023). scientific method. *WhatIs.com*.

<https://www.techtarget.com/whatis/definition/scientific-method>

Appendix

Appendix 1- MPSM Steps

Step 1: Problem identification

The first step within the problem identification is starting with the problem, which is given by Denko in this case. After that, the next step is pointing out the different problems that Denko has. With these problems a scheme with the causes and results between the problems can be made, a so-called problem cluster. With the help of the problem cluster, the core and action problem at Denko can be found.

Step 2: Solution planning

In the solution planning step, we want to know how we are going to arrive at the solution. We need to make certain decisions in terms of the research. As an example: Supervisors for the thesis project must be found, as the supervisors have a key role, because they help and guide the researcher doing the project. Another aspect in solution planning is pointing out what needs to be known to arrive at the solution. This will be done by coming up with the research questions that need to be answered to come up with a solution in the end. Also, choices need to be made in terms of what the result of the conclusion needs to be in the end. For example: When implementing the new SLA, does only Denko themselves need to benefit from it, or do the customers of Denko also need to experience improvements?

Step 3: Problem analysis

Within the problem analysis step of the MPSM, we want to find more details about the problem at Denko. For example, we need to search if the outdated SLA is really the cause that results in our action problem. Otherwise, we need to search for the exact cause(s) of the action problem. A content analysis also has to be done, to get some insights into the current situation at Denko. In the problem analysis, there is also going to be searched to see if there are already solutions for such communication errors and lower customer satisfaction that result from an unclear and outdated SLA. There will be looked why these solutions are not used at Denko or they will be analyzed if these solutions are looking useful.

Step 4: Solution generation

The first step we have to take in the solution generation step is to see what the requirements are of our new SLA(s), to see what the key elements are that need to be improved/changed or added. We can give certain requirements scores and weights to indicate what are the most important aspects that need to be included in the new SLA(s) for Denko. After this, there can be looked at existing or new solutions. If there are found a set of different solutions that improve the current SLA, then these solutions will be compared on their attractiveness.

Step 5: Solution choice

Within the solution choice step of the MPSM, a choice between the different solutions will be made. This choice will be made together with Denko's supervisor. The reason for this is that together with my work supervisor we have to see if the agreements that are stated in the new SLA(s) can be implemented in Autotask PSA. If the agreements that are stated in the new SLA(s) cannot be implemented in Autotask PSA, which is an existing application that Denko uses for its ticketing system and its dashboards, then these agreements will not be chosen.

Step 6: Solution implementation

Within this phase of the MPSM, the solution will be implemented. For this thesis project, this will mean the implementation of the new agreements that are stated in the improved SLA in Autotask, this will be done in collaboration with Denko's supervisors. There must also be an implementation plan and if practical issues when implementing the SLA(s) in Autotask occur, then these issues have to be solved.

Step 7: Solution evaluation

Within the last step, the researcher will look at how the new SLA(s) did/do. There can be asked questions like: Is the communication internally at Denko and with customers really improved? Or is customer satisfaction improved? Conclusions and recommendations also have to be made in the solutions evaluation step.

Appendix 2 – Invitation for the survey (In Dutch)

Beste [Contact: First Name][Contact: Last Name]

Wij zijn momenteel bezig met het verbeteren van de SLA (Service Level Agreement) van Denko. Het onderzoek gaat erover dat er meer duidelijkheid moet komen over de SLA zodat deze ook gerapporteerd en gemonitord kan worden.

Hiervoor hebben we uw mening ook nodig over de verschillende aspecten van de SLA. Daarom vragen we of u deze survey voor ons zou kunnen invullen graag, hier zouden we namelijk heel veel profijt van hebben. De survey duurt ongeveer rond de 5-10 minuten om in te vullen.

Als u verdere vragen heeft over het invullen van de survey, kunt u ons altijd contact met ons opnemen via s.korfage@denko.nl

U kunt de survey invullen via: [Link voor survey](#)

Alvast hartelijk bedankt voor uw bijdrage aan deze survey.

Met vriendelijke groeten,

Denko-ICT

Harald Beernink en Stijn Korfage (Student aan UT)

Appendix 3 - The complete survey (In Dutch)



Onderzoek over de SLA van Denko-ICT

Beste klant,

We zijn momenteel bezig met een onderzoek over het verbeteren van de SLA(Service Level Agreement) van Denko. Als we op het einde van het onderzoek een goede conclusie en aanbeveling kunnen schrijven, kan u als een klant van Denko hier alleen maar profijt van hebben.

Daarom vragen we om alstublieft even de tijd te nemen om deze vragen te beantwoorden over uw ervaring en mening.

Alvast heel erg bedankt voor uw medewerking! **En vergeet niet om op Submit te klikken nadat u de vragen hebt ingevuld.**

Niveau	Omschrijving	Toelichting
1	Critical	Het geheel niet beschikbaar zijn van de Dienst.
2	High	Gedeeltelijk onderbroken / verminderde prestatie van de Dienst.
3	Normal	Problemen met relatief storende gevolgen voor Opdrachtgever.
4	Low	Fouten die niet direct storend zijn voor de Opdrachtgever.

Figuur 1 - De verschillende prioriteiten van een ticket

Prioriteitsniveau	Reactietijd*	Hersteltijd*
1	8 Business Hours	24 Business Hours
2	8 Business Hours	28 Business Hours
3	8 Business Hours	32 Business Hours
4	8 Business Hours	36 Business Hours

Figuur 2 - De verschillende prioriteiten met hun bijhorende reactietijd en hersteltijd

Bedrijfsnaam (Als u onherkenbaar de survey wilt invullen is * ook goed) *

Hoe tevreden bent u met de services die Denko aanbied in het algemeen? *

(5 being the highest rating)

1 2 3 4 5 N/A
 Clear

Hoe tevreden bent u met de communicatie tussen u en Denko in het algemeen? *

(5 being the highest rating)

1 2 3 4 5 N/A
 Clear

Op het moment staat er in de SLA(Service Level Agreement, (1*)), dat u als klant binnen 8 uur de prioriteit te horen moet krijgen van de ticket(2*). Ook na het oplossen van het ticket, moet u als klant te horen krijgen wat de oorzaak en oplossing is van de ticket. Hoe tevreden bent u over de hoeveelheid en manier hoe u wordt geïnformeerd over de status van een ticket? En waarom? - (U kunt uw tevredenheid uitdrukken met een cijfer tussen 1-5, zoals hiervoor ook het geval) *

Hoe tevreden bent u met het inzicht dat u krijgt met betrekking tot hoe Denko presteert? En waarom? Dit wil zeggen inzicht hebben tot verschillende performance indicatoren van Denko. Als u momenteel hier geen inzicht in hebt, kunt u dit ook aangeven. - (U kunt uw tevredenheid uitdrukken met een cijfer tussen 1-5, zoals hiervoor ook het geval) **

Gebeurt het vaak dat er een miscommunicatie is tussen u en Denko? Als we het hebben over de afspraken die zijn gemaakt tussen u en Denko? - (1: Is nog nooit gebeurd of heel erg zelden, 5 : Gebeurt regelmatig) *

(5 being the highest rating)

1 2 3 4 5 N/A
 Clear

Op het moment staat er in de SLA, dat de tijd die Denko heeft om een ticket op te lossen is gebaseerd op de prioriteit van het ticket(zie Figuur 1). Was u op de hoogte van deze verschillende prioriteiten? En wat vindt u ervan dat de tijd die Denko heeft om een probleem op te lossen alleen gebaseerd is op de prioriteit van de ticket? *

In de SLA van dit moment, staat ook dat hoe belangrijker de prioriteit van het ticket hoe minder tijd Denko heeft om het probleem op te lossen(zie Figuur 2). Was u op de hoogte van deze tijden? En wat vindt u van deze reactietijden(3*) en hersteltijden(4*), passen de tijden goed bij hun bijhorende prioriteit? *

Zou u bereid zijn om extra te betalen voor kortere reactietijden en hersteltijden? Zo ja: In hoeverre verwacht u dat de reactietijden en hersteltijden veranderen, als er extra betaald wordt? Zo nee: Wat is de reden dat u niet geïnteresseerd bent in kortere reactietijden en hersteltijden? *

Als het mogelijk was, zou u dan verschillende reactietijden en hersteltijden willen voor verschillende software/hardware? Als ja: Voor welke software/hardware zou u kortere of langere tijden willen? Als nee: Wat is de reden waarom u geen andere tijden wil voor verschillende software/hardware? *

Zou u het interessant vinden om meer inzicht te krijgen in hoe Denko presteert? Dit wil zeggen, meer inzicht krijgen in wat de status is van een ticket en/of meer inzicht in bepaalde performance indicatoren? En waarom wel of niet? *

Als u in staat was om bepaalde overeenkomsten toe te voegen in de SLA, wat van soort overeenkomsten zou dit dan zijn? Of misschien hoe u de momentele overeenkomsten zou veranderen? (Als u geen antwoord heeft, is nee ook een optie) *

Submit You are in Preview mode. If you submit this survey, your responses will not be counted.

1*: SLA is de overeenkomst waarin afspraken staan tussen klant en Denko

2*: Tickets worden gebruikt om ondersteuningsproblemen, serviceverzoeken, incidenten en problemen voor interne en - externe klanten bij te houden. De ticket bevat als het ware alle informatie over het probleem of fout dat is opgetreden.

3*: Reactietijd is de tijd tussen het tijdstip waarop opdrachtgever een melding van een fout heeft gedaan en het tijdstip waarop opdrachtnemer een reactie stuurt aan opdrachtgever

4*: Hersteltijd is de tijd tussen het tijdstip waarop opdrachtnemer een fout heeft geconstateerd of opdrachtgever een melding van een fout heeft gedaan en het tijdstip waarop de fout is opgelost

Appendix 4 – Contacted companies for survey

Beijer Transport & Logistics BV Total	Stegehuis B.V. Total
InfoDish B.V. Total	L.H. van der Woning Glas B.V. Total
Kwekerij Aarninkhof Beheer B.V. Total	Olde Hanter Bouwconstructies Total
H.V.P.C. BV Total	Fedacc BV Total
Addition Solutions B.V. Total	Nijhuis taxi
Werktuig & Bouwdienst Denekamp Total	Today Food Group BV Total
Betoncentrale Twenthe B.V. Total	Adventure King B.V. Total
RePi Installatietechniek B.V. Total	Crownfood XL BV Total
Transportbedrijf Schopman BV Total	Stuiver bewind en beheer Total
Vitaal Verder BV Total	Agro World Transport B.V. Total
STT LOGISTICS B.V. Total	Tijhuis Houtbewerkingsmachines BV Total
Ruel Staalconstructies BV Total	Nusmeier C.S. praktijk voor fysiotherapie (De Thij) Total
't Gantvoort BV Total	Platvoet Beveiligingssystemen BV Total
WEG Benelux SA Total	Installatie Bureau Vasterink Total
Dumeta Handwheels BV Total	Machinefabriek Westerhof BV Total
TransHeroes Real Estate B.V. Total	Volker BV
Bakkerij Holland Total	Aircrete Systems B.V. Total
Textielreiniging "Het Springendal" B.V. Total	Trinity Trade B.V. Total
Oude Elferink Natuursteen Total	Veldscholten Dakdekking B.V. Total
Vennegoor Installatie B.V. Total	Ter Hoek Vonkerosie Rijssen B.V. Total
Buurman Facilitaire Producten Total	

Appendix 5 - The survey questions with goals

Survey question 1: How satisfied are you with the services that Denko provides you with in general? (Answer: Scale of 1-5, with 5 being very satisfied and 1 being not satisfied)

- The goal is to get an overview of how satisfied the customers are with the services that Denko provides. This is to see how the general customer satisfaction is at the moment and to see if there is a lot of improvement possible.

Survey question 2 – How satisfied are you with the communication between you and Denko in general? (Answer: Scale of 1-5, with 5 being very satisfied and 1 being not satisfied)

- The goal of asking this question is to get an overview of how satisfied the customers are with the communication between them and Denko. This is to see how the general communication is at the moment between the customer and Denko and to see how much improvement is possible.

Survey question 3 – Currently in the SLA (Service Level Agreement), Denko has to provide the customer within 8 hours with the priority of the ticket, also when the ticket is solved the customer must receive the cause and solution of the ticket. How satisfied are you with the amount and manner in which you get informed about the status of a ticket? And why? (Answer: Scale of 1-5, with 5 being very satisfied and 1 being not satisfied - Open)

- We want to get insights into the customers' opinions about the amount and the manner in which they get informed about the status of a ticket. In the current SLA is included that Denko has to provide the customer within 8 hours with the priority of the ticket, this must be communicated via email. Also when the ticket is solved the customer must receive the cause and solution of the ticket, this must be communicated via email or telephone. We want to see how satisfied the customers are with this form of communication and get insights into how strictly Denko follows these agreements. This can be an interesting aspect to increase customer satisfaction and communication.

Survey question 4 – How satisfied are you with the insights that you get into how Denko performs, for example, if you get insight into certain KPIs from Denko? Why? (Answer: Scale of 1-5, with 5 being very satisfied and 1 being not satisfied - Open)

- The goal is to get information about how satisfied the customers are with the current insight they have into such performance indicators of Denko. The current SLA cannot be monitored or reported, so it is also quite difficult to measure such KPIs and report this to the customer.

Survey question 5 – Occurs a miscommunication(misunderstanding) between you and Denko often, if we talk about the agreements that are made between you and the company? (Answer: Scale of 1-5, with 5 being regular and 1 being never occurred/very rare)

- We want to know whether the customers experience many miscommunications or whether they have the feeling that such problems do not occur that often.

Survey question 6 – Currently in the SLA, there is stated that the amount of time Denko has to solve your ticket is based on the priority the ticket has(see Table 9). Were you aware of these priority differences? And what is your opinion about the time Denko has to solve a ticket is only based on the priority of a ticket? (Answer: Yes/No and open)

Niveau	Omschrijving	Toelichting
1	Critical	Het geheel niet beschikbaar zijn van de Dienst.
2	High	Gedeeltelijk onderbroken / verminderde prestatie van de Dienst.
3	Normal	Problemen met relatief storende gevolgen voor Opdrachtgever.
4	Low	Fouten die niet direct storend zijn voor de Opdrachtgever.

Table 9 – (In Dutch) The four different priorities

- The goal of asking this question is that we want to know what the opinion of the customer is about the four different priorities that influence the solving time for a ticket. Also, we want to know whether the customer is aware of this agreement in the SLA at all.

Survey question 7 – Currently in the SLA, there is stated that the more important the priority of the ticket (“Prioriteitsniveau”), the faster the ticket has to be resolved(see Table 10). Were you aware of these differences in the maximum solving time of a ticket? And what do think about the response time (“Reactietijd”) and solving time (“Hersteltijd”), are the times in combination with the priority too long, or do the times fit well with the priority? (Answer: Yes/No and open)

Prioriteitsniveau	Reactietijd*	Hersteltijd*
1	8 Business Hours	24 Business Hours
2	8 Business Hours	28 Business Hours
3	8 Business Hours	32 Business Hours
4	8 Business Hours	36 Business Hours

Table 10 – The priorities with their response and solving time

- The goal is to get insight into what the customer thinks about the response and solving time. To see how satisfied they are currently are with the times that belong to the corresponding priority. And again to know whether the customers were aware that the different priorities have different solving times.

Survey question 8 – Would you be willing to pay extra for a shorter response time and solving time? If so: What do you expect from the response time and recovery time, if you pay extra? If no: What is the reason you are not interested in shorter response times and solving times? (Answer: Yes/No and open)

- Shorter response and solving times can be an interesting aspect to include in the new SLA. For customers that want to have a shorter response and solving time, it will be advantageous. Also for Denko self, it can be advantageous if such customers are willing to pay extra for this. That is why we are asking this question to the customers.

Survey question 9 – If it were possible, would you want to have a different response and solving time for the different software/hardware you have? If yes, for which type of software/hardware you would like a faster and/or response and solving time? If not, what is the reason you do not need a different response and solving times for different software/hardware? (Answer: Yes/No and open)

- It can be the case that customers find some software or hardware more important than others. If there occurs a problem in this software or hardware, then the customer may want to have

this problem in this software or hardware resolved faster. So the goal of asking this question is to get information if the customer is interested in such an agreement.

Survey question 10 – Would you find it interesting to get insight into how Denko performs? So this means getting informed about certain KPIs from Denko and/or more insight into the status of a ticket. And why? (Answer: Yes/No and open)

- The goal is to get information about whether there are improvements possible in giving the customer more insights into certain performance indicators, to increase customer satisfaction.

Survey question 11 – If you were able to add a certain agreement in the SLA, what kind of agreement would you add? (Open)

- The customers themselves can maybe have interesting ideas to add to the SLA. So it is helpful to see what type of agreements they would add in the SLA, it can be the case that such an agreement is advantageous for both the customer and Denko.

Appendix 6 – Results of the survey

Customers 1:

Q1	5, so he/she is very satisfied with services.
Q2	5, so he/she is very satisfied with communication.
Q3	5, so he/she is very satisfied with the amount and manner how information about the status of tickets is communicated.
Q4	4, so he/she is satisfied with insights in performance.
Q5	2, so it is happened a few times that there is a mis communication.
Q6	5, so he/she is satisfied with that the ticket is only based on priority of a ticket.
Q7	Fine, so he/she thinks the response and solving times are fine.
Q8	No, he/she thinks that a company like Denko should just be fast but can also change priorities if it is not very urgent. They already pay extra to get their turn faster at Disney Land and I do not like to go there.
Q9	No, so he/she do not want other response and solving times for different software/hardware
Q10	No really, so he/she is not really interested in more insights in tickets or performance indicators
Q11	No, he/she would not add anything extras in a new SLA

Customer 2:

Q1	2, so he/she is not really satisfied with services.
Q2	2, so he/she is not really satisfied with communication.
Q3	2, Problems that play longer are temporarily solved and then reoccur. We do not really read the tickets because there is little useful information in them, often it is a confirmation of a telephone conversation.
Q4	1, no insight into performance
Q5	4, so it happened often that there is a mis communication between company and them
Q6	No he/she was not aware of the different priorities of tickets. Depends on the problem, when the mail or phone is out, everything must be done to solve this.
Q7	No, response times are too long in my opinion. See example above.
Q8	No, this should be a standard service. If this is the case, I would rather try to solve it myself because of the higher costs.
Q9	Yes, a big problem should have a high priority and a small problem should have a low priority
Q10	Not necessarily when we call or email and it is not a big problem so we cannot go any further, I trust Denko to pick it up. If we have a problem that prevents us from doing our work, I expect Denko to pick it up immediately.
Q11	No, he/she would not anything extras in a new SLA

Customer 3:

Q1	4, so he/she is satisfied with services.
Q2	4, so he/she is satisfied with communication.
Q3	Overall good. But sometimes I send emails that do not get a response - so I do not know if it is going to be picked up.
Q4	3, so he/she has a neutral opinion about the insights into performance indicators.
Q5	2, so it is happened a few times that there is a mis communication.
Q6	I personally do not, but this is a mistake on our end (probably my boss knows this). In general, resolve times are good.

Q7	Fine, so he/she thinks the response and solving times are fine.
Q8	Yes, interested, but only for really specific cases (company-wide failures). Then it should be solved as soon as possible
Q9	Seems generally universal to me, unless there is some sort of physical limit, e.g. delivery time of replacement hardware.
Q10	Yes, then I also have an answer to other people within my team why it happened, how it was solved, and possibly how to avoid it. (and of course if I am asked every day by colleagues if there is already an update, that I can also answer that)
Q11	No, he/she would not anything extras in a new SLA

Customer 4:

Q1	4, so he/she is satisfied with services.
Q2	3, so he/she has a neutral opinion about the communication between them and Denko
Q3	<p>The operation of tickets is good. However, direct agreements are regularly made between the reporter (colleague of mine) and the practitioner and are not personally fed back despite an appointment. This ticket then ends up in my mailbox as an administrator, but the reporter is not always informed. Also, reported problems without priority are not always addressed and remain untreated.</p> <p>Tip: possibility to hang a 2nd contact person on ticket. 1x the system administrator (me) and 1x the detector.</p>
Q4	I do not think I have any insight into this.
Q5	3, so it happens sometimes that there is a mis communication between them and Denko
Q6	<p>Not specifically aware of the hours, but of the priority differences. Denko now only determines the priority. Added value would be to be able to determine this priority based on impact on the company. Example: the non-functioning or incomplete functioning of Rushfiles immediately shuts down our company for 8 FTEs(Fulltime-equivalent). Then a difference between priority 1 and 5 of 12 working hours is a risk of almost 7 to 10 thousand euros. In addition to the minimum loss of turnover of the 24-hour treatment period. It can therefore have a completely different priority level for a customer than it is from an ICT technical perspective.</p>
Q7	<p>I find a period of 8 working hours for a response of how to solve the problem is a lot. My proposal in terms of response times would be: Prio 1 - 2 hours Prio 2 - 4 hours Prio 3 - 6 hours Prio 4 - 8 hours</p> <p>I can imagine that the response times are also partly dependent on external parties. However, it might be nice to make this twofold. Example: Priority internally beh. external treatment 1 8 hours 24 hours 2 16 hours 28 hours 3 24 hours 32 hours 4 32 hours 36 hours</p>
Q8	This is difficult to estimate. This is also because the "rental" of products in my opinion should also include some kind of delivery guarantee and a level of service. In case of failure of a product or not having it available, no refund will be given on the "rent".

	<p>In addition, I can also imagine that if a customer purchases all services, there is a quicker response than a party that purchases a separate product, we purchase 7/8 different products.</p> <p>Also, if rush files do not work, we have to pay for solving problems if this takes longer than half an hour.</p> <p>So it is hard to say, yes, we want to pay extra for shorter times. This is certainly worth money, but is that fair, because with us most reports and actions arise from the non-functioning or not fully functioning of the purchased products.</p>
Q9	Yes, shorter response times for service related products. Cause problem at supplier than as a service fast response times. Own caused ICT problem, then longer response times or higher service premium to solve this.
Q10	Not necessarily
Q11	Addition of a piece of warranty part. Have solved problems beyond our control of a delivered product/service free of charge (or even indemnified)

Customer 5:

Q1	4, so he/she is satisfied with services.
Q2	2, so he/she is not really satisfied with communication.
Q3	2, so he/she is not really satisfied with the amount and manner how information about the status of tickets is communicated.
Q4	No insights in performance indicators
Q5	2, so it is happened a few times that there is a mis communication.
Q6	He/She thinks it is good that the solving times are only based on the priority of the ticket
Q7	He/She was not aware of the different response and solving times for the different priorities in tickets
Q8	In our opinion, the rates that are applied are fine and an increase would be exorbitant.
Q9	-
Q10	Being informed about the course is preferable
Q11	Agreement with an explanation of invoices, structure and where the prices come from. It is and remains unclear.

Customer 6:

Q1	4, so he/she is satisfied with services.
Q2	4, so he/she is satisfied with communication.
Q3	3, so he/she has a neutral opinion about the amount and manner how information about the status of tickets is communicated.
Q4	4, no further insights
Q5	2, so it is happened a few times that there is a mis communication.
Q6	Was aware. Fine
Q7	Was aware. Response and resolve times should be shorter for all priorities.
Q8	Yes, that partly depends on the staff.
Q9	Shorter times with regard to failure of workplaces/servers.
Q10	No, as it is now, it is fine.
Q11	Looking at the current SLA, it is not clear which services are purchased from Denko ICT. Think for example of, backup recovery, firewall management, network management, updates / patches, management AD policy etc. From the customer's point of view that is carried out by Denko ICT very concretely on paper (read: in the SLA). When agreements

	are written down very concretely, it is also possible for Denko ICT to report on this in a targeted manner and then assess compliance with the customer.
--	--

Customer 7:

Q1	4, so he/she is satisfied with services.
Q2	4, so he/she is satisfied with communication.
Q3	4, so he/she is satisfied about the amount and manner how information about the status of tickets is communicated.
Q4	N/A
Q5	1, so it is happened never or maybe 1 time that there is a mis communication.
Q6	He/She was not aware of that, but he thinks the reaction speed is very high. As a customer, I want to know as soon as possible that it has been picked up and that it is being worked on.
Q7	I was not aware of that. With external influences, I can imagine that a solution is not always easy to come up with. In the event of a complete system failure, a faster (temporary) solution is necessary.
Q8	As long as the need is high enough
Q9	Faster for the essential parts.
Q10	No interest
Q11	No, he/she would not anything extras in a new SLA

Customer 8:

Q1	4, so he/she is satisfied with services.
Q2	3, so he/she has a neutral opinion about the communication between them and Denko
Q3	3, Perhaps this should be part of a visit from your specialist 1x every 6 weeks.
Q4	1, no insights
Q5	4, so it happened often that there is a mis communication between company and them
Q6	Fine, yes fine
Q7	Yes. tricky question. Every part of the process is important. If something is missing, it is disruptive to the process. We have a quality laundry with 24 hours service (read 8 hours). Linen must be returned to the customer within a day.
Q8	Why pay extra for a service you already pay for. We also no longer ask if the customer asks for 8 hours of service or 32 hours of service. This is where we distinguish ourselves from other laundries. That is why customers choose us. Service.
Q9	In case of need, everything must be arranged quickly. rest in consultation so that process is not or minimally disrupted.
Q10	I would like to see some info when Mike visits our company. what is on the agenda and what still needs to be done. Please plan an annual schedule in advance so that the appointments are fixed.
Q11	Annual planning

Customer 9:

Q1	3, so he/she has a neutral opinion about how satisfied he/she is with the services.
Q2	3, so he/she has a neutral opinion about the communication between them and Denko
Q3	3, I do not think the feedback is sufficient. It sometimes remains open-ended. In addition, I find the ticket system does not always clearly show how it is solved. That is why I filled in a 3.
Q4	1, I am not aware of Denko's performance. Would not know where I might see that either. So I would have to indicate "n/a" or else a "1".
Q5	4, so it happened often that there is a mis communication between company and them
Q6	I was aware of this, and I understand that prioritization precedes solving a problem.
Q7	I was aware of this, but I am not really working on this. Lately, I have noticed that recovery times cannot always be met. This has already been discussed with the account manager.
Q8	In my opinion, it should be doable within the stipulated times. Hence no interest in additional payment.
Q9	Currently we have a lot of 'hassle' around the presentation screens. This can be solved and addressed faster from me. Services are not provided in this respect.
Q10	No
Q11	None

Appendix 7 - Systematic Literature Review

A systematic literature review will be conducted to answer a research question. The research question that will be answered with the help of a systematic literature review is the third research (sub) question: What are known techniques that improve the design of an SLA? There will be a lot of literature available for this question, but it is important to get insights into what are used techniques to increase the efficient use of an SLA. So, the formulation of the inclusion and exclusion criteria plus the search terms is important to do this correctly. For the inclusion and exclusion criteria, see Table 11 and for the search terms, see Table 12. The database that is used for the Systematic Literature Review is Scopus. Scopus contains a lot of good literature and using Scopus for a Systematic Literature Review is also easy. It is namely not difficult to understand how Scopus is working, that is also why the researcher likes working with Scopus. Other databases that could be used were Business Source Elite or Web of Science. Also, good databases for doing a Systematic Literature Review, but the researcher liked the environment and way of working of Scopus more.

Important criteria within a Systematic Literature Review are the language, data, and the origin of the article. An important aspect of the article is that the researcher needs to be able to read the entire article and not just a summary or the abstract. As last is it important that the article is focused on the same problem as stated in the knowledge problem. The article needs to help the researcher answering the research question.

Inclusion criteria	Exclusion criteria
The language of the article needs to be in Dutch or in English	The article was published earlier than 15 years ago.
The article must be from an academic source (so in this case that will be Scopus)	An article whose full text could not be read.
	The focus of the study does not help the researcher with answering the knowledge question.

Table 11 – The inclusion and exclusion criteria

Key concepts	Broader concepts	Related terms
“Service Level Agreement”	“Service Level Agreement*”	
SLA	SLA*	
Improved	Improv*	Optimized

Table 12 – Search terms

With the help of the inclusions and exclusion criteria plus the search terms the search log can be made. The search log can be seen in the table underneath (Table 13)

Data	Database name	Search string	Total articles	Comments
05-04-23	Scopus	(Article title, Abstract, Keywords ("Service Level Agreement*" OR SLA	22,481	Way too many results, also a lot of results which for this SLR has no addition at all
05-04-23	Scopus	(Article title, Abstract, Keywords ("Service Level Agreement*" OR SLA) AND Article title, Abstract, Keywords (improv* OR optimi*))	5,653	Need to adjust the search string to get fewer results
05-04-23	Scopus	(Article title ("Service Level Agreement*" OR SLA) AND Article title (improv* OR optimi*))	127	Too many articles to screen everything in a good manner, only a fast screen could be done
05-04-23	Scopus	(Article title ("Service Level Agreement*" OR SLA) AND Article title(improv*))	43	Three interesting sources, so we stop with the SLR

Table 13 – Search log

When there were founded 43 articles with the help of the last search string in Table 13, all 43 articles were screened. Before this number of articles, the total amount of articles was too much to screen. The screening is done with the help of the title, abstract, conclusion, and introduction of the article. First, there is looked at the title if this is interesting for our research, if this is the case then also the abstract will be read. If is thought that after the reading of the abstract, the article is still useful for the research, the introduction and the conclusion will also be read. In the end will be definite if this article is useful for our research. These useful articles will be read completely. Within this Systematic Literature Review, there are three useful sources found. These three sources are also included in the conceptual matrix underneath (Table 14).

Articles ↓/ Concepts→	Use of QoS as an SLA parameter	With the help of methodology or models, increase functionality of SLA	Taking costs into account for determining the usefulness of an SLA
(Labidi et al., 2022)	X		X
(Edinat et al., 2021)	X	X	
(Asosheh & Hajinazari, 2012)		X	

Table 14 – Conceptual Matrix

As also partly discussed in Section 3 Literature review, for all three we will now give a summary and conclusion.

The first source is: Labidi, T., Sakhrawi, Z., Sellami, A., Mtibaa, A., & Bouassida, N. (2022). On the use of OLS regression algorithm and Pearson correlation algorithm for improving the SLA establishment process in cloud computing. *Innovations in Systems and Software Engineering*.
<https://doi.org/10.1007/s11334-021-00424-4>

Within this research is mentioned that cloud services are in more demand as more organizations and people move their operations to the cloud. As a result, the cloud service providers are required to deliver services in line with the standards of the intended clientele. One of the crucial service-level agreement (SLA) parameters that enables establishing a relationship of trust between the client and the supplier is QoS (Quality of Service). The main research is that they started by determining how the QoS parameters relate to one another. Second, they established the connection between cloud service pricing and QoS metrics. Third, they provided predictions about cloud service costs. Lastly, they create an SLA.

Main conclusion of this article: Performance and availability have been found to have a significant impact on cost as an independent variable. Hence, achieving satisfactory performance and availability results in cutting costs. They have developed an SLA that satisfies both customer expectations and provider objectives, lowering cloud service costs.

The second source is: Edinat, A., Al-Sayyed, R. M. H., & Hudaib, A. (2021). A Survey on Improving QoS in Service Level Agreement for Cloud Computing Environment. *International journal of interactive mobile technologies*, 15(21), 119. <https://doi.org/10.3991/ijim.v15i21.26379>

A defined Service Level Agreement (SLA) is required to ensure that the QoS between CSPs (Communications Service Providers) and customers will be met. This relationship must be established in a legal agreement. This study reviews several previously proposed models that have been utilized in literature to enhance the QoS in the SLA for cloud computing and to address many of the issues in the SLA. Discussed are also the difficulties associated with SLA violations and how resolving them can increase customer satisfaction.

Main conclusion: In order to design the SLAs between customers and CSPs, it is imperative to comprehend the CSPs' role in providing all critical QoS services in the SLA. It is expected that customers will receive all necessary services.

In this research, they proposed an improved deep reinforcement learning agent based on models (EDRLA). The suggested model, EDRLA, enhances the selection of SLAs based on QoS characteristics and chooses the best CSP, which provides the necessary services for the client without any violations and foresees any QoS violations in the future.

The third source is: Asosheh, A., & Hajinazari, P. (2012). Towards improving enterprise performance with Service Level Agreements. *International Symposium on Telecommunications*.
<https://doi.org/10.1109/istel.2012.6483116>

The researchers suggest an ontology-based SLA representation paradigm and use the KPIs and KQIs designated as key indicators for business services to specify SLA parameters. The goal is to provide SLA-based business process monitoring in order to ensure compliance with strategic goals and business needs. In general, this model can assist in automating the SLA representation process.

Main conclusion: In general, there are some benefits for businesses in being able to characterize business processes using SLA parameters. As an example, since business processes may be created in accordance with service standards, it enables more effective translation of an organization's vision into those processes. To ensure compliance with the initial KIs requirements and targeted objectives, business processes must be rigorously and continuously evaluated throughout their life cycles. The

researchers developed a methodology to manage service-based business processes with SLAs that ensure a particular level of performance in order to accomplish these goals.



Service Level Agreement

for

<<COMPANY NAME>>

Bronze

S. Korfage 18 August, 2023

Ref: 1.0

Denko-ICT

1.	Introduction	2
	1.1. Structure	2
	1.2. Contact persons	2
	1.3. Reporting	2
	1.4. Consultation structures	2
2.	SLA general	3
	2.1. The goal of the SLA	3
	2.2. Duration of the agreement	3
	2.3. Background to the agreement	3
	2.4. Control over the SLA	3
	Preparation (description of the Transition phase)	3
	Approval of the SLA	3
	Maintenance of the SLA	3
	Distribution of the SLA	4
3.	Responsibilities	5
	3.1. Responsibilities of the customer	5
	3.2. Responsibilities of the provider	5
	3.3. Responsibilities of the suppliers	5
4.	Description of services	6
	4.1. Goals of the service and critical success factors	6
	4.2. Delimitation of the service	6
	4.3. Assumptions and framework conditions	6
	4.4. Description of the service	6
	4.5. Maintenance (dependent on Service Desk Contract)	6
	4.6. Documents to be delivered contractually	7
	4.7. Definitions of priorities	7
	4.8. Beyond Denko's reach	8
	4.9. Escalation	8
	4.10. Continuity arrangements - safeguarding	8
	4.11. Specific requirements for the customer	9
5.	Service levels and measurements	10
	5.1. Factors of measurement	10
	Response times	10
	Availability times of the support organization	10
	5.2. Method of measurement	10
	Measurement procedure	10
	5.3. Agreed service levels	10
	5.4. Consequences of failure	11
6.	Services reporting	12
	6.1. Overview	12
7.	Appendix	13
	7.1. Points of contact	13
	Provider	13
	Customer	13
	Supplier	13

1. Introduction

This document uses the term 'Service Level Agreement', which is abbreviated to SLA. The associated process to manage SLAs is called 'Service Level Management'.

1.1 Structure

In the Service Level Agreement (SLA), the service between the supplier and its customers is put in black and white. The structure is as follows. Chapter 2 provides an overview of the general validity and agreements of the SLA. Chapter 3 sets out the responsibilities, duties, and powers of the contracting parties. Chapter 4 describes the provision of services. For each service, the user groups are indicated, and the aspects of the service are specified. Chapter 5 further indicates how the final service can be measured, while Chapter 6 states which report will be delivered with regard to that service. The appendix contains various documents, including a glossary.

1.2 Contact persons

The Provider and the Customer both designate a contact person. These contacts have a number of tasks:

- point of contact regarding the SLA
 - management of the different parts of the SLA
 - receipt and assessment of the report regarding the service
 - attending the SLA consultation
 - distribution of the SLA
 - handling disputes as described in the dispute procedure in part 1
- The contact persons must be designated per SLA

1.3 Reporting

In order to determine to what extent the agreed service is met, reports will be made about that service (if the customer wants this). Chapter 5 of this section defines for each service what the reporting on the service can consist of.

In general, it is reported to both contacts. For each report, it must be recorded who reports.

1.4 Consultation structures

When concluding an agreement between provider and customer, consultation takes place. If desired, the contact person can ask other people, including specialists, to attend the meeting.

Topics covered include:

- determine the level of services in the past period
- deviation from the level of services
- structural incidents
- work to be expected
- discussion changes on different parts of the SLA

At least 1x per year, the entire SLA is evaluated and is adjusted as much as possible to the current situation and wishes.

2. SLA general

2.1 The goal of the SLA

This SLA is concluded between the parties:

1. Denko-ICT
2. <<COMPANY NAME>>

The SLA describes the minimum level of service that is acceptable. In addition, it provides a common frame of reference for the expectations of service levels and constitutes a benchmark for performance measurements.

Both parties accept that the service levels are only achieved if there is no exceedance of the agreed maximum capacity.

2.2 Duration of the agreement

- This SLA deals with adaptation and support of the current systems, has a duration of 1 year and ends on 01/01/2025.
- The SLA undergoes a review 1 time per year.
- The SLA has a trial period of 3 months, after which the final SLA starts based on the measurement data from this trial period.
- The SLA has a notice/renewal period of 3 months.

2.3 Background to the agreement

This SLA has been drawn up in order to agree on the service between the provider and the customer as well as possible. Cost savings are also part of why this SLA was drawn up.

2.4 Control over the SLA

Preparation (description of the Transition phase)

We are looking at what is wrong with the current service. This is discussed with the management. After this, an opinion comes out. This advice goes to the provider.

Approval of the SLA

The table lists those who endorse this SLA by signing it. The actual signature will appear on the front of the SLA

Name	Function / role
Dennis Koop	Manager

Maintenance of the SLA

The maintenance of the SLA is a task of Dennis Koop, position: Manager. He is responsible for managing the change requests and for versioning the SLA. Dissemination of the SLA after an adjustment also falls under this responsibility.

Any of the parties involved may submit change requests for the SLA.

Amendments are discussed at the time of the review meeting. At that moment, the parties involved make a decision. As a result of the decision, the SLA will be adjusted.

The adjustment of the SLA is only valid after all the parties involved agree to a signature on the new SLA.

Distribution of the SLA

The SLA is sent to the stakeholders after completion. The table below shows the names and locations of these individuals.

Amount	Location	Name receiver
1	Denko ICT, Oldenzaal	Dennis Koop
1		

3. Responsibilities

3.1 Responsibilities of the customer

The responsibilities of <<COMPANY NAME>> are that they must provide the best possible service for Denko-ICT to manage this. There must also be clear agreements between the customer and the supplier.

3.2 Responsibilities of the provider

The responsibilities of Denko-ICT are, together with the <<COMPANY NAME>> to achieve the best possible agreement, so that there are no misunderstandings, and the management runs as smoothly as possible.

3.3 Responsibilities of the suppliers

The following (sub)suppliers may be involved in this SLA:

Suppliers
Rushfiles
Copaco
Previder
Routit
WeServe
Microsoft (Ireland)
Ziggo
Westcon
Xolphin
Tony
TD SYNTEX
Qonnected
Ndix
Integra Business Continuity
BusinessCom
AlplusK
Kaseay
Exclusive Networks
Delta Fiber Network
Shock Media

4. Description of services

4.1 Goals of the service and critical success factors

Denko-ICT's business objective is to help people faster with the service, to save time and money. The objectives of the service itself are to improve efficiency and deliver better results. The customer's expectations of the system are that the system fits well with the current or new infrastructure and that it works correctly.

4.2 Delimitation of the service

Components	Description
<i>Analyze current situation</i>	<i>The current situation is analyzed in order to arrive at a good analysis of what is wrong.</i>
<i>Give advice</i>	<i>Advice is given on the best possible solution.</i>
<i>Implementation</i>	<i>As a result of the advice, the implementation is fully taken care of.</i>
<i>Guiding transition phase</i>	<i>We provide guidance on the transfer of new systems.</i>
<i>Provide aftercare</i>	<i>See what is missing and if differently maintain it</i>

4.3 Assumptions and framework conditions

Assumptions:	Framework conditions:
<i>Everyone knows his task</i>	<i>The hardware and software of the new systems work well</i>
<i>There is sufficient communication</i>	<i>The advice is good and may have a limited number of spelling errors</i>
<i>Advice is always given</i>	<i>Service level agreements are not exceeded or neglected</i>

4.4 Description of the service

Supplier is responsible for maintaining the functionality of the managed components. Based on this general responsibility, the supplier supports the use of the functionalities, evaluates the use, and responds to imperfections and new wishes that may lead to changes.

4.5 Maintenance(dependent on Service Desk Contract)

The maintenance that is delivered on the basis of patch management is carried out weekly on the night from Saturday to Sunday (22:00 – 03:00). If other times are desired, it will be mentioned here. All devices that have this functionality are maintained in this way. Agreements about onsite maintenance are concluded in the Service Desk Contract.

4.6 Documents to be delivered contractually

Name	Goal deliverable	Abbreviation	Delivery
Service Level Rapportage	Reporting on the provision of the service levels under the agreed conditions.	SLR	On request
Service Desk Rapportage	Availability reporting	SDR	On request
Underpinning Contract	Contract with an external supplier in which agreements are laid down about the provision of certain parts of an IT service.	UC	On request

4.7 Definitions of priorities

	Serious The entire company has been affected	Mild Partially affected	Not serious One or a small group of users have been affected
High impact Primary business processes have been stopped	Critical – P1	High - P2	Normal -P3
Average impact Company is less efficient but can still function	High - P2	Normal - P3	Low - P4
Low impact More in the context of irritating, not entirely stopped processes	Normal - P3	Low - P4	Low - P4

Priority	Response time ¹	Resolution plan time ¹	Solving time ¹	Example type of incident occurring
1	< 8 hours	<18 hours	< 24 hours	Total infrastructure outages
2	< 8 hours	<20 hours	< 28 hours	Not available by phone
3	< 8 hours	<24 hours	< 32 hours	User with login problems
4	< 8 hours	<28 hours	< 36 hours	Restore user files

¹ 1 These are target times. For days read working days..

4.8 Beyond Denko's reach

During the resolution of an incident, it may happen that Denko himself can no longer take steps to solve the incident. In this case, the time that Denko has as response time, resolution plan time, and solving time (according to Chapter 4.7) will be stopped and therefore no longer count down. This is in the case if the task and/or ticket has the following status: Callback, awaiting planning, awaiting confirmation, awaiting materials, waiting customer, awaiting check, awaiting supplier, will be picked up, partially complete, and shipment. The response time, resolution plan time, and solving time (according to Chapter 4.7) will continue counting down when the task and/or ticket leaves this status and Denko can therefore take further steps to resolve the incident.

4.9 Escalation

In the event of an escalation, the levels and actions below apply.

Escalation Level	Responsible at Provider	Responsible at Customer
Level 1	Level II Support	
Level 2	Office Manager	
Level 3	Business Unit Manager	

Linking the priorities to the escalation levels leads to the following actions:

Priority	Escalation Level	Escalation - conditions
1	Level 1	After 8 hours no First Response
	Level 2	After 18 hours no Resolution Plan
	Level 3	After 24 hours no Resolved
2	Level 1	After 8 hours no First Response
	Level 2	After 20 hours no Resolution Plan
	Level 3	After 28 hours no Resolved
3	Level 1	After 8 hours no First Response
	Level 2	After 24 hours no Resolution Plan

Priority	Escalation Level	Escalation - action
1	Level 1	Notification to Level II Support
	Level 2	Notification to Office Manager
	Level 3	Notification to Business Unit Manager
2	Level 1	Notification to Level II Support
	Level 2	Notification to Office Manager
	Level 3	Notification to Business Unit Manager
3	Level 1	Notification to Level II Support
	Level 2	Notification to Office Manager

4.10 Continuity arrangements - safeguarding Software and data recovery

A backup should be available on-site within fifteen minutes for possible data recovery. Regular data recovery is done within 2 working days, except when the situation requires an alternative period. Procedures and arrangements for backup and data recovery in the event of calamities can be found in the regulations.

4.11 Specific requirements for the customer

Critical applications and systems (facilities)

- *Communicate changes to the system properly*
- *The customer must more or less adapt to the working method of the supplier*

5. Service levels and measurement

5.1 Factors of measurement

Response times

The indication for the waiting times of users who call the helpdesk are shown in the table below.

Amount of calls / day	Peak number per hour	Target time for answering
<50	6	After a maximum of 3 rings
<100	12	After a maximum of 5 rings
>100	15	Up to 2 minutes on hold

A maximum of 15% of the number of calls made may be lost due to the waiting times. 20% of the calls must be resolved directly by the helpdesk in the telephone contact with the caller. The remaining 80% must be registered using tickets and categorized according to the SLA. These numbers are not recorded and are at most an indication of what it is really like.

Availability times of the support organization

The helpdesk is available on weekdays from 08:30 to 17:00.

5.2 Method of measurement

Measurement procedure

How?	Rapportage	Frequentation	Measuring area
Availability formula according to OGC.	Availability report.	Quarterly.	The availability of the service.

5.3 Agreed service levels

The tickets that are created and to which a certain resolution time is linked under contract also have a certain success rate. The First Response goal is 93%, the Resolution Plan goal is 93%, and the Resolved goal is 90%.

The service itself (telephone/remote/onsite support)

- The service is available on weekdays from 08:30 to 17:00 (12:30-13:00 break).
- The required availability within these opening hours is aimed at 99%.
 - This availability would amount to a maximum of 5 hours of loss per quarter.
- The maximum number of disruptions per month is 3.

- Requirements for the restoration of services

Failures with a priority 1 : Within 24 hours

Failures with a priority 2 : Within 28 hours

Failures with a priority 3 : Within 32 hours

The maximum number of users at one time is the current number of registered accounts.

User support around the service

- The maximum number of registered reports per month is 100. *(For the rest, see section 5.1)*
- In a possible fallback situation, the service has an availability of 95%
- The period for activating the service in a fallback in the event of calamity is 2 days

5.4 Consequences of failure

The failure of software and/or hardware is entirely the responsibility of the customer. This means that the software/hardware goes to Denko ICT for investigation, and it is investigated here whether there is still a warranty on it. If this is not the case, the costs are entirely for the customer. Research costs are also settled for this.

The availability of the service is one of the most important indicators. A deal is then if agreed availability is not met, a message will follow with further information about any adjustments in SLA or costs.

Exceeding the number of transactions does not lead to a bonus malus at the end of the measurement period. During the review of the SLA, these are discussed and, if necessary, lead to an adjustment of the SLA and possibly an adjustment to the costs of the service.

Exceeding the number of users does not lead to a bonus malus at the end of the measurement period. During the review of the SLA, these are discussed and, if necessary, lead to an adjustment of the SLA and possibly an adjustment to the costs of the service.

A deviation from the number of malfunctions does not lead to a bonus malus at the end of the measurement period. During the review of the SLA, these are discussed and, if necessary, lead to an adjustment of the SLA and possibly an adjustment to the costs of the service.

Exceeding the number of reported incidents and the associated response rate of user support does not result in a bonus malus at the end of the measurement period. During the review of the SLA, these are discussed and, if necessary, lead to an adjustment of the SLA and possibly an adjustment to the costs of the service.

A deviation in activating a fallback at the agreed term does not lead to a bonus malus. Deviations depend on unpredictable situations.

A deviation in the number of changes is evaluated during the review of the SLA. The deviations in the reaction times and treatment of changes will also be discussed. Based on this, adjustments are made to the SLA or costs.

A deviation in the growth of the number of users is evaluated during the review of the SLA. Based on this, adjustments are made to the SLA or costs.

6. Services reporting

6.1 Overview

The reporting services consist of the following components:

Type of report	Frequency	Stakeholders
<i>Service Desk Report</i>	quarterly	<i>The customer and service provider</i>
<i>Service Level Report</i>	quarterly	<i>The service provider</i>

7. Appendix

7.1 Points of contact

Provider

Name of contact person(s) :

E-mail address contact person(s) :

Telephone number :

Fax :

Postal address :

Customer:

Name of contact person(s) :

E-mail address contact person(s) :

Telephone number :

Fax :

Postal address :

Supplier

Name of contact person(s) :

E-mail address contact person(s) :

Telephone number :

Fax :

Postal address :

Approval Service Level Agreement

Name	Function / role	Signature
	
	
	
	

Appendix 9 – Implementation of the solution

In Appendix 9.1, it is explained how the SLAs are implemented in Autotask. So this section gives an answer to research (sub) question 5:

5. How can the solution (the improved SLA) be implemented in Autotask?

In Appendix 9.2, it is explained how it is possible to implement a configuration item for a customer. In Appendix 9.3, it is explained how the client portals are designed and made. And in Appendix 9.4, it is explained how the new SLAs are implemented toward customers.

A. - 9.1 Implementation of the SLAs

The first step of the implementation of the SLAs is the making of the SLAs in Autotask. This is possible under the tab Service Level Management (Admin → Features & Settings → Service Desk (Tickets) → Service Level Management). How the three SLAs (bronze, silver, and gold) are made in this Service Level Management tab is shown in Figures 8,9 and 10.

The screenshot shows the configuration page for a new SLA named 'NEW SLA Bronze'. The page includes a header with 'Service Level Agreements - NEW SLA Bronze' and a help icon. Below the header are buttons for 'Save', 'Save & Close', and 'Cancel'. The main form contains the following fields:

- Service Level Agreement Name:** NEW SLA Bronze
- Use business hours of:** Denko-ICT (dropdown menu)
- First Response Goal (%):** 93,00
- Resolution Plan Goal (%):** 93,00
- Resolved Goal (%):** 90,00
- Use SLA to automatically set ticket due date and time:**
- Service Level Agreement Description:** The new SLA bronze, which is used as the new standard SLA

Below the form are tabs for 'Objectives' and 'Hours'. A message states: 'Configure the individual objectives for this agreement below. For additional information on setting up objectives, click the Help icon in the upper-right corner of the page.' A '+ New' button is present above a table of objectives.

Priority	Ticket Type	Ticket Category	Issue Type	Sub-Issue Type	First Response	Resolution Plan	Resolved	Timeframe	Active
Critical	[All]	[All]	[All]	[All]	8,00 hour(s)	18,00 hour(s)	24,00 hour(s)	Business Hours	✓
High	[All]	[All]	[All]	[All]	8,00 hour(s)	20,00 hour(s)	28,00 hour(s)	Business Hours	✓
Low	[All]	[All]	[All]	[All]	8,00 hour(s)	28,00 hour(s)	36,00 hour(s)	Business Hours	✓
Normal	[All]	[All]	[All]	[All]	8,00 hour(s)	24,00 hour(s)	32,00 hour(s)	Business Hours	✓
[All]	[All]	[All]	[All]	[All]				Business Hours	✓

Last Update: 17-07-2023 11:54 by Stijn Korfage

Figure 8 – Making of SLA bronze in Autotask

The screenshot shows the configuration page for a new SLA named 'NEW SLA Silver'. The page includes a header with 'Service Level Agreements - NEW SLA Silver' and a help icon. Below the header are buttons for 'Save', 'Save & Close', and 'Cancel'. The main form contains the following fields:

- Service Level Agreement Name:** NEW SLA Silver
- Use business hours of:** Denko-ICT (dropdown menu)
- First Response Goal (%):** 96,00
- Resolution Plan Goal (%):** 96,00
- Resolved Goal (%):** 95,00
- Use SLA to automatically set ticket due date and time:**
- Service Level Agreement Description:** The new SLA silver

Below the form are tabs for 'Objectives' and 'Hours'. A message states: 'Configure the individual objectives for this agreement below. For additional information on setting up objectives, click the Help icon in the upper-right corner of the page.' A '+ New' button is present above a table of objectives.

Priority	Ticket Type	Ticket Category	Issue Type	Sub-Issue Type	First Response	Resolution Plan	Resolved	Timeframe	Active
Critical	[All]	[All]	[All]	[All]	4,00 hour(s)	6,00 hour(s)	8,00 hour(s)	Business Hours	✓
High	[All]	[All]	[All]	[All]	4,00 hour(s)	10,00 hour(s)	14,00 hour(s)	Business Hours	✓
Low	[All]	[All]	[All]	[All]	4,00 hour(s)	14,00 hour(s)	24,00 hour(s)	Business Hours	✓
Normal	[All]	[All]	[All]	[All]	4,00 hour(s)	12,00 hour(s)	18,00 hour(s)	Business Hours	✓
[All]	[All]	[All]	[All]	[All]				Business Hours	✓

Last Update: 17-07-2023 12:08 by Stijn Korfage

Figure 9 – Making of SLA silver in Autotask

Service Level Agreements - NEW SLA Gold

Save Save & Close Cancel

Service Level Agreement Name *
NEW SLA Gold

Service Level Agreement Description
The new SLA Gold

Use business hours of Denko-ICT
 Use SLA to automatically set ticket due date and time

First Response Goal (%)
99,00

Resolution Plan Goal (%)
98,00

Resolved Goal (%)
98,00

Objectives Hours

Configure the individual objectives for this agreement below. For additional information on setting up objectives, click the Help icon in the upper-right corner of the page.

+ New

	Priority	Ticket Type	Ticket Category	Issue Type	Sub-Issue Type	First Response	Resolution Plan	Resolved	Timeframe	Active
	Critical	[All]	[All]	[All]	[All]	2,00 hour(s)	4,00 hour(s)	6,00 hour(s)	Business Hours	✓
	High	[All]	[All]	[All]	[All]	2,00 hour(s)	10,00 hour(s)	12,00 hour(s)	Business Hours	✓
	Low	[All]	[All]	[All]	[All]	2,00 hour(s)	14,00 hour(s)	20,00 hour(s)	Business Hours	✓
	Normal	[All]	[All]	[All]	[All]	2,00 hour(s)	12,00 hour(s)	16,00 hour(s)	Business Hours	✓
	[All]	[All]	[All]	[All]	[All]				Business Hours	✓

Last Update: 17-07-2023 12:12 by Stijn Korfage

Figure 10 – Making of SLA gold in Autotask

Now that the SLAs are made in Autotask, they can be selected as an SLA when making a configuration item.

The second and last step of the implementation of the SLA in Autotask is giving the corresponding SLA event to the different statuses of a task or ticket. Especially looking at giving the status “awaiting supplier” the event waiting customer. When a status of a task or ticket is in the SLA event waiting customer, then the timer of the first response, resolution plan, and resolved time is stopped with counting down. The result is that the response, resolution plan, and resolved time that is included in the SLA of the supplier has no influence on achieving the response, resolution plan, and resolved times Denko has included in his SLA. The different task & ticket statuses with their corresponding SLA event are included in Figure 11.

← Task & Ticket Statuses

+ New

	Status Name *	SLA Event	Active	System
1	New		✓	✓
2	In Progress	First Response	✓	
3	Callback	Waiting Customer	✓	
4	Customer replied		✓	
5	Planned		✓	
6	Awaiting Planning	Waiting Customer	✓	
7	Awaiting Confirmation	Waiting Customer	✓	
8	Awaiting Materials	Waiting Customer	✓	
9	Materials Arrived		✓	
10	Waiting Customer	Waiting Customer	✓	✓
11	Awaiting Check	Waiting Customer	✓	
12	Awaiting Supplier	Waiting Customer	✓	
13	Will be picked up	Waiting Customer	✓	
14	Partially Complete	Waiting Customer	✓	
15	Shipment	Waiting Customer	✓	
16	Complete After Consult	Resolved	✓	
17	Complete	Resolved	✓	✓
18	Escalate		✓	
19	Klant gebeld	First Response		
20	Oplossing aangedragen	Resolution Plan	✓	
21	Auto-status 1			

Figure 11 – Task & Ticket statuses with their corresponding SLA event

To give more information about the different SLA events and the different statuses of a ticket/task, we give an overview of the different SLA events and ticket/task statuses in Tables 15 and 16. This information is also interesting for the staff members of Denko, because they must be able to work probably with the different SLA events and ticket/task statuses.

SLA Event	Description
First Response (FR)	First response is when a staff member of Denko first starts to work on the problem. At this point, the staff member has to provide the customer with the priority of the problem. So the time between when the ticket 'arrived' at Denko and the first response, is the first response time.
Resolution Plan (RP)	Resolution plan is the moment when a staff member of Denko suggests a solution to the customer, in order to solve to problem. So the time between when the ticket 'arrived' at Denko and when the resolution plan is provided to the customer, is the resolution plan time.
Resolved (Re)	Resolved is the moment when the problem of a customer is solved. So the time between when the ticket 'arrived' at Denko and when the problem is solved, is the solving time.
Waiting Customer (WC)	Waiting customer is used when Denko self cannot work further on the problem, they have to wait for example on the supplier or customer self. When a status of a task or ticket is in the SLA event waiting customer, then the timer of the first response, resolution plan and resolved time is stopped with counting down.

Table 15 – SLA events with the corresponding description

Status Name (SLA Event)	Description
New (-)	This status is used when a ticket/task is 'arrived' at Denko. This is also the moment when the SLA timer starts counting down.
In Progress (FR)	This status is used when a staff member starts working on the ticket/task for the first time.
Callback (WC)	This status is used when Denko has to wait, for a callback.
Customer Replied (-)	This status is used when the customer replied to an email, call, etc., from Denko.
Planned (-)	This status is used when it is planned when there is going to be worked on the ticket/task.
Awaiting Planning (WC)	This status is used when Denko has to wait for when the ticket/task is going to be planned in.
Awaiting Confirmation (WC)	This status is used when Denko has to wait for confirmation from a certain stakeholder.
Awaiting Materials (WC)	This status is used when Denko has to wait on materials that have to be delivered.
Materials Arrived (-)	This status is used for a ticket/task when the corresponding materials have arrived at Denko.
Waiting Customer (WC)	This status is used when Denko has to wait for a customer, for example when the customer has to make a certain decision about the ticket/task.
Awaiting Check (WC)	This status is used when Denko has to wait before a check is done for the ticket/task.

Awaiting Supplier (WC)	This status is used when Denko has to wait on the supplier to take certain steps in order to accomplish the ticket/task.
Will be picked up (WC)	This status is used when at the moment there is not worked to accomplish the ticket/task, but in a short time interval the ticket/task will be picked up.
Partially Complete (WC)	This status is used when the ticket/task is partially completed, but there has to be wait for something in order to completely finalize the ticket/task.
Shipment (WC)	This status is used when something has to be shipped in order to complete the ticket/task.
Complete After Consult (Re)	This status is used when the ticket/task is completed after the consult.
Complete (Re)	This status is used in general when a ticket/task is completed.
Escalate (-)	This status is used when the situation of a ticket/task is escalated.
Customer called (FR)	This status is used when a staff member of Denko has called the customer for the first time.
Solution Suggested (RP)	This status is used when a staff member of Denko has suggested a solution to the ticket/task of a customer.

Table 16 – The different statuses with their corresponding description

A– 9.2 Implementation of the configuration items

It takes a few steps to make a configuration item for a certain customer in Autotask. The first step is to search for the company you want to create a ticket for and then select the configuration item on the overview page. An example of an overview page is given in Figure 11, and the red circle indicates the item that has to be selected in order to make a configuration item.

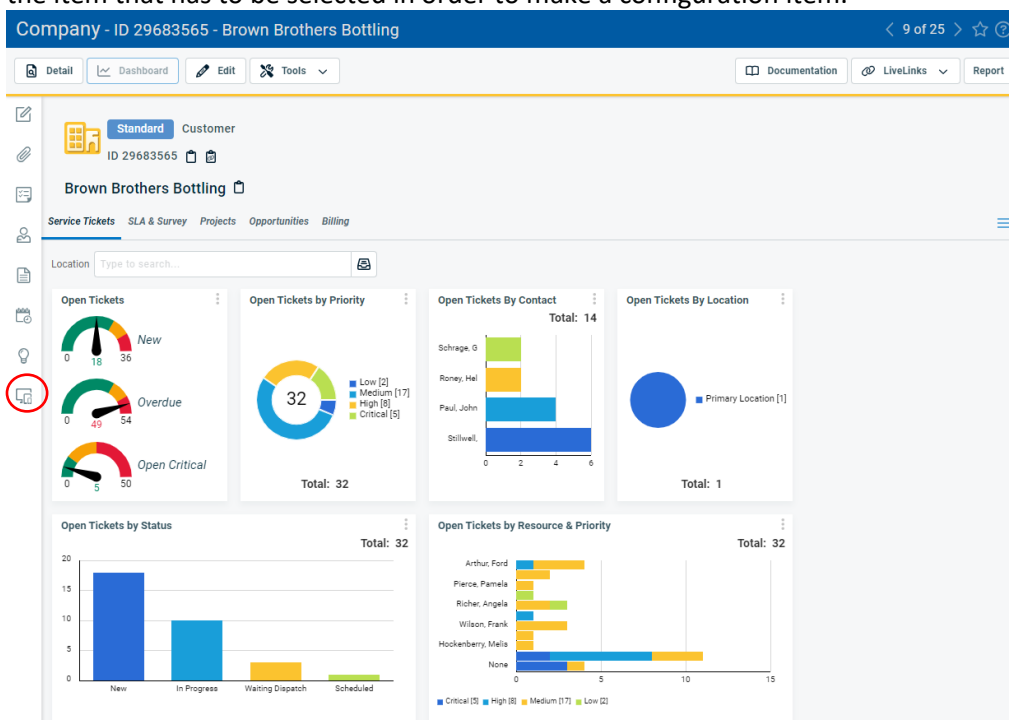


Figure 11 – Example of the overview page of a customer

When “Configuration Item” is selected, you end up on a page where the configuration item can be made (see Figure 12). Here all the corresponding information can be filled in, and afterward this new configuration item can be saved. This is also the place where the chosen SLA is connected to the software/hardware.

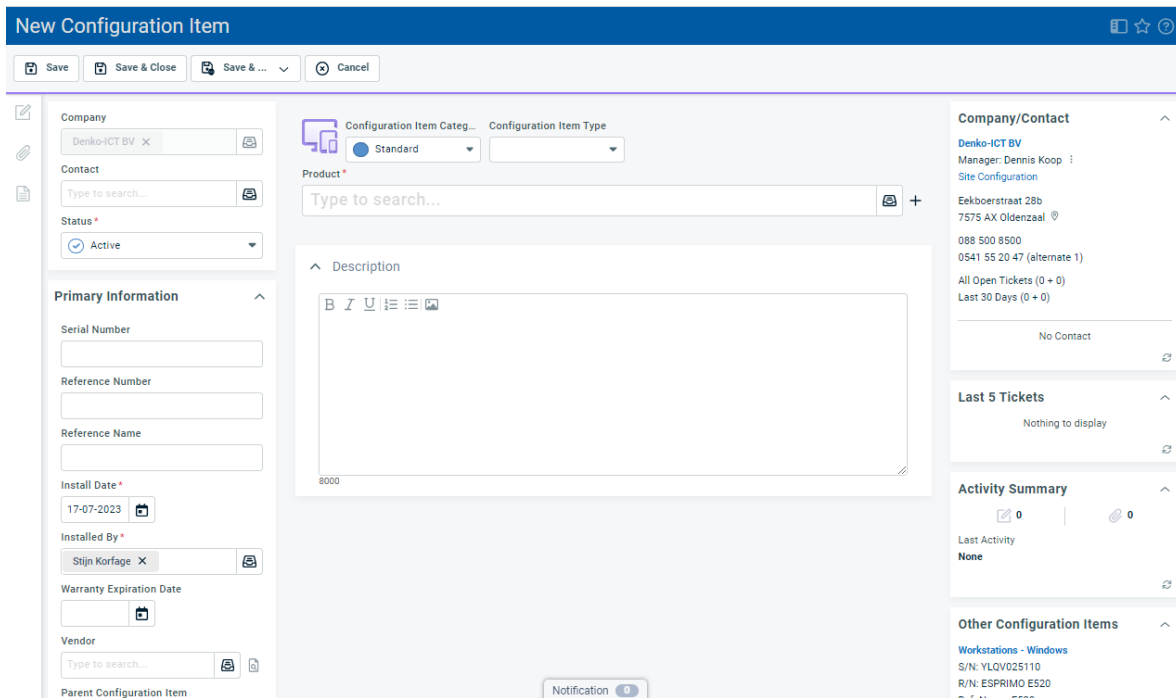


Figure 12 – The page where a new configuration item can be created

A. - 9.3 Implementation of client portal

All the customers have the right to have a client portal and also have the choice if they want to use it or not. If they would like to use the portal, they can register this with Denko. Denko will send a username and password, with which they can log into the portal (an example of a client portal is shown in Figure 13).

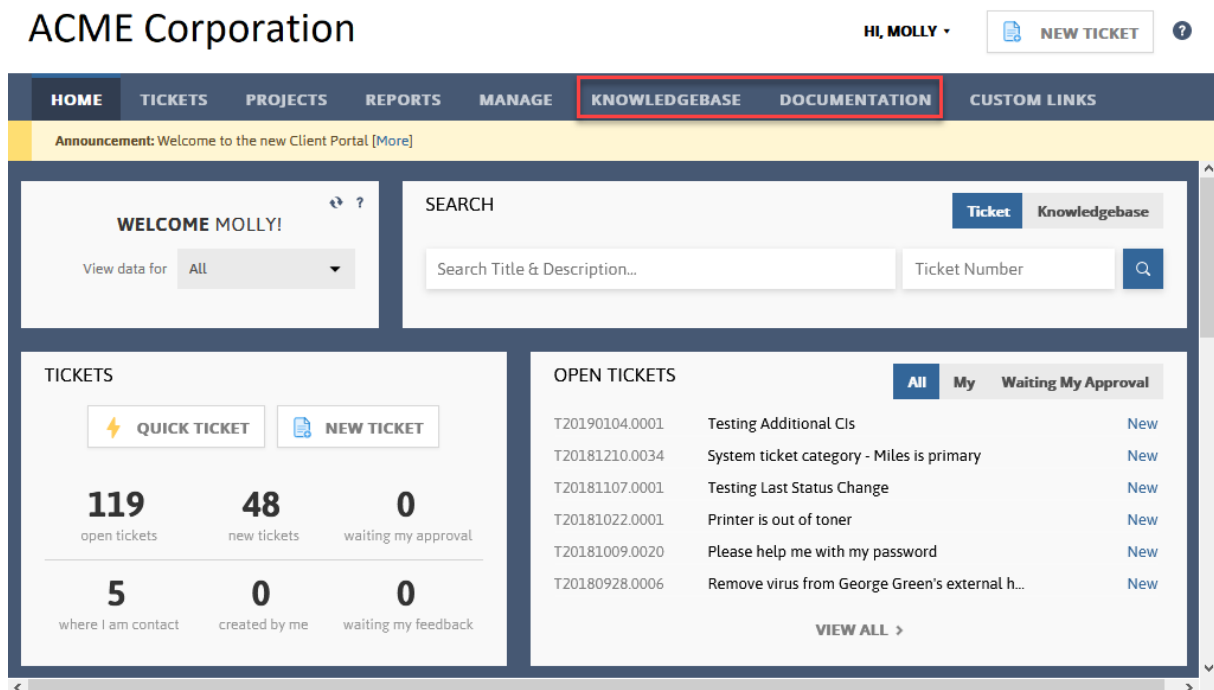


Figure 13 – Example of a client portal

There are three different levels of “Manage Security Levels”: Basic, Advanced, and Manager. Denko can determine what levels of manager security level a certain customer gets. The three different levels have different access to certain Autotask features in the client portal. Autotask provides customers

with a generic client portal, but Autotask possesses some potent capabilities that enable you to alter the default client portal so that it reflects your business. Logos, links to your corporate websites, and fine-grained tweaking of many global parameters are all included in this. However, this ignores the preferences of each of your clients for using the client portal.

On the manage clients page and on pages that can be reached from that page, the settings for specific clients are set (see an example of the manage clients page in Figure 14). From this manage clients page, you can do the following:

- Customize a client's portal settings: You can alter a lot of your global settings for specific clients.
- Set up client contacts' portal access: By default, the client portal is enabled for all active customers at the corporate level; however, before anyone can access the site and work on tickets and projects, you must enable individual users.
- The client portal's taskfire plugin can be used to enable paying for taskfire. It gives your client's internal IT workers a safe, private, interactive service desk that is integrated with your own Autotask system.
- Configure client portal access using an identity provider: You can set up a client's client portal to integrate with their identity provider for clients who use that identity provider for authentication.

Enabled for CP	Company Name	Client Portal Users	Taskfire Users	Notifications	Knowledgebase	Documentation	Resource Names	Show Time	Quick Ticket Priority	Quick Ticket Request Type	Identity Provider (IdP) Settings	Configure IdP
✓	[Blurred]	1	Setup	✓	✓	✓	Don't Show	Don't Show			Custom	Settings
✓	[Blurred]	0	Setup	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	[Blurred]	0	Setup	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	[Blurred]	1	Setup	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	[Blurred]	0	Setup	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	[Blurred]	0	Setup	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	[Blurred]	0	Setup	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	[Blurred]	0	1	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	[Blurred]	1	Setup	✓	✓	✓	Don't Show	Don't Show			Use Global Settings	Settings
✓	Account 0976-2	0	Setup	✓	✓	✓	Don't Show	Don't			Use Global	Settings

Figure 14 – Example of the manage clients page

A. - 9.4 Implementation towards customers

At the moment the customers are not aware of the SLA of Denko. They must become aware of the different SLAs Denko has, the SLA bronze, silver, and gold. After they are well aware of the different SLAs, they must decide which SLA they want for which software and hardware. Probably the customers are going to decide that they want to have an SLA silver or gold for the hardware or software that they think is important in their company. If for example, the whole company cannot work if their router(s) are defective or do not function well, they will probably choose to have an SLA gold for their router(s). They want to have fixed their router as fast as possible, and this is the case if they have an SLA gold for their router(s).

The administration of the SLAs will be done with the help of contracts. Currently is only the software and hardware of which the customer is provided included in the contracts. So the customer only sees

which software and hardware they have in the contract. When the new SLAs are implemented and used at Denko, the SLAs will also be included in the contracts. This will mean that a certain contract of a customer will be connected to an SLA. For example, you get a contract that has SLA gold, and so contains all the software and hardware that have SLA gold. Then there is a good overview of what kind of software and hardware the customer has, and which SLA this software and hardware has. Also with doing the invoicing, it is helpful that there is an overview of which software and hardware, have an SLA silver or gold. Because the contract that has an SLA gold or silver can then be easily invoiced.

Appendix 10 – The questions for the evaluation survey

In Dutch:

Nr.	Vraag
1	PE-1: De nieuwe SLAs zijn handig voor mijn baan
2	PE-2: Het gebruiken van de nieuwe SLAs verhoogt de effectiviteit van mijn taken
3	PE-3: Het gebruiken van de nieuwe SLAs verbetert de kwaliteit van mijn werk
4	PE-4: Het gebruiken en communiceren van de nieuwe SLAs verbetert de communicatie naar de klant toe
5	PE-5: Het gebruiken en communiceren van de nieuwe SLAs verbetert de communicatie intern bij Denko
6	PE-6: Het gebruiken en communiceren van de nieuwe SLAs zorgt ervoor dat de klant tevredenheid omhoog gaat
7	EE-1: De interactie met de nieuwe SLAs is duidelijk en begrijpbaar
8	EE-2: Het is voor mij gemakkelijk om ervaren te worden met die nieuwe SLAs
9	EE-3: Ik vind de nieuwe SLAs makkelijk te gebruiken
10	ATT-1: De nieuwe SLAs gebruiken is een goed idee
11	ATT-2: De nieuwe SLAs maakt het werk interessanter
12	ATT-3: Het gebruiken en werken van de nieuwe SLAs is leuk
13	FC-1: Ik heb de middelen die nodig zijn om de nieuwe SLAs te kunnen gebruiken
14	FC-2: Ik heb de kennis die nodig is voor het gebruik van de nieuwe SLAs
15	FC-3: De nieuwe SLAs zijn te verenigen met andere systemen/aspecten die worden gebruikt
16	SE-1: Ik kan een taak volbrengen als: Niemand aanwezig is om te vertellen wat is stapsgewijs moet doen
17	SE-2: Ik kan een taak volbrengen als: Ik iemand kan bellen wanneer ik vastloop
18	SE-3: Ik kan een taak volbrengen als: Ik veel tijd krijg voor het voltooien van mijn taak waarvoor de nieuwe SLAs zijn gemaakt
19	BIU-1: Ik heb de intentie de nieuwe SLAs te gebruiken in de komende 6 maanden
20	BIU-2: Ik voorspel de nieuwe SLAs te gebruiken in de komende 6 maanden
21	BIU-3: Ik ben van plan de nieuwe SLAs te gebruiken in de komende 6 maanden

In English:

Nr.	Question
1	PE-1: The new SLAs are useful for my job
2	PE-2: Using the new SLAs increases the effectiveness of my tasks
3	PE-3: Using the new SLAs improves the quality of my work
4	PE-4: Using and communicating the new SLAs improves communication to the customer
5	PE-5: Using and communicating the new SLAs improves communication internally at Denko
6	PE-6: Using and communicating the new SLAs ensures that customer satisfaction increases
7	EE-1: The interaction with the new SLAs is clear and understandable
8	EE-2: It is easy for me to get experienced with those new SLAs
9	EE-3: I find the new SLAs easy to use
10	ATT-1: Using the new SLAs is a good idea
11	ATT-2: The new SLAs make the work more interesting
12	ATT-3: Using and working with the new SLAs is fun
13	FC-1: I have the resources needed to use the new SLAs
14	FC-2: I have the knowledge needed to use the new SLAs

15	FC-3: The new SLAs are compatible with other systems/aspects used
16	SE-1: I can accomplish a task if: No one is present to tell what is step-by-step to do
17	SE-2: I can accomplish a task if: I can call someone when I get stuck
18	SE-3: I can accomplish a task if: I get a lot of time to complete my task for which the new SLAs were created
19	BIU-1: I intend to use the new SLAs in the next 6 months
20	BIU-2: I predict to use the new SLAs in the next 6 months
21	BIU-3: I plan to use the new SLAs in the next 6 months