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What Contents are Important for the Development of Personalised Work Instructions?

Exploring the Work Instruction Information Quality Framework by Haug (2015)

Master's thesis, MSc Supply Chain Management

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Submission Date: 27-01-2025

Word count: 9466 words excluding abstract, table of contents, figures, tables, references and appendices

Supervisor: Dr. J.A.C. Bokhorst

Second assessor: Dr. S. Waschull

In preparing this work, I did not use GenAI

Abstract

Previous research has investigated the implementation of work instructions for different characteristics of employees, such as the level of experience. Various forms of personalised work instructions have been studied, but the content of personalised work instructions has received less research attention. This paper investigates which dimension of the work instruction quality problem framework by Haug (2015) can be adapted to specific characteristics of employees to optimise the work performance for different types of employees. Through a multiple-case study with two companies, the five subjective dimensions of the framework (2015) - "too repetitive", "too much amount", "too difficult to understand", "too complex content", and "untimely"- were shown to be heavily influenced by the form of the work instructions. Characteristics of employees were hardly influencing the relationship between the subjective dimensions and the work performance since the companies either standardised work instructions or grouped employees by the characteristics into teams before assigning tasks. The findings suggest that the Framework of Haug (2015) is not applicable to all types of work instructions. Although this research focused on the content of work instruction, the result shows that the form and format of work instructions influence the content and even affect the options for personalisation.

Keywords. Work instructions, Content, Form, Framework of Haug, Personalisation

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1. Introduction

In the modern world where efficiency is the key to fast production, work instructions have an essential role. Having insufficient, confusing work instructions only leads employees to be unsatisfied and results in poor work performance outcomes (Haug, 2015). Moreover, low-quality work instructions can cause critical incidents that can affect the safety of people. For example, the Boeing 737 Max 9 had its door flying off on the way to Alaska in mid-air due to missing several bolts. It has been discovered that the work instructions at Boeing were too complicated for employees to follow (Shram, 2024). Therefore, companies must provide their employees with high-quality work instructions.

Many previous researches have explored various forms of work instructions. For instance, text-only instructions increase the cognitive workload of employees, making employees become burdened and overworked compared to picture and text combined work instructions (Li et al., 2018; Tsutsumi et al., 2020). Digital forms of work instructions have more advantages than paper-based work instructions, such as reducing human error, and time duration for assembly of the product (Letmathe & Rossler, 2021). However, these studies are not focused on personalisation, but the form of work instructions in general.

Personalised work instructions are individual/group centred work instructions that are catered to the needs of the employees in an optimal way (Tsutsumi et al., 2020). Implementation of technologies with work instructions such as Augmented Reality (AR) to provide personalised guidance have shown to help learning of employees, such as helping employees to adapt better by setting the practice in realistic work environments (Mourtzis et al., 2019; Geng et al., 2020; Wang et al., 2023; Li et al., 2024; Vanneste et al., 2024). Training employees with AR and AI-

implemented work instructions led to increased product assembly quality (Li et al., 2024). Visualisation of tasks helped workers to understand their tasks better (Wang et al., 2023). Besides the technological implementation, some organisations provide mentors to support employees as another form of personalised work instructions (Bokhorst et al., 2024).

Despite the advantages mentioned above, the content of personalised work instructions is facing a shortage compared to the number of studies regarding the form of personalised work instructions. Although the field of work instructions recognises that personalisation is important, only the form part has been explored extensively. When it comes to the general content of the work instructions, there are some frameworks that set some standards for what should be included in the work instructions. The information quality problem framework by Haug (2015) presents a detailed dimension of work instruction information qualities. Design Principles for Information Presentation (DFIP) by Mattsson et al. (2018) simplified the information presentation and reduced complexity within the work instructions. Yet, both frameworks focus on the case of one single, universal work instruction, and not on personalisation. Furthermore, some of the aspects mentioned by Haug (2015) could be evaluated differently for different types of people, thereby opening up possibilities for personalisation. This has not been explored yet. Bokhorst et al. (2024) shows some content related personalisation such as having different levels of detail within the work instructions or employees being able to make some small changes in their work instructions. But further research is needed since Bokhorst et al. (2024) combines form and content of the personalised work instructions in the research, not focusing only on content.

Adopting personalised work instructions is indeed a challenge. Creating one personalised work instruction for one specific person can be done easily. But when it comes to an entire organisation with many people, creating such instructions for each individual is challenging, as it “involves

complex and time-consuming maintenance" (Bokhorst et al., 2024, p.1). However, limited adoption of personalised work instruction by organisations/companies does not diminish the benefits of it. Vanneste et al. (2024) emphasise that personalised instructions are very important for learners, especially those with lower cognitive abilities. Bokhorst et al. (2024) highlight that personalised work instruction is necessary as it helps and enables sheltered employees to carry out more complex tasks. Furthermore, personalised instruction considers different characteristics of employees and complex environments, being able to help the employees to achieve not only efficiency but also safety (Tang et al., 2019).

As personalised work instruction has been shown to be beneficial to employees via previous researches, different methods of providing them other than the form should be investigated. Bokhorst et al. (2024, p.12) state that organisations had pilot programs where the organisations have tried new technologies, but they were "faced with significant time investments and costs for maintaining instructions". Hence, if the form of personalised work instruction involves a more advanced level of technologies or professional support, the time and cost can increase highly. In addition, not all organisations can provide mentors for their employees. Thus, depending only on different types of forms for personalised work instruction can be inefficient. As there are various forms, there might also be various methods for the content of personalised work instructions, that can even cost less for maintenance since it will mainly change the information content of the instruction. Exploring the content of personalised work instructions may lead companies/organisations to lower their threshold to adaptation toward personalised work instructions.

This paper aims to explore which dimensions of the framework of Haug (2015) are universal and which dimensions are open to personalisation by differentiating them for different types of

workers. This framework of Haug (2015) is chosen because it thoroughly categorises the information qualities in detail, providing a better understanding of what contents should be included. This is to show that content can result in various personalisation to match employees' characteristics, not only the form of work instructions. The following research question will be discussed throughout this paper:

What dimensions for information content quality are relevant to develop personalised work instructions that fit to individual worker's characteristics?

With this research, the framework of Haug (2015) will be tested to see if the dimensions of it are applicable for creating all types of work instructions. This will show what contents are important for the development of personalised work instructions, and see if this framework of Haug can be used if different characteristics of employees are considered. This research can help the creators of the work instructions of the companies/organisations by providing detailed critical information required to be included for the creation of the personalised work instructions.

The remainder of the paper is organised as follows. Section 2 provides an overview of the previous research in the field of work instructions and research framework of this paper. Section 3 presents the methodology, followed by results at section 4, comparative analysis at section 5, discussion at section 6, and finally, conclusion at section 7.

2. Literature Review

2.1. Content vs. Form of Work Instructions

In this paper, the definition of form and content adheres to the study by Fässberg et al. (2021). Form of work instruction is defined as the carrier or the means of storing information, while the

content of the work instruction is defined as the actual information within the work instructions. Form is the way how the information is communicated (Peltokorpi et al., 2023), meaning that if text-based work instruction changes to picture and text-based work instruction, as long as new information is not added with this change, this is just a change of form. On the other hand, if new information is added to the work instructions during a shift from text-based instruction to a combination of picture and text-based, then not only the form has changed but also the content.

2.2. Subjectivity within the Framework of Haug (2015)

Haug (2015) emphasises the importance of good information quality for work instructions. For example, incorrect, ambiguous or incomplete aspects need to be avoided or excluded since they can result in confusion and misunderstanding (Haug, 2015) Haug (2015) organised 15 dimensions of work instructional information quality problems into 5 categories, which are intrinsic, representational, unmatched information, questionable information and inaccessible information. This explains that to design high-quality work instructions, the work instructions need to be of sufficient quality to avoid these problems (see Figure 1).

Figure 1: Information Quality Problem of Work Instructions Framework by Haug (2015)

However, some dimensions of this framework seem subjective and may be interpreted differently by people with different characteristics. Therefore, these dimensions may not be universally applicable to all workers, requiring further investigation. In this paper, we focus on the following

five dimensions: (1) too repetitive, (2) difficult to understand, (3) too large amount, (4) too complex content and (5) untimely.

2.2.1. Too Repetitive

Haug (2015) emphasises "too repetitive" as a problem when the information is given but it is repeated too often. This might feel like unwanted information is given in the later stage as it appears again, but according to Haug (2015), the problem of "too repetitive instruction" is a different situation compared to the category of "unneeded instruction". "Unneeded instruction" focused on the given information itself, while "too repetitive instruction" is about how often that same information is presented to the readers. Therefore, the content of instruction will become repetitive if the same information is presented more than once. Haug (2015) states that instructions need to have adequate repetitions, indicating that repetition itself is not a problem, but rather it is more about how frequently it will appear in the instruction again that it becomes problematic. However, when it comes to different characteristics of employees (such as experience) or variability of work environment, this factor of being too repetitive can be perceived very differently per employee and work environment. For instance, Kolbeinsson et al. (2023) conducted a research about beginner employees preferring the video instructions that include a looping video for a repetitive factor, while experienced employees did not notice there were information gaps in the work instructions unless they did the tasks together with beginner employees. This indicates having "too repetitive" as one of the quality problem dimensions limits the framework of Haug (2015) towards the development of personalised work instructions. Thus, this raises the question of, what would be seen as "too repetitive" for beginner employees when repetitiveness is what they perceived as a needed factor?

2.2.2. Difficult to Understand

"Difficult to understand" also can be perceived differently by different types of employees, since employees might differ with respect to their cognitive ability or experience within the work. The ability to understand varies per individual. Kolbeinsson et al. (2023) state that both beginner and experienced employees prefer simplified images for work instructions, but the style of "easy to understand" work instructions are different. Beginner employees perceived step-by-step instructions as more important, while experienced employees preferred images and highlighted markings for detail (Kolbeinsson et al., 2023). Therefore, the dimension "difficult to understand" is too subjective and vague to be used for the development of personalised work instructions, and further investigation is needed.

2.2.3. Too Large Amount, Too Complex Content, and Untimely

The category of "Unmatched information" holds the following three dimensions: too large amount, too complex content, and untimely. Haug (2015) states that the category refers to a mismatch of information and employees. First, "appropriate amount of data" refers to fitting the amount of data for each person receiving the instruction based on his/her cognitive capabilities. In other words, Haug (2015) states that the amount of data provided should match the amount of data the employees can handle. Too much data should be avoided since it can be too much for individuals with little patience or concentration (Haug, 2015). This shows that Haug actually suggested personalisation of work instructions. However, the standard that has been presented in this framework does not distinguish different worker characteristics. The claim of "individuals with little patience or concentration" can be viewed very subjectively since not everyone has the same amount of patience or concentration, and there is no suggested objective measurement for these

traits. If an organisation only hired employees with the same amount of patience and concentration, then this framework would work perfectly. But that is not realistic. Thus, the dimension of "too large amount" needs to be further investigated, as it is currently challenging to standardise due to the variability in individual characteristics.

Secondly, Haug explains "too complex content" by using a subjective unit of the level of experience of employees. For the work instruction not to be too complex, one should consider the pre-knowledge of the employees whether the employees have obtained the information beforehand. Moreover, the definition of this dimension relies very much on the ability of individual employees as it depends on the ability of employees to handle complexity (Haug, 2015). Connecting back to other factors mentioned previously, this "too complex content" dimension relies too much on a subjective standard of employees, being difficult to use for standardisation for developing personalised work instructions from the existing framework.

Lastly, the "untimely" dimension is explained as "point of time when the data was needed" and "time the data was provided" (Hang, 2015). Haug (2015) states that for instructions to be timely, they need to be given at the time when employees need them. But do employees know the perfect timing themselves? This might depend on the characteristics of employees, such as their level of experience. Due to this dependency, employees need to tailor their time of work instructions based on their needs, which adds further subjectivity to the framework of Haug. Thus, the current framework by Haug (2015) has limitations in expanding the content of work instructions toward personalised work instructions

2.3. Characteristics of Employees

Human workers and their performance are crucial aspects of the assembly lines in manufacturing environments (Katiraee et al., 2022). Diverse characteristics, efficiency and motivation of workers influence the performance of the lines (Katiraee et al., 2021; Katiraee et al., 2022). The difference between skills, age and gender of employees can impact the product system performance (Katiraee et al., 2021). Interestingly, on the other hand, Villani et al. (2019) state that characteristics can be categorised into similar clusters to create common needs. Villani et al. (2019) categorised those characteristics into groups, clustering them to similar levels such as age, cognitive impairments and experience. This leads to an advantage of tailoring those clusters to match individuals that fit within those. Since these differences can cause significant challenges for companies with reliance on high manual jobs to design assembly lines, it is important to tailor work instructions to align with the various characteristics of individual employees, ensuring that the characteristics of employees are matched with appropriate personalisation.

2.3.1. Level of Experience

Having different levels of experience can result in different needs. Level of experience was taken frequently as the driver of personalisation for many organisations to personalise their work instructions for employees (Kolbeinsson et al., 2023; Bokhorst et al., 2024). As mentioned above, Kolbeinsson et al. (2023) present that beginner employees and experienced employees have different preferences for their instructions. Beginner employees wanted more support such as having step-by-step instructions, while experienced employees can handle more complex tasks with less support.

2.3.2. Cognitive Differences

Following an all-for-one type of work instruction can be burdensome for some employees. Cognitive differences need to be taken into account since this can largely impact assembly performance (Katiraee et al., 2021). This shows well in the form of work instruction. As mentioned above, when the work instructions were provided with only text, and only in paper form, it increased the cognitive workload of employees and influenced performance (Li et al., 2018). Moreover, when the employees are cognitively challenged, the influence of cognitive differences on individual work performance would be strong. Companies have been relying on mentors to provide support for cognitively impaired employees (Peltokorpi et al., 2023; Bokhorst et al., 2024). Peltokorpi et al. (2023) conducted research to find which form of instruction works best for employees with cognitive disabilities. The result was varied, showing that some disabilities preferred paper form of work instruction, while others relied heavily on mentor assistance.

2.3.3. Other Characteristics

Several other characteristics also influence the work performance. Age is frequently mentioned as an influential factor. As employees age, their physical conditions are impacted and that can cause several changes, even to significant impairments (Villani et al., 2019). Information processes can be changed by change of perception due to aged organs and functions (Villani et al., 2019). Peruzzini and Pellicciari (2017) state that it is an important task for the future to bring adaptive manufacturing systems for ageing employees. This characteristic differs a bit from cognitive differences, since it focuses more on impairments and changes due to age. Education level can also influence work performance. Villani et al. (2019) show that education affects the interaction between employees and work, as less educated employees experienced more difficulty in the task.

Considering these characteristics, the research framework is proposed as below (see Figure 2). The main independent variables are the five subjective content dimensions from the framework of Haug (2015) mentioned previously, which are too repetitive, too large amount, too difficult to understand, too complex content and untimely. Since there can be more subjective content discovered throughout the study, an additional dimension marked with ellipsis has been added under the dimension of Untimely. The dependent variable is the work performance of employees, and the moderating variable of this relationship is the characteristics of employees.

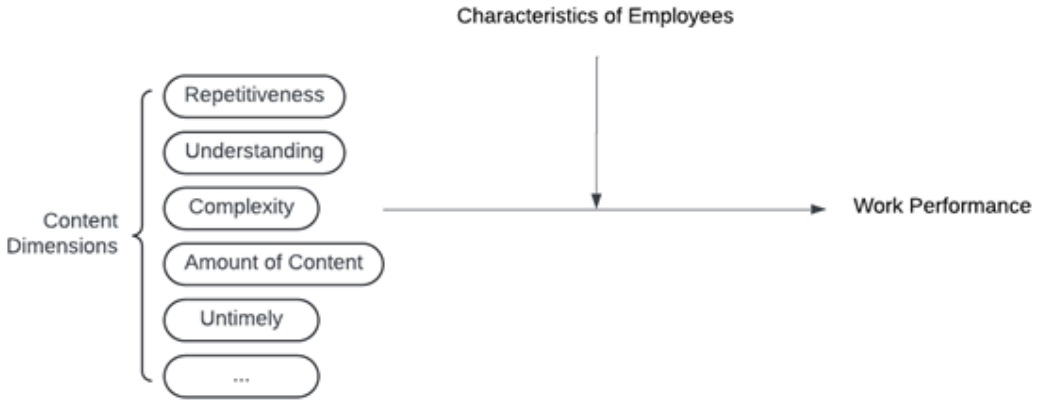

Figure 2: Research Framework

3. Methodology

3.1. Research Design

A multiple-case study is conducted at two companies within the larger RAAK.MKB17.017 project on Flexiblework instructions, led by the HAN University of Applied Sciences. The multiple-case study was chosen because the methodology provides more reliable results than a single-case study (Gustafsson, 2017). It allows the research to dive in-depth into each case by not only doing within-

analysis of an individual case but also comparing and contrasting between cases (Adams et al., 2022).

This study involves two companies involved in manufacturing and assembling, both from the Arnhem region. Six companies were contacted to ask for the possibility of interviews and data collection, and two companies reached out. Table 1 provides an overview and short descriptions of the companies. The unit of analysis is the worker with his/her unique characteristics in interaction with the work instructions.

Table 1: Company Overview and Descriptions

Company	Number of employees	Function of interviewee(s)	Case description
A	Approx. 90	Manager of operations	A company that receives electronic product orders from various customers such as embedded controllers
B	188	Creators of work instructions	A company that produces air suspension system for various large vehicles

3.2. Data Collection

3.2.1. Interview Protocol

A semi-structured interview was chosen for data collection. This is done to get detailed information about the work instructions of each company and potential influential characteristics of employees, and to ensure a deep understanding of how they impact the work performance or not. Before forming the interview protocol, previous interview transcripts were looked at. This was to see if previous interviews within the RAAK project provided similar information to this research. Also, it was to reduce potential unnecessary questions so that the same questions would not be asked to the companies repeatedly. After the inspection, it was found that the previous interviews were not focused on the same topic as the current research. However, it was found that the previous interviews did not separate the distinction between the terms: "repetition" and "too large amount", and "too complex content" and "too difficult to understand". When it comes to "repetition" and "too large amount", there seems to be no distinction between them. There was no clearly stated problem with the work instructions, whether it was too large due to being repetitive, or it just is repetitive, or it was just too much amount. A similar problem existed for "too complex content" and "too difficult to understand". There was no separate distinction between whether the problem, such as "need to read the work instructions several times", was caused by difficult language usage (terminology) or the content of work instruction did not match the ability of the employees. Thus, it became important that the interview questions within this study clearly state the difference between those four terms. The previous interview transcripts showed that product and customer order variations are the main influential factors that change the work instructions, while the characteristics of workers are not considered much.

After going through the previous interview transcripts, an interview protocol for this research was formed (see Appendix A). It covered topics such as the current format of work instructions, characteristics of employees, five subjective aspects of Haug's framework, and other potentially influential factors for personalisation of work instructions. These interview protocols were designed for interviews with managerial level employees of the companies, such as team leaders.

3.2.2. Survey Protocol

To collect data from lower-level employees, an online survey was created (see Appendix B). Similar to the interview questions, this survey contained questions regarding current existing work instructions, five subjective dimensions of Haug's framework, potential influential characteristics of employees, personalisation factors within work instructions and options for personalisation in the perspective of lower-level employees. The online survey was chosen to collect as many responses as possible in a short period of time. It could be accessed by sharing an anonymous link through personal networks of the interviewees such as emails. English and Dutch were available as language options (see Appendix C).

3.3. Data Analysis

3.3.1. Interview

Firstly, with each of the raw interview data, some irrelevant portions were ignored for the data cleaning process. This was done to get rid of irrelevant quotes that do not add to the research. Then, each interview transcript was inspected from line to line to inspect for repeated themes that could be coded. For example, when the interviewee mentioned picture/photos from the work instruction, this quote was coded as "usage of picture/photo for work instructions". Like this, using

the direct quotes from the interview, descriptive codes were selected. From these descriptive codes, interpretative codes were formulated to not only categorise the descriptive codes, but also to connect back to the research framework.

With the interpretative codes, pattern codes were created. Repetitive themes of interpretative codes were categorised, recognised into a pattern and combined to create new compiling codes. For example, specific codes such as "adding comments", "colour code", "accepting complaints" and "shop floor system" have overlapping themes that can be categorised as "improving work instructions in Company A", becoming a pattern code. The coding tree analysis of this research is available in Appendix D.

3.3.2. Survey

The survey was published online. After an interview with the managerial level employees, they were asked to share the link via email with the lower-level employees. Unfortunately, with the period of long winter vacation mixed with Christmas and New Year, the survey emails seemed to be ignored by most of the employees. It collected a very small number of samples (1 response), and therefore, it will not be included in the further data analysis and results.

3.4. Quality of the Research

For construct validity, this research collected data from more than one company using a semi-structured interview with pre-formulated interview protocols (see Appendix A). Interviews encouraged interviewees to be open in order to gather in-depth insights about their work instructions with consented confidentiality. However, internal validity is limited as the interviewees are positioned at the managerial level of the company, and that may have led them to

give overly positive responses about the company and the work instructions. Therefore, better internal validity would be shown if this research were conducted with more employees in various positions. The external validity is low as the findings of this research are hard to generalise due to threats such as potential sampling bias. In addition, the contextual differences between companies must be considered, and therefore, the generalisability of the findings is difficult to do so. Lastly, reliability is low for this research since each company in this research produced different results despite processing the same interview protocols. As each company has its own way of dealing with work instructions, work performance, and personalisation, the same results will not be produced. In addition, as Company B is currently in the process of changing the format of the work instructions, this may potentially affect the replication of this study due to a change of context in the future. In conclusion, improvements should be made to increase the validity and reliability of this study.

4. Results

This section describes the current state of work instructions within Company A and Company B. First, the current form of the work instruction will be discussed, followed by a discussion of the content of the work instruction. Then, the current state of how the company manages its employees' characteristics will be presented.

4.1. Creation of Work Instructions

Company A: The work instructions are created by the R & D department. Their aim is to create a work instruction called version 0. When the R&D department publishes the version 0 work instruction for a product, they do not participate in the process of improving the work instruction. It is the responsibility of the team leaders and employees of teams to further improve the given

work instruction. The work instructions are not personalised, rather published as universal work instructions.

Company B: The work instructions are created by the department of creating work instructions. First, the work instructions are created as the process engineers assemble a product and the creators of work instructions take photos and write down the steps. The creators formulate the work instructions, and get it tested out by not only process engineers but also assembly employees. This is the time for the assembly employees to give the creator feedback for improvements, such as some pictures are not clear, or some steps should be sequenced differently. After this process, the work instruction is published, and no further changes or improvements are expected. The aim of the department of creating work instructions is to publish the final version of work instructions. There are also sets of rules that the creators must follow while creating work instructions, such as the background colour of photos. These rules are set-in-stone, and company B aims to make its work instructions as uniform as possible. Therefore, all the work instructions must follow the rules and standard structure. Company B does not produce personalised work instructions, rather, they focus on creating uniform and standardised work instructions.

4.2. Form and Content of Work Instructions

Company A: Company A uses a fully digitalised form of work instructions. Each employee has a workbench for assembling products, and there is a monitor on the top side of the workbench. Through this monitor, they can access the shop floor system, where the digitalised documents of the products' work instructions are available.

The work instructions are in picture/photo form, as there are no paragraphs or sentences for instructions. Each page of the work instructions contains one photo of the assembly step. When

assembling a product, employees can look at the picture on their monitor for as long as needed. Next to the photo is a box where employees can write comments to either give themselves a more detailed explanation of the step or remind themselves not to forget something from that specific step.

Company B: In the case of company B, digital format and paper format are used. Their goal is to change all their work instructions into digital format, and they are currently in the process of moving away from the paper format by converting the existing paper format work instructions into digital format. The digital format of work instruction contains step-by-step pictures/photos, with little amount of text under the pictures/photos. These texts are provided for more detailed information. Text is used because, according to company B, some things are easier to explain with a few lines of text instead of showing 20 more pictures/photos.

In addition, within their digital format of work instructions, they also provide an overview of the entire steps on one page. Employees can choose to either go through the work instructions step by step or look at the overview page while they assemble the product.

4.3. Improvement and Maintenance of Work Instructions

Company A: When the work instruction version 0 is published, it is up to the responsibility of team leaders and employees to improve and maintain the work instructions. When an employee faces a problem with a work instruction, he or she can ask the team leader if he/she can write down a comment next to a photo/picture to add a clear explanation. This step is discussed with the team leader, and then a comment can be written down in the box. This process can be done quickly since there are no further requirements needed for adding the comments. There are no other departments involved in this process; thus, the comments are applied immediately. Since the improvement

process of the work instructions is done within the team, the employees can provide their feedback quickly to the team leaders. When the product of the customer order changes, the work instructions are changed or updated following the news version of the product. This happens around once a year.

Company B: As their work instructions follow set-on-stone standard rules, there are limits to the change of the work instructions, such as the pictures/photos change because they are not within the standard background colours. Moreover, as the aim of the creators is to provide the final version of work instructions, employees cannot add comments or give feedback directly to the work instructions. Instead, feedback meetings are done regularly to discuss the work instructions. These meetings are usually held twice per week, and more if the creators are present on the shop floor. However, Company B has a hierarchical system when it comes to changing or improving work instructions. If the team leader cannot handle the problem, it passes to a process engineer. If a process engineer cannot handle it, that is when the creators are called to solve the problem.

Below, Table 2 shows an overview of all information regarding the creation and improvement process of work instructions in Company A and B. The work instructions are changed or updated when there is a change within the product, and this can happen around once a year, twice maximum. Table 3 shows an overview of the format and form of work instructions in Company A and B.

Table 2: Overview of Creation and Improvement of Work Instructions in Company A and B

Company	Work instructions created by	Work instructions improved by	Personalisation of work instructions	Frequency of change/update of work instructions due to change of

				product
A	R & D Department	Team leaders and employees within each team	No	Once a year
B	Department of creating work instructions	Department of creating work instructions	No	Once a year, twice maximum

Table 3: Format and Form of Work Instructions in Company A and B

Company	Format of work instructions	Form of work instructions
A	Digital	Pictures/photos
B	Digital and paper	Digital: 95% pictures/photos, 5% text Paper: 50% pictures/photos, 50% text

4.4. Five Subjective Dimensions of Haug's Framework (2015)

Five subjective dimensions of Haug's framework (2015): too repetitive, too large amount, too difficult to understand, too complex content, and untimely, were discussed during the interviews. The questions first asked if the work instructions included the subjective dimensions, and what kind of problems the work instructions have with each dimension, what solutions can be used to solve the problem, and if that solution can include personalisation aspects by considering the different characteristics of employees. In the dimension of "too repetitive", repetitiveness within a single work instruction was considered.

4.4.1. Too Repetitive

Company A: Following the definition of too repetitive by Haug's framework (2015), it is about the frequency of the same information being presented to the end users that results in a problem. In the work instructions of company A, there were no steps that presented the same information again to the employees due to the work instructions being a picture/photo form. Each picture of the work instructions showed different parts of a product. The manager of operations mentioned that it would not be necessary to repeat the same steps because the employees can look at the picture continuously if needed. Also, they can zoom into the photo to have a more detailed look. This makes the dimension of "too repetitive" not applicable to the case of Company A. The content problem of repetitiveness of work instruction was averted by the usage of digitalization format and picture/photo form.

Company B: There was a repetitiveness problem with the text part in their previous version of work instructions. For example, when employees had to pay more attention to a certain product within several steps, the same message, such as "make sure there is no dust in the tube", was shown repetitively in every step. However, the creators viewed this as unnecessary and as the form of the work instructions changed to be more picture/photo based than text, the repetitive texts were removed. In their current work instructions, both the digital and paper formats of work instructions do not have repetitive pictures/photos or texts. There are no steps that repeatedly give the same information to the employees. With this change of form, it shows that currently there is no repetitiveness in the case of Company B. However, it is unknown yet if employees with certain characteristics perhaps prefer to have some kind of repetition within the work instructions. A relevant question to this was asked in the survey but due to not having enough response numbers to analyse it, it can only be concluded that the objective repetitiveness level is very low with the

data from the interview. The work instructions from Company B fulfills the objective of Haug (2015), but it is unknown if this low level is optimal for all types of workers.

4.4.2. Too Large Amount

Company A: The dimension "too large amount" seems to be ignored in the case of Company A, and the reason behind it could be due to not having any feedback regarding this problem. The interviewee of Company A mentioned that he has never heard of this problem. The dimension itself may be relevant, but in Company A, it does require further attention to it.

Company B: In their previous version of work instructions, the work instructions provided all the information at once. This has led to stressful situations for some employees, especially for new employees since there were too many texts and pictures/photos to look at. This also links to the previous dimension of being too repetitive. Not only was the text repetitive, but it also made employees read more than necessary. However, as Company B converted their work instructions, problems regarding the amount of information given were solved. Not only were the repetitive texts removed, but the work instructions became simpler, as it provided more straightforward, more broken-down steps for employees instead of providing all the information at once. Company B also mentions that reading too much in the end does not add to the function of work instructions, even if all the text is the correct information. Furthermore, there has been no feedback regarding the amount of new work instructions given by the employees. With this change, Company B solved the problem, and now the dimension of "too large amount" does not require further attention in the case of Company B.

4.4.3. Too Difficult to Understand

Company A: In the case of company A, the dimension of "too difficult to understand" is not applicable since all the work instructions are done in picture/photo form. Similar to the dimension of "too repetitive", using a picture-based form of work instructions also solved the possible problems that the dimension of "too difficult to understand" can bring.

Company B: Company B uses simple language (level of Jip-en-Janneke taal) for their text part for both digital and paper format of work instructions. Pictures/photos are used mostly, but as mentioned previously, some information is better given in a few simple sentences instead of more pictures since those pictures might confuse the employees. Therefore, the usage of text cannot be avoided entirely in the work instructions of company B. However, when creating work instructions, the creators used simple language so every employee could understand easily. They aim not to cause an extra discussion about the meaning of terms used in the work instructions. In addition, company B mentioned that their work instructions are step-by-step and straightforward, so the dimension of "too difficult to understand" is not within their concern.

4.4.4. Too Complex Content

Company A: The dimension of "too complex content" refers to the mismatch between the ability of employees to handle the complex information in the work instructions (Haug, 2015). The manager of operations from company A mentions that their tasks are "not rocket science"; they are common work that everyone can do. Their tasks are clear enough that employees do not suffer from complexity. Therefore, the dimension of "too complex content" is not within their concern.

Company B: The creators of work instructions from company B mentioned their work instructions are clear and straightforward. Moreover, Company B has also been making some improvements to its products. Their product (called a box) is changed to be more foolproof. For example, some connectors can only go in one place during the assembly process, making it easier for employees to avoid mistakes during assembly. With this, the combined synergy of more straightforward work instructions and the product becoming foolproof and simpler to assemble, the dimension of "too complex content" is not within their concern.

4.4.5. Untimely

Company A: In the case of company A, the time of the information being provided is controlled by the employees themselves. Using the digital format of the shop floor system, the employees can control their own speed and timing of needing the information. Since employees can look at the instructions anytime in any steps, the dimension "untimely" becomes solved in the case of Company A by the format of the work instructions.

Company B: The creators of work instructions mentioned it is entirely up to the employees to whether following the exact steps of work instructions or changing some steps for their convenience, as long as the product comes out well. For example, if certain employees want to place cable ties from step 4 instead of placing wires from step 3, as long as the final product passes the quality check, it is not a problem. Furthermore, the work instructions of Company B provide an overview page of all the steps of work instructions in one page. This adds more options for the employees to choose how to follow the work instructions, as the employees can also look at the one-page work instructions instead of going through the steps of work instructions. Thus, the dimension "untimely" is solved in the case of Company B.

4.5. Characteristics of Employees and Work Performance

Several types of characteristics of employees were discussed in the interviews. This section explains whether the characteristics of employees influence the relationship between the subjective dimensions of Haug's framework (2015) and work performance.

4.5.1. Personality, Age, and Language

Company A: Several foreign workers in company A do not speak the main language (Dutch) of the company. However, this is not a significant factor in work performance for company A because the work instructions are in pictures. Furthermore, the foreign workers have previously obtained background knowledge related to their current work, so they understand the process and tasks.

The manager of operations stated that being precise and detail-oriented has shown to produce products with better quality. This is an important characteristic for company A because better quality products lead to fewer customer complaints. Following this reason, age is also viewed as an influential factor in this sense because employees with older age become less precise due to decreased physical abilities. However, this shows a relationship between characteristics and work performance, but without considering the dimensions of work instructions contents.

Company B: There were no mentioned characteristics of employees that influenced work performance. Company B did not have employees who did not speak the main language of the company, as everyone spoke it (Dutch).

4.5.2. Level of Education and Experience

Company A: Company A has a distinct team that includes employees with low levels of education and experience. Unlike the other teams, this team receives a more detailed version of work instructions. Compared to the general work instructions from different teams, this detailed version includes smaller steps explained with more pictures. However, these work instructions are not available in other versions, as these detailed work instructions are made for the specific products that only the lower education and experience team assemble. Moreover, this team receives more straightforward tasks, so the employees do not suffer from the complexity of the task.

Company B: Company B did not have a separate team based on education or experience. All teams received the same type of work instructions. The creators of the work instructions mentioned that some new employees did struggle with their previous work instructions, which included a lot of information and text to read, but this did not lead them to problems that showed through in the quality of the products they assembled. The level of education was not mentioned as an influential characteristic of employees. Overall, there have been no influential characteristics of employees that showed in the work performance within Company B.

4.6. Arguments for Not Using Personalised Work Instructions

In the interviews, it was mentioned that both Company A and B do not provide personalised work instructions to their employees. This section presents the reasons for their decisions and discusses them.

Company A: Company A considers and categorises the characteristics of employees before the employees are assigned to their tasks. As mentioned in a previous section, employees are

categorised to a certain team when their level of education and experience are low. This specific team receives tasks that are simpler than other teams, and the work instructions for their products are more detailed with extra images and have smaller, broken-down steps. This makes the employees match well to the task they perform. Thus, instead of changing the work instructions to fit the characteristics of employees, Company A categorises the employees into teams by matching and then provides general work instructions for the team.

Moreover, the current feedback system of work instructions in Company A also plays a part in why they do not find personalised work instructions as necessary. In their current procedure, the team leader and employees can discuss and implement feedback directly to the provided work instructions. When an employee wants to add a comment to give more detailed information, it can be inserted into the comment box of the work instruction, applied directly by using their current digital shop floor system. Thus, as the comments can be added to the work instructions immediately, the employees do not have to suffer from unclear and confusing information. With this quick way of improving work instructions, Company A does not view providing personalised work instructions necessary. With these processes, the work instructions do not have to be personalised for employees in the case of Company A.

Company B: Company B provides the full work instructions to all employees in assembly, but it is up to their freedom on how to use the work instructions. The creators of work instructions mentioned that employees have freedom on whether to follow the work instructions exactly step-by-step or just read the parts where the employees need information as a reminder throughout the assembly process. As long as the end product ensures good quality, the steps of work instructions do not have to be followed exactly. For example, if step 3 says put cable ties and step 4 says put cables in their designated places, employees can do step 4 first before step 3 if it is more convenient

for them. In addition, with the overview page that has all steps of work instructions presented on one page, employees do not have to go through the work instructions fully either. If they want, they can have the overview page open and do their tasks with it. The creators even said if the employees are fully familiarized with their tasks, they do not even need to look at the work instructions. One of the creators quoted "it is not necessary to make a shorter version of a work instruction if they are not using the work instructions". With this freedom of work instruction usage, Company B views making personalised work instructions unnecessary.

4.7. Case Summary

Company A: Some of the subjective dimensions from the framework of Haug (2015) have been shown to be either not applicable, or solved by the form of work instructions of Company A. In the case of "too repetitive" and "too difficult to understand", there was no shown repetitiveness due to the work instructions being picture/photo form. "Too large amount" is not applicable, and "too complex content" is not a concerned dimension since their tasks are not a super complicated job. Furthermore, "untimely" is solved by the digital format of the work instructions as employees have access to information whenever they need.

For influential characteristics of an employee, being precise and detailed-oriented was important for work performance. However, this characteristic was not related or influential to the relationship between subjective dimensions and the work performance, as this characteristic was viewed as influential by its own.

Company B: Some subjective dimensions from the framework of Haug (2015) became not applicable as Company B changed the form of its work instructions and thus, solved the content problems without acknowledging them. Problems regarding "too repetitive" and "too large

amount" were taken care of as the form changed from text to picture/photo. Usage of simple language and more pictures/photos in the work instructions took care of "too difficult to understand" dimension. Additionally, not only simplifying the work instructions but also simplifying the product (task) helped the situation with "too complex content". Also, with digitalised format, "untimely" became not within their concern as the employees have freedom of what steps they want to follow within the work instructions as long as the quality of the final product is good.

5. Comparative Analysis

From the creation of work instructions and management of the different characteristics of employees, Company A and Company B take very different approaches. In this section, the similarity and difference of two cases are compared and discussed.

5.1. Similarity Between Company A and Company B

5.1.1. Digitalised Format and Pictures/Photos Form of Work Instructions

Company A and B both have digitalised format work instructions, where most of the information form is in picture/photo. This has made some subjective dimensions of Haug's framework not applicable and even got solved. "Too repetitive" dimension became not applicable due to having mainly pictures/photos, putting the level of repetitiveness into the optimal level according to Haug (2015). "Too difficult to understand" dimension was solved due to the usage of pictures/photos, as there were no difficult terminology problems induced by text. The "untimely" dimension was solved without realisation that it is a problem by the usage of digital format of work instructions, since employees were able to receive the information whenever they need.

5.2. Difference Between Company A and Company B

5.2.1. Consideration of Characteristics of Employees

Each company uses different methods to improve and maintain the current work instructions. For Company A, instead of matching the work instructions to the employees with different characteristics, it separates and categorizes the employees into specific teams from the beginning. As mentioned, employees with lower experience levels and/or lower education levels are placed into a team that handles specific tasks that fit their level. The work instructions they receive are more detailed than those of other teams, with more broken-down smaller steps and more pictures/photos to look at. This case of Company A shows that, unlike the proposed research framework of this study, the characteristics of employees work as the factor that directly influences some of the content of the work instructions, such as "too complex content" and "too difficult to understand", not as the moderating factor (see Figure 3).

Figure 3: Relationships of the Factors in the Case of Company A

On the other hand, unlike Company A, Company B does not consider the characteristics of the employees but rather aims to make the work instructions understandable by everyone. Using simple languages and even making the tasks simpler, Company B manages to create standardised, uniform work instructions that can be used by all employees without considering the different characteristics. Thus, the proposed research framework is not suitable for Company B, as no relationship between each variable was found.

5.2.2. Feedback Process

The feedback process of Company A is fast-paced, process being done by the team leader and the employees within the team. This process helps employees to not suffer from confusion for a long time as the process is done quickly without involving other departments. In contrast, Company B has a hierarchical structure within their feedback process, as the employees on the shop floor cannot give feedback or add comments directly on the work instructions. But Company B seems to overcome this problem by holding the feedback meetings regularly, and the creators of work instructions being present on the shop floor frequently also.

6. Discussion

This research aims to see which subjective dimensions from the framework of Haug (2015) are influential to the work performance of employees, and if the characteristics of employees are influential in this relationship. Five subjective dimensions within the framework of Haug (2015) are chosen as they can be interpreted differently when they are viewed by different characteristics of employees. The characteristics of employees investigated in this research were selected based on existing literature, as they were shown to be influential toward the work performance. This study conducted a multiple-case study with two companies. A semi-structured interview was conducted, which led to a within-case analysis and a comparative analysis. This section summarises the findings from the previous sections and discusses them using the framework of Haug (2015) and previous literature.

Haug emphasises that the framework includes the most important aspects of quality, and thus, the framework may be used as a "guideline for work instructions in either written or oral form" (Haug, 2015, p.176). However, this research revealed that some dimensions were inapplicable, or content

problems were being solved by having the digitalised, pictures/photos form work instructions. Even before inspecting the content of the work instructions, the cases of Company A and B show that the form of the work instructions significantly influenced the content dimensions. The dimensions "too repetitive" and "too difficult to understand" were shown to be influenced by the form of work instructions, as the pictures/photos are not repeated, and none to few texts are used to explain in detail. The digitalised format of work instructions solved the problem regarding the dimension "untimely" without companies realising that it is a part of the content problems. Although the content of work instructions was focused, this research shows that the form of work instructions is very influential to the content and even acts as a solution for some of the content problems. Therefore, when creating work instructions, the form should not be less of a concern than the content. The format, form, and content are all important aspects to consider.

In addition, in the dimension of "too complex content", Company A categorises employees to match the complexity of the task with their ability. At the same time, Company B simplifies its product and work instructions to make the process fool-proof. This shows that other systems within the company can be changed to solve problems of the content of work instructions. By mixing the different aspects within the company, potential solutions can be created that do not involve changing the contents of work instructions.

Even though previous literature has shown several characteristics of employees that influence work performance (Villani et al., 2019; Kolbenisson et al., 2023), all characteristics of employees investigated in this research were shown to be not influential toward the relationship between the dimensions of work instructions and work performance. Being detailed was recognised as an influential characteristic, but only in Company A's case, as it influenced the work performance instead of the relationship between work instructions and work performance. Company A even

showed that some subjective dimensions are influenced by the characteristics of employees first since it categorises the employees based on certain characteristics into separate teams before assigning tasks.

Therefore, unlike what Haug (2015) has stated, the framework of Haug (2015) does not seem to fit as a universal work instruction guideline. Despite how the research framework expected a relationship between the subjective dimensions and work performance and the moderating effect of characteristics of employees, no relationships were found. These findings suggest that to personalise work instructions, the role of format and forms must be considered as much as the content itself. Furthermore, the characteristics of employees are revealed to be an uninfluential factor for the proposed research framework within this research, and thus, for the personalisation of work instructions, different influential factors should be searched and investigated.

6.1. Theoretical Implications and Practical Implications

This research has shown that the framework of Haug (2015) does not fit as a universal work instructions guideline to use. As some of the dimensions of the framework of Haug (2015) became redundant due to the changes in technology and forms of work instructions, it shows that not all "written" forms of the work instructions would find this framework to be fitting. Despite how the framework focuses on the content of the work instructions, the form of work instructions seems to be must considered as well.

This research also provides what companies should aim for when they create work instructions similar to the cases of Company A and B. This research shows that digitalised, picture/photo form of work instructions do not have to adhere to the framework of Haug (2015) fully. The framework

of Haug (2015) does not act as a universal guide in that case, and therefore, a new guideline that considers the new technologies and image form will be necessary to develop.

In addition, this research also shows that to solve the content problems of the work instructions, the solution might be in different aspects of the company. Instead of focusing only on one aspect of the work instructions, considering all the possible helpful aspects within the company may lead to the solution that might not even require changing the work instructions. Even for personalisation, the content of work instructions is not the only way to solve it, but rather it is a mix of team and tasks matching and picture/photo based form.

6.2. Limitation and Future Research

This research has several limitations. Firstly, it is conducted with a minimal number of cases. This results in a lack of data variety and weakness in comparative analysis. Furthermore, the interviews were conducted with the manager of operations and creators of work instructions, which can lead to bias that they do not know what the employees might think about the work instructions. For future research, more interviews should be conducted with different teams and positions and should consider which type of company to interview. In addition, as the survey was unable to be analysed due to the low number of responses, the future research should conduct the survey as well to investigate the perspective of employees in the lower level.

Moreover, the research was conducted in the Netherlands. Considering different cultures, company atmospheres, and hierarchical systems within companies, the result might differ in other countries. Although it was shown that personalisation of work instructions is not done and does not seem necessary within the companies, it can be very different in other countries since they might have

more difficult situations to provide feedback. Therefore, future research should consider the culture of the people and companies.

Another limitation is the interview questions. Even though the interview questionnaire attempted to see if the subjective dimensions of work instruction influence work performance while being moderated by characteristics of employees, this relation was hard to find as work instruction itself did not consider the characteristics of employees as a factor for personalisation. This made the connection between the subjectivity dimensions and personalisation very difficult.

Furthermore, the form of the work instructions was not considered, as the questionnaire focused on the content of the work instructions. As the interview answers included many parts about the form of work instructions, it might be better to ask questions regarding the mix of form and content to see the mixed effect of both instead of trying to find the solo effect of each. Additionally, this research only investigated companies that have pictures/photos-form work instructions. The result might have been more diverse if the companies with text-form work instructions were included in the data collection.

Finally, there is a risk of personal bias for interpretation of the interview answers, as this research is done by a single researcher. This bias might have led to shaping the interpretation of the data to fit the preconceptions and other biases of the researcher, resulting in potentially influencing the results. It is recommended that several researchers conduct this research together in the future to avoid reliability and validity issues.

7. Conclusion

This research set out to explore the influence of subjective dimensions within Haug's framework (2015) on the work performance and the potential moderating role of characteristics of employees. By examining two companies through a multiple-case study it is shown that the form of work instructions, digitalisation and picture/photo based work instructions, play a significant role in addressing the content problems. The subjective dimensions were solved through change of form rather than changing the content. Moreover, the characteristics of employees investigated in this research shows no influence on the relationship between subjective dimensions of work instructions and work performance. Overall, this research shows that the framework of Haug (2015) is not universally applicable to all work instructions.

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Appendix A. Interview Protocols

Thank you so much for your time and allow me to interview you. My name is So Yeon Joo, and I will be interviewing you today to ask questions regarding the current work instructions of your department/company, personalisation factors within the work instructions, and subjective content aspects together with worker characteristics that influence work performance. My goal of this interview is to gather information on existing content of work instructions, influential worker characteristics, and potential factors for developing personalised work instructions. This interview will be confidential and the data will be only used for the RAAK project. Do I have your permission to also record this interview so I can transcribe it?

1. What is your position in your organisation and what do you do?
    1. What function do you have in your department?
2. How long have you been working in this organisation?
3. How many years of experience do you have in this field?

Creation/distribution of work instructions within the department:

1. Are work instructions created together by team leaders and experienced workers?
    1. If not, who else is involved and responsible for the creation of work instructions?
2. How is the work instruction presented? Is it paper or digital form?
    1. Is it mainly text or picture based?
    2. Is there any option for the content to be personalised? (Such as a more detailed picture/description for those who need it?)
        1. Definition of personalised work instruction: individual/group centred work instruction that provides the needs of employees in an optimal way
3. Are the work instructions made based on the products or tasks or abilities of workers?
4. For feedback of work instructions, what kind of feedback do you receive the most? Is it related to the content of the work instructions?
    1. Have you ever received feedback related to the work performance of the workers?
    2. Have you ever received feedback related to characteristics of workers? (such as cognitive abilities and physical abilities)

General information within the content of work instructions:

1. What kind of information must the work instructions for your department contain?
    1. How detailed is the information within the work instruction of your department? Is it sufficient for your department?

Characteristics of Employees and option for personalisation:

1. Considering different types of characteristics of employees as a team leader, do you perceive any specific characteristics of employees (such as experience level, educational background, age, cognitive abilities, etc) that may impact their work performance through the work instructions?
    1. Which characteristics of employees do you think that are most influential to work performance (age, cognitive abilities, background education, etc)? How do these characteristics influence work performance?
        1. Level of experience is mentioned a lot as a characteristic that influences work performance. Do you think that level of experience is the most influential factor?
            1. If yes, why do you think that? Do you also think there are other characteristics that are as influential as the level of experience?

Subjectivity within the Content of the work instruction - Repetition:

Repetition within the single instruction, for one product, per one department

1. Is there a certain type of information/content in the work instructions for your team that must be repeated?
    1. If so, what kind of information is it?
2. Does the work instruction of your department have several versions that considers the characteristics of employees such as level of experience? If yes, how are those instructions different based on the level of repetition?
3. Was there any situation where your team workers complained about the level of repetition of the work instruction?
    1. If yes, was it due to repetition of the same information?
        1. Did the complained team worker(s) share similar characteristics? (Such as level of experience, age, etc)
    2. Did the workers experience an influence on their work performance due to this problem?
    3. What kind of feedback did you receive from these complaints?
    4. What was done to improve the work instruction from this problem?
4. Is repetition a factor that is of concern (that needs attention) in your work instruction?
5. Do you perceive that repetition is relevant for personalisation of work instruction?
    1. If yes, what can be done for repetition to be used for personalisation?

Subjectivity within the Content of the work instruction - too large amount:

1. Have you received feedback that the amount of work instruction causes inconvenience to some employee's work performance?
    1. If yes, did that employee (group) have any specific characteristics?

        i. If it is the level of experience, did they find the work instruction too repetitive? Or is it just the amount of work instruction (too much text)?
            1. How did this problem influence their work performance?
2. When the feedback is implemented to improve the work instruction, does this change the amount of the work instruction?
    1. If yes, is there a reason for that? Such as level of detail?
    2. If not, how is it done?
3. Is "too large amount" a factor that is of concern (that needs attention) in your work instruction?
2. Do you perceive that "too large amount" is relevant for personalisation?
    1. If yes, what can be done for this to be used for personalisation?

Subjectivity within the Content of the work instruction - difficult to understand:

1. Are your employees able to understand their work instructions without any struggles? (if not, move to 2)
    1. Are there other aspects that are used in the work instructions for better understanding than Jip-Jannake Language?
    2. After training, do your "new" team employees struggle to understand the work instruction due to difficult terms? Or are there other aspects such as individual characteristics?
2. (For foreign employees) Are your employees struggling with understanding their work instructions?
    1. If yes, is it just a language translation problem? Or are there other new problems to be considered?
    2. For employees that struggle to understand the work instructions, do they share any other characteristics other than being a foreigner?
        1. If so, what type of characteristics did they have? How critically those characteristics impact the work performance?
    3. Are there any personalisation options of work instruction for these characteristics?
3. Is "difficult to understand" a factor that is of concern (that needs attention) in your work instruction?
4. Do you perceive that "difficult to understand" is relevant for personalisation?
    1. If yes, what can be done for this to be used for personalisation?

Subjectivity within the Content of the work instruction - too complex content:

1. As the employees of the same department have one single version of work instructions per product, has this caused some workers to suffer from complexity of the content of work instructions?
    1. If yes, what kind of characteristics do those employees have?

2. Making more detailed explanations/steps in the work instruction seems to be the method that is used widely to help employees to understand the work instruction. Is this correct in your case?
    1. Is there other content-focused method than detailed steps that can be used to help employees to understand the work instruction?
3. Is “too complex content” a factor that is of concern (that needs attention) in your work instruction?
4. Do you perceive that “too complex content” is relevant for personalisation?
    1. If yes, what can be done for this to be used for personalisation?

Subjectivity within the Content of the work instruction - untimely:

1. Do the work instructions state the certain/optimal time for providing information?
    1. If yes, how and when is that information provided?
    2. If not, are there any reasons for that? (Is timing not crucial for the work in your department?)
2. Is “correct timing” a factor that is of concern (that needs attention) in your work instruction?
3. Do you perceive that “correct timing” is relevant for personalisation?
    1. If yes, what can be done for this to be used for personalisation?

Suggestion of improvements toward personalisation:

1. Are there any other factors (other than product, task and customer order variation) that you think that influences the content of work instruction?
    1. If so, how do those factors influence the content of work instruction?
2. Why is there variation between product/customer order for work instructions and not within the characteristics of workers within the department?
    1. Is there a reason why all employees use the same work instruction?
    2. Why is the work instruction for your department not developed based on the specific characteristics of employees such as level of experience?
        1. Can personalised work instruction be implemented in your department based on the characteristics of employees? Why or why not?
3. Do you think it is necessary to consider personalisation based on characteristics of employees for creation of work instruction?
    1. Can you call some instructions of your department as personalisation? If yes, why? And if not, why?
    2. Can personalization based on characteristics improve the current work instruction?

Appendix B. Survey Protocols (English)

Consent:
Please read the information on this page carefully.

You are invited to participate in a research study. The study will also ask for your demographic information (such as gender, age, education background, etc.). Please complete the survey in one go, without any distractions or breaks.

Duration: The time to complete this survey is approximately 5 minutes.

Confidentiality: Your data will be recorded, analyzed and kept on file for the sake of future research and analyses, but they will be kept completely confidential at all times. We will maintain confidentiality by keeping your data under lock, and by storing, coding, analyzing and reporting them anonymously so that others will not be able to connect you with your data.

Your rights: Your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time. You have the right to refuse to answer particular questions or perform any task. In addition, your privacy will be maintained in all published and written data resulting from this study.

Questions or concerns: If you have any questions regarding this study, please contact So Yeon Joo at s.y.joo@student.rug.nl

In order to continue with this survey, you have to agree with the aforementioned information and consent to participate in the study. Clicking "I agree and consent to participating in this study" indicates that you have been informed about the nature and method of this research in a manner which is clear to you, you have been given the time to read the page, and that you voluntarily agree to participate in this study.

- I agree and consent to participating in this study
- I do not agree and do not give consent to participate

Demographic/Characteristics

What is your gender?

- Male
- Female
- non-binary/third gender
- Prefer not to say

What is your age?

- Between 18 to 25
- Between 26 to 35
- Between 36 to 45
- Between 46 to 55
- Over 56

How long have you been working in the company?

- Less than 3 years
- Between 3 to 5 years
- Between 5 to 10 years
- Between 10 to 15 years
- Over 15 years

What is your education background?

- No formal education
- Primary school
- High school diploma or equivalent
- Some college, no degree
- Associate's degree
- Bachelor's degree
- Master's degree
- Doctorate (PhD or equivalent)
- Other

What is the function of work instruction to you?

- To obtain new information from product or customer order variation
- To use it as reminder/checklist of the task
- Other reasons

If you choose other reasons from the previous question, please specify your reasons.

_____

Think about one work instruction that you use in your job to answer the following questions.

Is there repetition in the work instruction?

- None
- Minimal
- Moderate
- Frequent
- Excessive

Do you think the amount of repetitiveness in the work instruction is adequate?

- Highly Inadequate: Repetition is either completely missing or overly excessive, significantly hindering understanding or effectiveness.
- Somewhat Inadequate: Repetition is present but insufficient or too frequent, causing confusion or inefficiency.
- Moderately Adequate: Repetition is present at an acceptable level but could be optimized for better clarity or emphasis.
- Mostly Adequate: Repetition is appropriately balanced and aids understanding, with minor room for improvement.
- Perfectly Adequate: Repetition is exactly right, reinforcing key points without being redundant or excessive.

What aspect is repetitive within the work instruction?

- Picture
- Text
- Both
- Other aspects
- Not applicable (in case there is not repetitiveness)

If you selected others in the previous question, please specify.

_____

Is it repetitive because you have seen the same work instruction over and over again for a while?

- Strongly Disagree
- Disagree

- Neutral
- Agree
- Strongly Agree

Is it repetitive because the same information within the work instruction is provided over several different steps?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Do these repetitiveness aspects also exist in other work instructions?

- No
- Yes, but only the repetition due to me looking them over and over again throughout the time
- Yes, but only the repetition of same information on several different steps
- Yes, both repetitiveness aspects exist in other work instructions

If it benefits, why?

_____

If it hinders, what should be done?

_____

Do you think the amount of work instructions should be different for different employees, based on their characteristics?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

If you (strongly) disagree, why?

_____

If you (strongly) agree, why?

_____

What kind of characteristics should be considered?

- Age
- Gender
- Experience level
- Education background
- Others

If you selected others in the previous question, please specify.

_____

How do you evaluate the extensiveness of work instructions?

- Far Too Brief: The instructions are extremely limited, missing essential details or steps.
- Somewhat Brief: The instructions cover the basics but lack sufficient depth or explanation for clarity.
- Adequate: The instructions are thorough enough to cover the task without being overly detailed or sparse.
- Somewhat Extensive: The instructions provide more detail than strictly necessary, which may be helpful but could lead to minor inefficiencies.
- Far Too Extensive: The instructions are overly exhaustive, including unnecessary information that complicates understanding.

If you said extensive, is this because it includes too many steps to follow?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Is the work instruction extensive because it is repetitive with information/steps?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Does the amount of work instructions hinder your work performance in terms of productivity?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Does this problem regarding the extensiveness also exist in other work instructions?

- No
- Yes, but only because it includes too many steps to follow
- Yes, but only because it is repetitive with information/steps
- Yes, there are too many steps to follow and it is too repetitive

How difficult do you think your work instructions are written?

- Very easy
- Easy
- Moderate
- difficult
- very difficult

Do you think the difficulty of the work instruction matches your working ability?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

If it does not match, why? Please explain.

_____

Does the difficulty of work instructions hinder your work performance?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

If there are employees who struggle with understanding the work instructions, should they receive different work instructions from the standard work instructions?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

If yes, what kind of characteristics should receive the different work instructions?

- Age
- Gender
- Experience level
- Education background
- Others

If you selected others in the previous question, please specify.

_____

If you selected not, why not?

_____

If you selected yes, why yes?

_____

Do you think the complexity of work instructions for certain characteristics of employees should be different from the standard instructions?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

If you have to re-read a step in the work instruction, what is the reason?

- Written text or picture used in the work instruction is hard to understand
- The given information itself is hard to understand
- Both of the above options apply
- Others

If you selected others in the previous question, please specify.

_____

When you re-read a step in the work instruction, is it because the written text or picture used is hard to understand?

- Both text and picture are hard to understand
- Only the text is hard to understand
- Only the picture is hard to understand
- Both text and picture are not hard to understand

Have you ever had a situation where you could not understand the work instructions because the information provided was too complex?

- Not at all
- Rarely
- Sometimes
- Often
- Always

Why did you find the given information too complex?

- New information of the product
- Complex order variation
- Cognitive problems
- Others

If you selected others in the previous question, please specify.

_____

How often do you ask others to help you with understanding some parts of the work instructions?

- Not at all
- Rarely
- Sometimes
- Often
- Always

Does the complexity of the work instruction hinder your work performance?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

Does the complexity of the work instruction exist in other work instructions?

- Not at all
- Yes, in few work instructions are too complex
- Yes, in some work instructions are too complex
- Yes, in most of the work instructions are too complex
- Yes, in all the work instructions are too complex

Do you think the complexity of work instruction for certain characteristics of employees should be different from the standard instructions?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

If so, what kind of characteristics should be considered?

- Age
- Gender
- Experience level
- Education background
- Others

If you selected others in the previous question, please specify.

_____

If you selected not, why not?

_____

If you selected yes, why yes?

_____

Are there any other factors you think that influences the content of work instructions other than product/order variation? Please specify.

_____

Would you rather have a mentor (or a co-worker) that helps you to go through the work instructions or a personalised content of work instructions?

- Mentor
- Personalised content of work instructions
- Both
- None

Appendix C. Survey Protocols (Dutch)

Consent:
Leest u de informatie op deze pagina alstublieft zorgvuldig.

U bent uitgenodigd om deel te nemen aan een onderzoeksstudie. Deze studie zal u ook vragen om uw demografische informatie (zoals geslacht, leeftijd, studie achtergrond, etc.). Vul deze enquête alstublieft in één keer in, zonder enige afleiding of pauzes.

Duur: De tijdsduur voor het invullen van deze enquête is ongeveer 5 minuten.

Vertrouwelijkheid: Omwille van toekomstig onderzoek en analyses, zullen uw gegevens worden opgenomen, geanalyseerd en bewaard in een dossier. De gegevens zullen te allen tijde vertrouwelijk worden behandeld. Wij bewaren uw gegevens vertrouwelijk en slaan deze anoniem op, coderen ze, analyseren ze en rapporteren ze. Zo kunnen anderen u niet in verband brengen met uw gegeven.

Uw rechten: Uw deelname is vrijwillig en u hebt het recht om uw toestemming in te trekken of deelname op elk gewenst moment te beëindigen. U heeft het recht om te weigeren om bepaalde vragen te beantwoorden of een taak uit te voeren. Bovendien wordt uw privacy gehandhaafd in alle gepubliceerde en geschreven gegevens die voortvloeien uit deze studie.

Vragen of opmerkingen: Als u vragen heeft over deze studie, neem dan contact op met So Yeon Joo via s.y.joo@student.rug.nl

Om door te kunnen gaan met deze enquête, moet u akkoord gaan met de bovengenoemde informatie en toestemming geven om deel te nemen aan het onderzoek. Als u op "Ik ga akkoord en geef toestemming om deel te nemen aan dit onderzoek" klikt, geeft u aan dat u op een voor u duidelijke manier bent geïnformeerd over de aard en methode van dit onderzoek, dat u de tijd hebt gekregen om de pagina te lezen en dat u vrijwillig akkoord gaat met deelname aan dit onderzoek.

- Ik ga akkoord en geef toestemming om deel te nemen aan dit onderzoek
- Ik ga niet akkoord en geef geen toestemming om deel te nemen

Demografie/kenmerken

Wat is uw geslacht?

- Man
- Vrouw
- Non-binair/derde geslacht
- Liever niet zeggen

Wat is uw leeftijd?

- Tussen 18 en 25
- Tussen 26 en 35
- Tussen 36 en 45
- Tussen 46 en 55
- Ouder dan 56

Hoe lang werkt u al bij het bedrijf?

- Minder dan 3 jaar
- Tussen 3 en 5 jaar
- Tussen 5 en 10 jaar
- Tussen 10 en 15 jaar
- Langer dan 15 jaar

Wat is uw opleidingsniveau?

- Geen opleiding
- Basisschool
- Middelbare School
- Vervolg opleiding, geen diploma
- MBO, niveau 1 tot 4
- HBO
- WO
- Doctoraat
- Anders

Wat is de functie van werkinstructies voor u?

- Om nieuwe informatie te verkrijgen uit product- of klantorder variatie
- Om het te gebruiken als herinnering/checklist van de taak
- Andere redenen

Als u andere redenen uit de vorige vraag kiest, specificeer dan uw redenen.

_____

Denk aan een werkinstructie die u in uw baan gebruikt om de volgende vragen te beantwoorden.

Is er herhaling in de werkinstructie?

- Geen
- Minimaal
- Matig
- Frequent
- Overmatig

Vindt u dat de hoeveelheid herhaling (herhaling bevattend of gekenmerkt door herhaling, vooral wanneer deze onnodig of vermoeiend is) in de werkinstructie voldoende is?

- Zeer ontoereikend: Herhaling ontbreekt volledig of is overdreven aanwezig, wat het begrip of de effectiviteit aanzienlijk belemmert.
- Iets ontoereikend: Herhaling is aanwezig, maar onvoldoende of te frequent, wat verwarring of inefficiëntie veroorzaakt.
- Matig adequaat: Herhaling is aanwezig op een acceptabel niveau, maar kan worden geoptimaliseerd voor meer duidelijkheid of nadruk.
- Meestal adequaat: Herhaling is op de juiste manier in balans en helpt het begrip, met kleine ruimte voor verbetering.
- Volkomen adequaat: Herhaling is precies goed, wat de belangrijkste punten versterkt zonder overbodig of overdreven te zijn.
- Niet van toepassing (indien er geen sprake is van herhaling)

Welk aspect is repetitief binnen de werkinstructie?

- Afbeelding
- Tekst
- Beide
- Andere aspecten
- Niet van toepassing (indien er geen sprake is van herhaling)

Als u in de vorige vraag andere aspecten hebt geselecteerd, specificeer dit dan.

_____

Draagt de herhaling binnen een werkinstructie bij aan uw werkprestatie?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens
- Niet van toepassing (geen herhaling)

Als het voordelen biedt, waarom?

_____

Als het nadelig is, wat moet er dan gedaan worden?

_____

Is het herhalend omdat dezelfde informatie in de werkinstructie in verschillende stappen wordt gegeven?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens
- Niet van toepassing (geen herhaling)

Is het herhalend omdat je dezelfde werkinstructie al een tijdje ziet?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens
- Niet van toepassing (geen herhaling)

Bestaan deze aspecten van herhaling ook in andere werkinstructies?

- Nee
- Ja, maar alleen de herhaling omdat ik ze steeds opnieuw doorlees gedurende de tijd
- Ja, maar alleen de herhaling van dezelfde informatie in verschillende stappen
- Ja, beide aspecten van herhaling zijn te vinden in andere werkinstructies

Vindt u dat de hoeveelheid werkinstructies voor diverse werknemers verschillend zou moeten zijn, gebaseerd op hun kenmerken?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens

Als u het er (helemaal) mee oneens bent, waarom niet?

_____

Als u het er (helemaal) mee eens bent, waarom?

_____

Welke kenmerken moeten in aanmerking worden genomen?

- Leeftijd
- Geslacht
- Ervaringsniveau
- Opleidings niveau
- Anders

Als u in de vorige vraag Anders heeft geselecteerd, specificeer dit alstublieft.

_____

Hoe beoordeelt u de uitgebreidheid van werkinstructies?

- Veel te kort: De instructies zijn extreem beperkt, essentiële details of stappen ontbreken.
- Iets te kort: De instructies behandelen de basis, maar missen voldoende diepgang of duidelijke uitleg.
- Voldoende: De instructies zijn grondig genoeg om de taak te behandelen zonder al te gedetailleerd of karig te zijn.
- Iets te uitgebreid: De instructies geven meer details dan strikt noodzakelijk, wat nuttig kan zijn, maar kan leiden tot kleine inefficiënties.
- Veel te uitgebreid: De instructies zijn te uitgebreid, met onnodige informatie welke kan leiden tot onbegrip.

Als u uitgebreid zei, is dat omdat het te veel stappen bevat om te volgen?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens

Is de werkinstructie uitgebreid omdat het repetitief is met informatie/stappen?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens
- Niet van toepassing (geen herhaling)

Belemmert de hoeveelheid werkinstructies uw werkprestaties in termen van productiviteit?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens

Bestaat dit probleem met betrekking tot de uitgebreidheid ook in andere werkinstructies?

- Nee
- Ja, maar alleen omdat het te veel stappen bevat om te volgen
- Ja, maar alleen omdat het herhalend is betreffende informatie/stappen
- Ja, er zijn te veel stappen om te volgen en het is te herhalend

Hoe moeilijk denkt u dat uw werkinstructies zijn geschreven?

- Heel makkelijk
- Makkelijk
- Matig
- Moeilijk
- Heel moeilijk

Denkt u dat de moeilijkheidsgraad van de werkinstructie overeenkomt met uw werkvermogen?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens

Als het niet overeenkomt, waarom? Leg uit.

_____

Belemmert de moeilijkheid van werkinstructies uw werkprestaties betreft productiviteit?

- Absoluut niet
- Waarschijnlijk niet
- Misschien wel of misschien niet
- Waarschijnlijk wel
- Absoluut wel

Als er werknemers zijn die moeite hebben met het begrijpen van de werkinstructies, zouden zij dan andere werkinstructies moeten krijgen dan de standaardwerkinstructies?

- Zeer oneens
- Oneens
- Neutraal
- Eens
- Zeer mee eens

Als u nee hebt geselecteerd, waarom niet?

_____

Als u ja hebt gekozen, waarom hebt u ja gekozen?

_____

Zo ja, welke kenmerken moeten de verschillende werkinstructies krijgen?

- Leeftijd
- Geslacht
- Ervaringsniveau
- Opleidings niveau
- Anders

Als u in de vorige vraag Anders heeft geselecteerd, kunt u een voorbeeld geven?

_____

Vindt u dat de complexiteit van werkinstructies voor bepaalde eigenschappen van werknemers anders zou moeten zijn dan de standaard instructies?

- Absoluut niet
- Waarschijnlijk niet
- Misschien wel of misschien niet
- Waarschijnlijk wel
- Absoluut wel

Als u een gedeelte in de werkinstructie opnieuw moet lezen, wat is de reden?

- Geschreven tekst of afbeelding die in de werkinstructie wordt gebruikt, is moeilijk te begrijpen
- De gegeven informatie zelf is moeilijk te begrijpen
- Beide bovenstaande opties zijn van toepassing
- Anders

Als u in de vorige vraag Anders hebt geselecteerd, specificeer dit dan.

_____

Wanneer u een gedeelte in de werkinstructie opnieuw leest, is dat dan omdat de geschreven tekst of afbeelding die is gebruikt moeilijk te begrijpen is?

- Zowel de tekst als de afbeelding zijn moeilijk te begrijpen
- Alleen de tekst is moeilijk te begrijpen
- Alleen de afbeelding is moeilijk te begrijpen
- Zowel de tekst als de afbeelding zijn niet moeilijk te begrijpen

Heeft u ooit een situatie gehad waarin u de werkinstructies niet kon begrijpen omdat de verstrekte informatie te complex was?

- Helemaal niet
- Zelden
- Soms
- Vaak
- Altijd

Waarom vond u de gegeven informatie te complex?

- Nieuwe informatie over het product
- Complexe maatwerk
- Cognitieve problemen
- Anders

Als u in de vorige vraag Anders hebt geselecteerd, specificeer dit dan.

_____

Hoe vaak vraagt u anderen om u te helpen met het begrijpen van bepaalde delen van de werkinstructies?

- Helemaal niet
- Zelden
- Soms
- Vaak
- Altijd

Wat is de reden als u anderen om hulp vraagt? Leg uit.

_____

Belemmert de complexiteit van de werkinstructie uw werkprestaties?

- Absoluut niet
- Waarschijnlijk niet
- Misschien wel of misschien niet
- Waarschijnlijk wel
- Absoluut wel

Bestaat de complexiteit van de werkinstructie ook in andere werkinstructies?

- Helemaal niet
- Ja, in een paar werkinstructies
- Ja, in sommige werkinstructies
- Ja, in de meeste werkinstructies
- Ja, in alle werkinstructies

Vindt u dat de complexiteit van werkinstructies voor bepaalde kenmerken van werknemers anders zou moeten zijn dan de standaard instructies?

- Absoluut niet
- Waarschijnlijk niet
- Misschien wel of misschien niet
- Waarschijnlijk wel
- Absoluut wel

Als u nee hebt geselecteerd, waarom niet?

_____

Als u ja hebt geselecteerd, waarom ja?

_____

Zo ja, welke kenmerken moeten dan in aanmerking worden genomen?

- Leeftijd
- Geslacht
- Ervaringsniveau
- Opleidingsachtergrond
- Anders

Als u in de vorige vraag anders hebt geselecteerd, specificeer dit dan.

_____

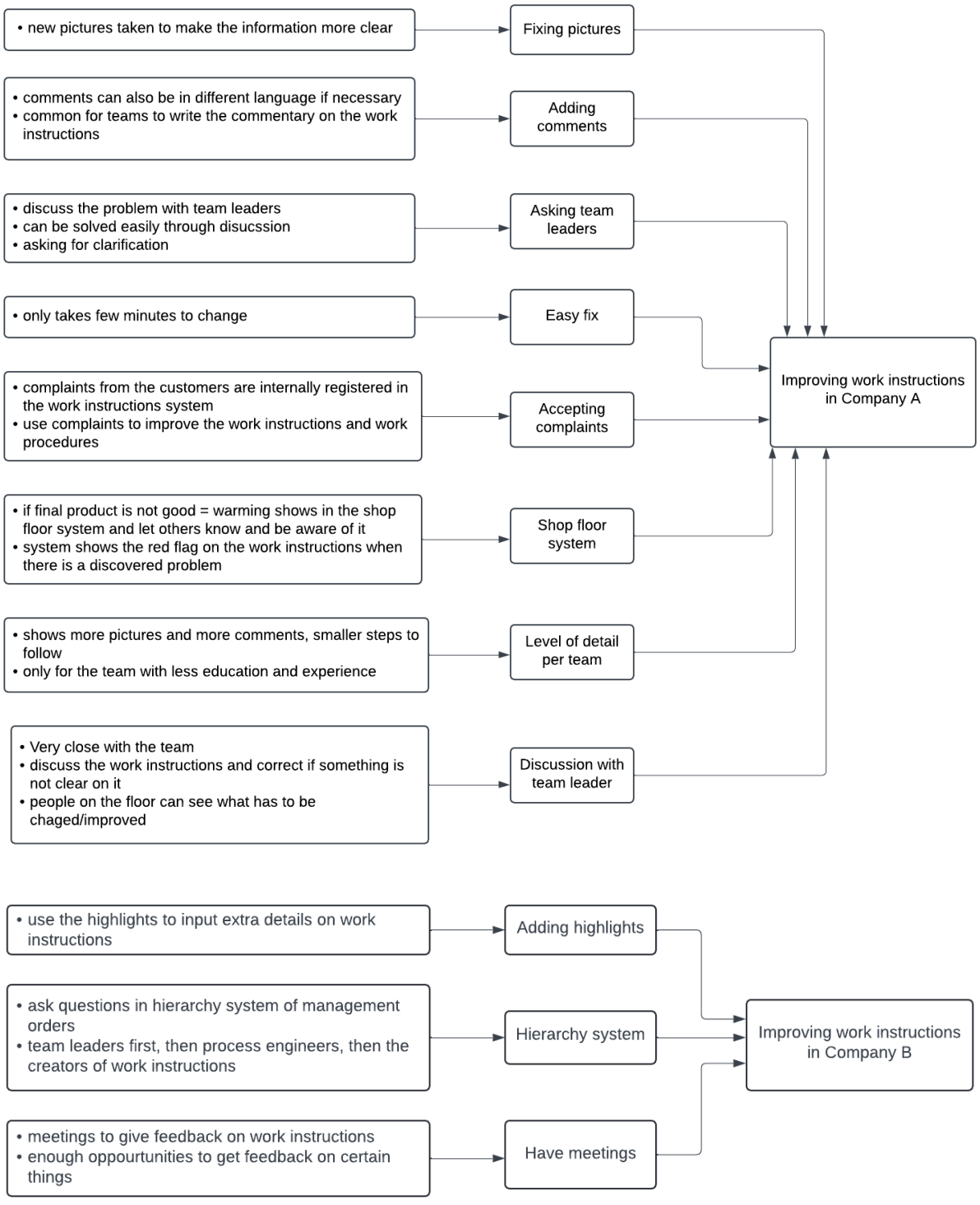
Zijn er nog andere factoren die volgens u de inhoud van werkinstructies beïnvloeden, behalve product-/maatwerk? Geef dit dan aan.

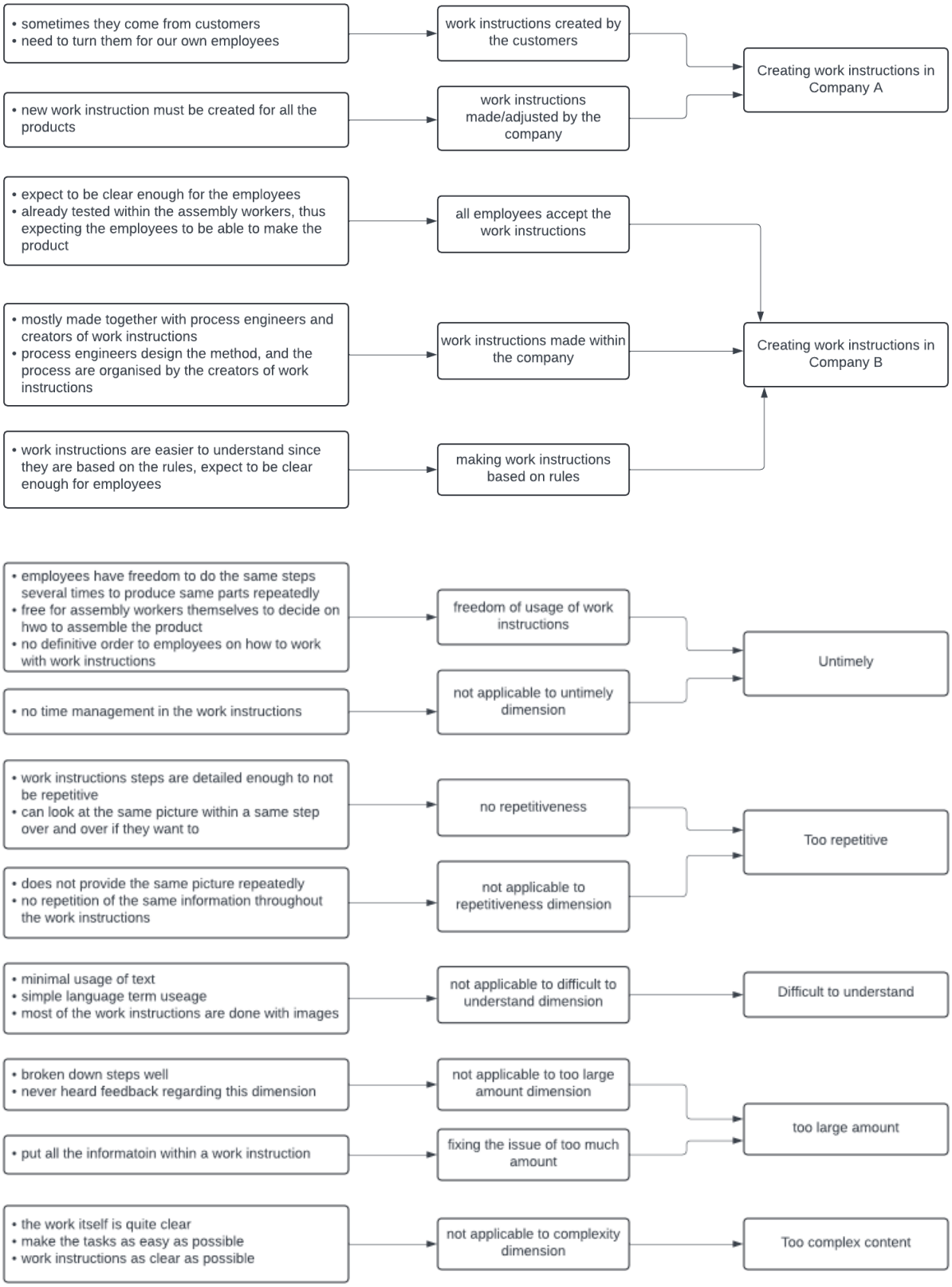
_____

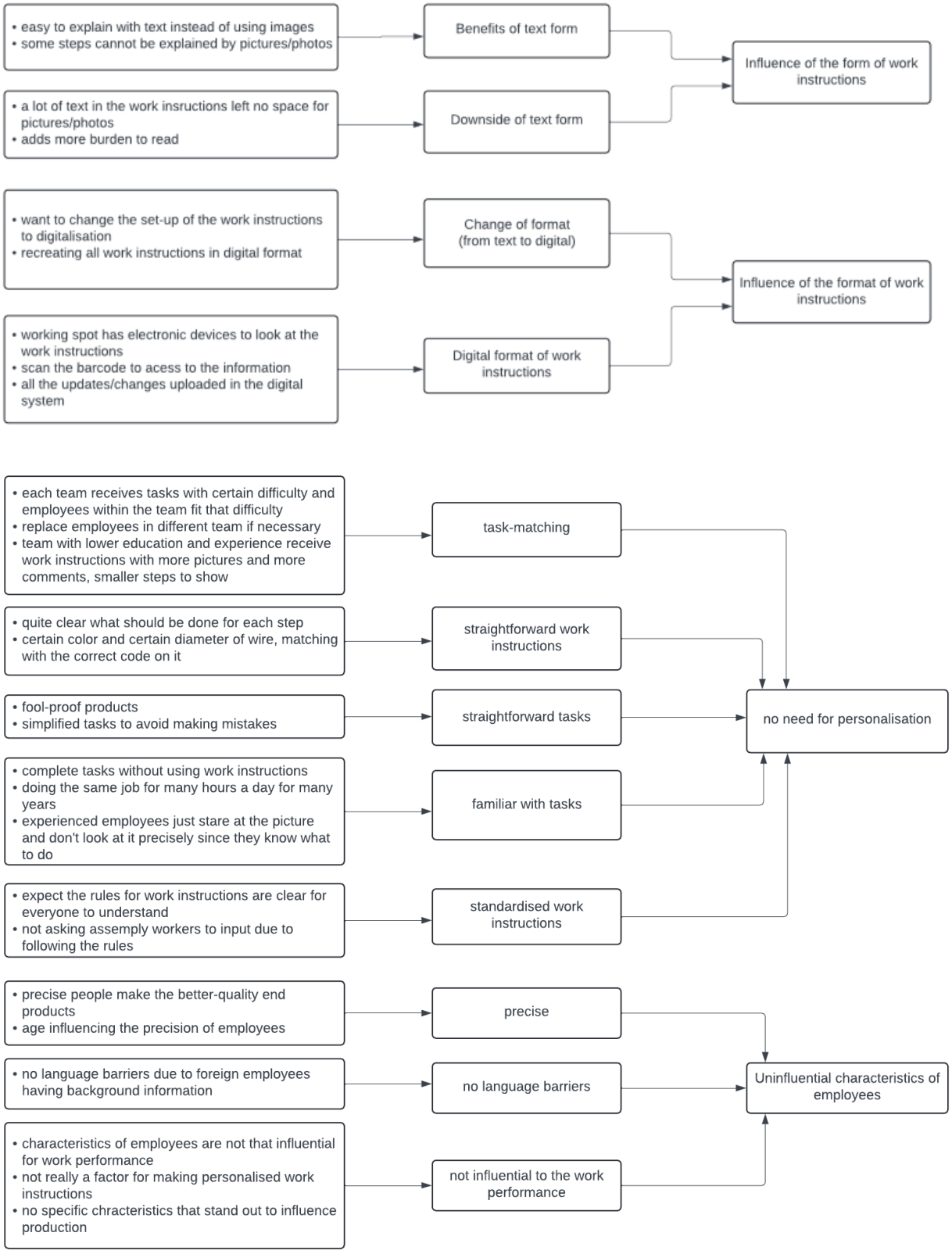
Zou je liever een mentor (of een collega) hebben die je helpt de werkinstructies door te nemen of een gepersonaliseerde inhoud van de werkinstructies?

- Mentor
- Gepersonaliseerde inhoud van de werkinstructies
- Beide
- Geen

Appendix D. Coding Tree




• sometimes they come from customers
• need to turn them for our own employees
work instructions created by the customers
• new work instruction must be created for all the products
work instructions made/adjusted by the company
Creating work instructions in Company A
• expect to be clear enough for the employees
• already tested within the assembly workers, thus expecting the employees to be able to make the product
all employees accept the work instructions
• mostly made together with process engineers and creators of work instructions
• process engineers design the method, and the process are organised by the creators of work instructions
work instructions made within the company
Creating work instructions in Company B
• work instructions are easier to understand since they are based on the rules, expect to be clear enough for employees
making work instructions based on rules
• employees have freedom to do the same steps several times to produce same parts repeatedly
• free for assembly workers themselves to decide on hwo to assemble the product
• no definitive order to employees on how to work with work instructions
freedom of usage of work instructions
• no time management in the work instructions
not applicable to untimely dimension
Untimely
• work instructions steps are detailed enough to not be repetitive
• can look at the same picture within a same step over and over if they want to
no repetitiveness
• does not provide the same picture repeatedly
• no repetition of the same information throughout the work instructions
not applicable to repetitiveness dimension
Too repetitive
• minimal usage of text
• simple language term useage
• most of the work instructions are done with images
not applicable to difficult to understand dimension
Difficult to understand
• broken down steps well
• never heard feedback regarding this dimension
not applicable to too large amount dimension
• put all the informatoin within a work instruction
fixing the issue of too much amount
too large amount
• the work itself is quite clear
• make the tasks as easy as possible
• work instructions as clear as possible
not applicable to complexity dimension
Too complex content


• easy to explain with text instead of using images
• some steps cannot be explained by pictures/photos
Benefits of text form
• a lot of text in the work insructions left no space for pictures/photos
• adds more burden to read
Downside of text form
Influence of the form of work instructions
• want to change the set-up of the work instructions to digitalisation
• recreating all work instructions in digital format
Change of format (from text to digital)
• working spot has electronic devices to look at the work instructions
• scan the barcode to acess to the information
• all the updates/changes uploaded in the digital system
Digital format of work instructions
Influence of the format of work instructions
• each team receives tasks with certain difficulty and employees within the team fit that difficulty
• replace employees in different team if necessary
• team with lower education and experience receive work instructions with more pictures and more comments, smaller steps to show
task-matching
• quite clear what should be done for each step
• certain color and certain diameter of wire, matching with the correct code on it
straightforward work instructions
• fool-proof products
• simplified tasks to avoid making mistakes
straightforward tasks
• complete tasks without using work instructions
• doing the same job for many hours a day for many years
• experienced employees just stare at the picture and don't look at it precisely since they know what to do
familiar with tasks
• expect the rules for work instructions are clear for everyone to understand
• not asking assemply workers to input due to following the rules
standardised work instructions
no need for personalisation
• precise people make the better-quality end products
• age influencing the precision of employees
precise
• no language barriers due to foreign employees having background information
no language barriers
• characteristics of employees are not that influential for work performance
• not really a factor for making personalised work instructions
• no specific chracteristics that stand out to influence production
not influential to the work performance
Uninfluential characteristics of employees

Appendix E. Transcript Company A

Speaker 1: Interviewer
Speaker 2: Interviewee from A (manager of operations)

Speaker 1
Thank you so much for your time and allow me to interview you. My name is _____, and I will be interviewing you today to ask questions regarding the current work instructions of your department/company, personalisation factors within the work instructions, and subjective content aspects together with worker characteristics that influence work performance. And my goal of this interview is to gather information on existing content of work instructions, influential worker characteristics, and potential factors for developing personalised work instructions. This interview will be confidential and the data will be only used for the RAAK project. Do I have your permission to also record this interview so I can transcribe it?

Speaker 2

It's okay.

Speaker 1
So the first question is, what is your position in your organization, and what do you do?

Speaker 2
My name is _____ and I've managed the operations at A, and I'm responsible for in totally, I think 9 teams.

Speaker 1
Okay. So there's quite a lot of things that you have to manage at once then.

Speaker 2
Na we have 2 or 4 team leaders, for different teams.

Speaker 1
And can you summarize what kind of function do you have as a team leader of all those 9 teams?

Speaker 2
When you are a team leader, you are, uh, we call it in dutch Meewerkforman, the team leaders also organizing and doing testing and also uh, I'm doing, uh, yeah, and the leading of the team for a yeah, the production planning, but also for delivery articles to the customer.

Speaker 1

And how long have you been working in this organization?

Speaker 2
This is 12th year now.

Speaker 1
And before you came to this work, do you have any other similar experiences in the similar field and how long have you been doing that?

Speaker 2
No, my experience was that I was an electronic guy, experience in managing a software team later on. When I joined to A, I didn't have to experience of manage operations.

Speaker 1
So you kind of had the career change? Okay, then I'll be jumping into the questions regarding the creation/contribution of the work instructions and our first question is, are, the more constructions created together by the team leaders and experienced worker in the department?

Speaker 2
Yes, sometimes they come from a customer, and we have to make it tuned for our own employees, and especially the photo reportage we made it by ourselves in steps of assembling the article.

Speaker 1
And then we can already, you already show me that it is in a digital form of the work instruction and I, and does that mean that all the 9 teams in your company, in this company all have the digital work instructions?

Speaker 2
Yeah, almost every working spot has electronic device to look into the work instructions and do the order in our registration and so on.

Speaker 1
And then would you describe the current work instructions as more picture based?

Speaker 2
Yes, you saw the electrical scheme and what you already saw is the wiring list. Very important in our business.

Speaker 1

Okay, and only wire wiring list is the text based at the moment.

Speaker 2
Yeah, it's like an excel with line to line.

Speaker 1
Is there like a critical reason why that has to be text based and not the picture?

Speaker 2
Because we are working with numbers on it and the numbers on the wiring numbering on the electronic device that has to be connected.

Speaker 1
And that cannot be replaced with picture. The number surges seem to be better with. Okay, and then you also show me in the work instructions that your employees can actually customize it themselves by writing the comment next to it. So does that mean that all the work instructions for each individual workers are kind of different from each other.

Speaker 2
No, they are common for all the employees in a team, so there's not a personal work instructions but it is common for the team and the comments on the right side of that document are placed together with the team and the team leader.

Speaker 1
Okay, so it's not like one person's opinion about it. It’s like everybody agrees to make that stuff.

Speaker 2
Sometimes we also have also people from Poland here and also from Slovakia and they all put comments on it if necessary, if you don’t understand.

Speaker 1
And so the comments can also be in different language, if they don’t understand.

Speaker 2
But that 's not done very much.

Speaker 1
So then doesn't mean that the comments have to be kind of approved by the team leader to be put on to the work instruction.

Speaker 2
Yes, but we don't have a formal way of accepting them together with a team leader. They will ask whenever I want this more clear, I want to put in the comment with. And then it will be agreed.

Speaker 1
Okay. And do they, so you said there's no formal way of doing it, but is there any standard of the comment that should be put in or not?

Speaker 2
No, no standard.

Speaker 1
Okay, so whenever just people all think that it's important enough to put in them.

Speaker 2
And yeah, besides that making of that assembly instruction, we also have quality management system. It's called VAK. it's more a Dutch thing. It's verbetering afwijking klachten. Verbetering is improvement, afwijking is uh, failure, and then we have klachten. Klachten is complain. Complains come from customer and the complains internally there are registered in a tool. When article has a complain, it's not okay or not good, then it will be shown in our shop floor system. That there is kind of warning, kind of red flag. Hold on, we see there is a problem with that. The work instruction has to be improved. I can show you.

Speaker 1
So the customer's requests are kind of used as like a signal?

Speaker 2
No, the signal comes from our own system. So when, for example, making this cup, and there is a problem with mounting this ear, then someone is writing afwijking on it, and everytime the order is put into our system for new cups, then there is kind of signal, beware there is a VAK on that article.

Speaker 1
Oh okay. So they let you know and then and then the employees work on it.

Speaker 2
Yeah, the work preparation has to adjust the failure and to make a better description or to make it another mounting way, or what necessary is. I can show you example after this.

Speaker 1
And then you also told me that based on the different teams you have in this, within this company that people receive different types of work instruction, and then one thing that you have described so far is that the way how is described is different? Can you maybe explain more specific, what you mean by that?

Speaker 2
Yeah, what we do is from our teams with lower education and the assembly team, for example, the work instructions are more complete, like there are more pictures and more comments, smaller steps to show.

Speaker 1
So there are more details.

Speaker 2
Yes, more details. That is correct.

Speaker 1
Are there any other aspects like that for different levels of the team? Or is that the only thing that is used?

Speaker 2
There's only for that team, because in that team are the people with less education.

Speaker 1
Okay, so other than that, there's not much other factors that you need to use to make the work instructions more personalized at the moment.

Speaker 2
No, no

Speaker 1
Okay.

Speaker 2
And I think that the work instruction will be fine for the whole company, but then we have to put more effort in it for the other teams to make it more in more pictures, more steps. And what we see is let's say, people that are more experienced, they stare at the pictures, and they don't look at it so precisely because they know how to mount, and sometimes when they oh, how was it mounted, then we check the picture.

Speaker 1
Okay, so should I say the work instructions within this company are based on the products?

Speaker 2
Yeah.

Speaker 1
Okay, are there any work instructions that are more based on the ability of the workers in this company also?

Speaker 2
Only for testers, I think.

Speaker 1
Okay, only for the testers. And that is where your R&D department?

Speaker 2
No, it's more in something in tester. Like _____, he was testing there, but sometimes you need special equipment to test and how to connect it and how to do it, and you have to have a certain equipment to test, then you need that, that is more experienced work.

Speaker 1
When the team leaders received the feedback from the work instructions from their employees, what type of feedback they receive the most? Because you said the team leaders have to approve the comments from the employees to put in the comments in the work instruction. What types of comment do they receive the most?

Speaker 2
I think that it's... I think it's a natural way that people are making a mistake and they say, yeah, but it's not quite clear in our structures. Then they put some more comment in this or paint some circles on it, be aware of this problem often made. And sometimes a new picture is made for to make it more clear.

Speaker 1
Okay, so it's more happening because people made mistakes.

Speaker 2
Yeah, I think that's mainly. Based from do not make the same mistake next time. Because it was unclear.

Speaker 1
And it's not like, for example, one product from a one more construction receives the same comment over and over again due to similar problems?

Speaker 2
No, and when we see on our list with the red flag on that article, our work preparation is looking weakly to this from what are new discovered problems. When a new product is made, then we have some more comments, obviously in this normal, because it's new, it's not organized on a different way.

Speaker 1
So it's kind of a bit more like use as a warning sign to let people know to not do this.

Speaker 2
Yes, to be aware of there is an issue pending on that product and that could be in an work instruction, or could be the building material is not complete or it's missing or you know the understanding of _____ I don't know the correct word for it. Articles that you used in a products, but they are not registered in the list. The common stuff. I will show you after.

Speaker 1
And all those mistakes kind of relate to the final work performance of the employees? if they make the mistake.

Speaker 2
Some people make more mistakes than other people, and some people are daydreamers. And sometimes they make some mistakes and sometimes they can be okay for several weeks and then they make mistakes.

Speaker 1
Okay, so it can be again done and again and yeah, okay.

Speaker 2
And we had some some, what we did is what we go is when we have a new article that is normally assigned to the module team and when the work instructions are okay, then we can decide to put that product made by the assembly group. Because it's all, find out all clear what to be about to ask, has to be done, so some people of the assembly can also make the product. Or part of it.

Speaker 1
Were there any comments that was made based on the worker characteristic for any specific worker characteristics? Such as when you tell me when you tell me that the people in the assembly lines are there due to lower educations, were there any comments of the work instructions had to be put in due to the certain characteristics they have?

Speaker 2
Yeah, what we have here is that the personal opleidingsplan. If all the skills people can use, some people don't have enough experience on certain work. On soldering, or uh, some other technical work and then we don't give the people that that person that kind of work because he is not experienced on this, that's making mistake. So we have a list of people, the people are all we are aware of some experience of some people that we may not be able to do some others.

Speaker 1
So those type of people, instead of keeping them in the same type of job, they have to be removed and put into somewhere else?

Speaker 2
Yeah, it could be. We have a skill of people we hire from Poland and Slovakia, and when there's less business, maybe we go down in FDC. And then we stopped with hiring, I think it would be 20 people hired here, so that's our flexible skill, okay, and A is a very social company. We never fire someone. There is not enough work for other simple work.

Speaker 1
Yeah, so instead of, is there a reason why you would play somebody else in a different team due to not having enough experience than maybe training them?

Speaker 2
Yeah, what we do we do we give workshops for this? And then it's soldering it's clipping and the wiring stripping wiring and crimping, that's special tools, and we have workshops for that. Because we have a lot of work in this assembly team and we have a lot of new people here, from Phillips company, from Winterswijkers place near by. And those ladies are not experienced with reading electrical schemes, for example. And we teach them how to read that seems for small units. So they also can make some small electrical cabinets. Because we make an example, make pictures. And again, look into it. But the problem can be that when and there's this one,say, this is the whole income from A, we have 1 team. Say this is customer X, we never want to have it bigger than then 30% of our business. Because when this customer is a problem, and there's no work anymore, then we have a lot of people. So we wanted not to do, but we can get more work from the customer, but we don't want. That is not the way of thinking here.

Speaker 1
So it's more like a try to be resilient to whenever there is a change within those situations.

Speaker 2
Yeah, and we want to have a nice part of cake for every customer, not too big, not to not too small.

Speaker 1
So there was not really that feedback based on the personal personality or characteristics of employees for the work instructions so far other than a level of education.

Speaker 2
Yeah, but what we see here in this team is that soldering, a lot of people is not done. There's someone that is not able to solder very tiny things, then we let them not do it. Because maybe his glasses or sight is not good. And then he does other works than can be done. Some work is not suitable for one or the other.

Speaker 1
So it's just better to replace the person with a different work then.

Speaker 2
We don't let that person do that that kind of that work. But there's a lot of other work in that team.

Speaker 1
Okay, there are enough other works for that team, for that person to continue the other type of work.
Speaker 2
Yes, except for when the customer is getting a problem and don't have new orders for us, then it should be a problem.

Speaker 1
All right, and now I'll be moving to the general information with the content of our constructions. And then what kind of information must the work instruction for your department contain?

Speaker 2
Our work instructions also contained a correct article number with the correct version. I think it's very important, because when there's some newer version from an article there's always a new document necessary because there has something changed. Revision control is called that. So i'm

doing the check off that component/12 and memories in/30, then we have to change also the work instructions, maybe because there's something different is changed that should be done. And what we do is that when we copy that article to a new article, so we come from version 12 to 13, the document is not copied automatically because otherwise it will be automatically may be forgotten to check to add also the new items for that.

Speaker 1
So you have to also do this job manually.

Speaker 2
The manual is done better for work preparation.

Speaker 1
Okay, so for every new version, then the new type of work instruction has to be created for all the product, if it's there.

Speaker 2
And that cannot be done by the team leader itself, it must be done by the work preparator.

Speaker 1
Yeah okay, so they share the information to each other?

Speaker 2
Yeah.

Speaker 1
And take the photos by yourself and then prepare another one. How long does it take to make one, if the new version is needed?

Speaker 2
Yeah, I think it's yeah. I think to complete, it's 2 hours, in total. To make it a copy of that and add all the documents to it, check the changes and and maybe who you write the test reception because we also have test documentation and also the maybe the photo reportage has to be changed.

Speaker 1
How often does this new version of date changes?

Speaker 2
Once a year. It's not that big.

Speaker 1
So your employees have enough time to get used to the work instructions.

Speaker 2
Yeah. We have, i think I sent you a workflow at A. In fact, we have 3 types of articles at A. The standard articles, we made with a lot of times, so they are actually they are frozen, made by anyone. Then we have the varianten, almost a piece or copy of it, they are the same, but there are some changes, small changes. Longer wire, all the different color, with some change because customer want for that special one. There are not that many. And then we have new articles, new products. New products are always coming through via the R&D department. And introduced on the floor and then we make for such a new item, we make a proto and when the portal is made and it's approved, then we make a null serie. And after those null serie, then the whole production dossier should be fixed. Should be frozen. Because it's ready for the production.

Speaker 1
Okay, and then after it goes into production, that's when the commentary kind of starts and see what it is.

Speaker 2
Yeah, then we experienced all the experience of them. Then we notice all the experience from the people that making it and there are some things not clear, take a look at it.

Speaker 1
So, even though it's if there are variation within the product, the variation doesn't really happen that often either.

Speaker 2
No, no.

Speaker 1
And how detailed is the information within the work construction of your department? For example, you can just think about one? How detailed is the variation? So I'm not just talking about assembly department. Because you already told me that those are for some special cases.

Speaker 2
It could be yeah, the price for example. If something change, new calculation has been made so a new offer has to be made to the customer. We often have those products. We have the main ____ as a level of agreements we check with our customer. For the PCBs, for example, what we discover is that some compounds are getting obsolete, because they are not available anymore

last time by, and then we have to redesign something. And then we have complete new products. That is reason why something changed, it can also be that some new functionality has been edited.

Speaker 1
But do you think that the information at the current stage for the work instruction is sufficient enough for your department?

Speaker 2
Yes, it's sufficient enough for now. In addition, in A you need to be a kind of, you need to have enough knowledge for electronics. Do you understand well, people think yeah, and all of and the team leaders here are young team leaders. Uh, that, uh, worked here for 20 years on the floor. So they know what's happening.

Speaker 1
Young team leaders have 20 years of experience?

Speaker 2
Yeah, there's _____. I think he's in 25 years at A and um, and _____ and ____ is also 10 or 12 years.

Speaker 1
And now I'll be asking about the characteristics of employees and the option for the personalisation for the work instruction. And considering different types of characteristics of employees as a team leader, do you perceive any specific characteristics of employees that might impact their work performance through work instructions? Well other than the level of education, so far.

Speaker 2
Yeah, mainly again, it's in this assembly team that people have some disabilities or how do you call that? They are not able to do certain kind of work with high precision work, or they have to be concentrated on that, then we see that we put it to another customer. And sometimes, we find out that this move to another team is not correct then we put it back.

Speaker 1
Okay. So you try to see a bit of a movement between the workers and then see if it truly fit in the team and not, then they go back or if they stay, they are good with it.

Speaker 2
Yeah, because we have also a short. If we're on the working place that the project's are every

time coming. So when you come here next week, you see completely other products, so the work of new products we see it, and if we put some people on it and then some people on it went testers are certain person with knowledge is not available, then we have to move the article, re-plan it sometimes, but that's not often.

Speaker 1
Okay. So if you say it's not often, then I guess then this kind of situation happens very less.

Speaker 2
Yeah, very less, yeah.

Speaker 1
And can you give me an example of how those kind of situations happens? How those situations when you have to say, describe what you said, replacement of those people?

Speaker 2
Yeah, people that are simple, less simple work that you can do. There's just enough for this.

Speaker 1
So the people, so the people who have to do more simple work than you expected to be assigned into a different place. Okay. And is there any characteristics of employees that do you think that are the most influential to work performance?

Speaker 2
Yeah, what we noticed we have some people here, they like testing, and they are very precise people. The people there they'd like to too, yeah, perfect, make it perfect. And those people will be put to often to making testing, because they are very precise to test. And when they normally assemble, it's taking a long time to make it 100 percent and sometimes we have to think about it how can we put those people on the right spot. And mostly they are very good testers.

Speaker 1
So it's more based on the personality of the people and how patient they are? Would you, would you describe it in that way?

Speaker 2
Patients, yeah, no, yeah, I'll show you, some people have and yeah, what do you call it? Very precise in working. Ardi Haadi (?) They are busy in their minds to make it perfect. But all team leaders know that the people good enough to think about what is the right project or the right article to assemble for those people.

Speaker 1
So you're saying, the work performance of an employee kind of also depends on the ability of the team leader, based on where they're going to place them?

Speaker 2
For example, we have some people there, EKA electronic kasteel cabinets for the KANBAN the people are, when I see from 3 different cabinets hours, I know who made the one without seeing it because I know this guy is working. That can be for the cabinets that is taking approximately taking 4 to 5 days, can fluctuate 1 day, 8 hours more. Same work.

Speaker 1
So you can already see who made it based on the finishing quality of the work, that you see?

Speaker 2
Hours. Hours spent.

Speaker 1
And then those that hour spend kind of related to the final product?

Speaker 2
No, what you see is that hour spent more, the quality is better. Less failures. Because we're testing, we are facing problems, and the Testers is solving them. But when you see people that are very precise doing a longer job, maybe less problems.

Speaker 1
Okay, I'm going to give an example of a worker characteristic that has been kind of shown to affect the work performance. And then you can tell me if they are relating to work performance or not. Based on your perspective, do you think age is related to the work performance of people?

Speaker 2
The uh, yeah.

Speaker 1
Okay, and how is that so?

Speaker 2
I think the work that is precise, and you wear glasses, and the work is heavy and work is done less good.

Speaker 1
Looking work is less…

Speaker 2
Less good is.

Speaker 1
And also, what about cognitive ability? The cognitive ability, thinking abilities?

Speaker 2
Mm, I don't know, that's not. Not. It depends on what kind of work it is. When it is straightforward work with a writing list, you can make yeah, you have to do the next row to connect. But some people are yeah, when they are making it, looking around and then doing again, looking around, they're not focused on that. That is the main reason why they don't get the same times.

Speaker 1
And background education, Do you think that also influences the work performance?

Speaker 2
No. It's more the technical skills. Like you notice when people had an early days, lego, you know lego? Yeah, and then the people are handy with their hands. Because we have an electrical site, we have some people that were also there were from origin metal works from the side, you're doing that because they like the screwing.

Speaker 1
So you're saying that it kind of all comes down to the personality of the person to be, whether precise or not and but age is also there to be precise or not.

Speaker 2
And the will to do it okay, to make it perfect.

Speaker 1
Okay, and plus will to deliver. So it's more of a their preferences plus the personality about how much they're doing the job as well.

Speaker 2
And we have yearly, we have a kind of a, we call it a functional thought. And we ask them, we ask them what do you think about your function and what are the circumstances. And do you want to be when you are older, what direction you want, and do you need some education for

that, and what do you think about A, the company? And other personal circumstances where you cannot perform? And in this talk once a year or more, we noticed that some people want to shift to another team because they see that's nice and they would rotate. The enrichment.

Speaker 1
So they want to see if it fits their skill?

Speaker 2
Yeah, and sometimes they want to go to block preparation. And last week, we had 4 people that left A of course, they were 65. And some new employees, they were longer in the company they go to the work preperation, that's because they uh, they wanted to do a new experience.

Speaker 1
You also mentioned that there are people who don't speak Dutch that well in this company, and does that influence their work performance also?

Speaker 2
Yeah, I think some people here that are uhmm, work together with our foreign employees, they have a language problem. Because some people are from Poland, they speak mostly German or English. We live on the German border here, it's not far away, so German is not a problem but some people, English is a problem. And to work together, yeah, sometimes they make failures.

Speaker 1
Okay, and is it because they do not understand the terms on the work instructions?

Speaker 2
Yeah, the work instruction itself. But when there are too many employees and most cases are from production. We have 4 or 5 Polish people there, hard workers, good workers. When we're making over-time they are also always there. But when you have too many together, then the team leaders cannot support them enough. And actually a long-term, they learn, but it takes time.

Speaker 1
Yeah, so it's a long-term problem.

Speaker 2
And in fact, we want to hire people, not on the technical and higher skills work, but more on the lower simple work with less instructions, so we can make it easy.

Speaker 1
So those people with a different language problem would start low and then…

Speaker 2
Yeah, some simple work and sometimes they see that they are very handy guys and then they get some difficult work.

Speaker 1
But it's not like a problem that will not be solved in the way. It's more like it will come some day.

Speaker 2
Yeah, let's say that support from our team leaders to that people is, it's not that well. Because of language problems.

Speaker 1
Yeah, and in the beginning, do they just, in the beginning when they enter A, and then they speak different language, does that cause them to do more mistakes and also deal with more problems?

Speaker 2
No, mistakes, I don't know if they make many more mistakes, the people we hire from Poland for example, they are educated electricians and those electricians, we don't have in Holland anymore and behind, from Poland or Slovakia and they are normally good electricians, they can do the work okay.

Speaker 1
So their work performance is still as good.

Speaker 2
Yeah, in the beginning, you have to have a language problem that is bordering, but on the long-term they will do.

Speaker 1
So it's just something that you have to see where it goes?

Speaker 2
Yeah.

Speaker 1
I'll be moving on to the informational part of the work instruction. And then what I'm focusing in my research is the subjectivity within the content of the work instructions and I'll be asking for aspects that I got from the framework that already existed. And the first aspect that I'll be asking you about is about repetition. And when I mean my repetition, in this case is a reputation within

single work instructions. So it's for 1 product and then 1 per department so in, for example, in the assembly team, you can just think about one more construction and see what kind of repetition. If it is repetitive over and over. And so, I actually read the previous interviews that the other people has done in A also, and then it shows that all the workers in the department they share one same work instructions, they do not have different work instructions for themselves individuals?

Speaker 2
Yeah.

Speaker 1
Is there a certain type of information such content in the work construction of your team that must be repeated?

Speaker 2
That must be repeated… in the work instructions? Yeah, we have a universal work construction for one team, for all the people, and our production team is sometimes 2 articles or 1 and sometimes thousands. We have always smaller series. Is that what you mean? Or is the question something else?

Speaker 1
I meant it more like a within a one instruction. Is there like a sentence or a picture or a text that has to be repeated over and over or not over and over, but just repeat it again?

Speaker 2
Yeah, but then it's shown on one way or on 1 photo and then “do this 20 times”.

Speaker 1
Okay, so, as then I take it as the in the work instruction, it doesn't say it, it doesn't pop out again and again, it's just that it just says a picture and then have it as the text to it 20 times?

Speaker 2
Yeah, then it's amounts of the 15 centers. For example, on the way I will show on the picture. Yeah, you understand it and you seen that picture.

Speaker 1
So it doesn't provide the same picture on the step, for example, step 3 and step 4?

Speaker 2
No, so detailed you don't have.

Speaker 1
And when you take it from the assembly, people's work instruction? Assembly department work instruction, and for example, the other department work instruction. Do they have very different work instructions or is it similar?

Speaker 2
For the electrical departments, they are similar, more or less same, because what's shown you at the ECA, that you also have wiring lists. They are the same. For the mechanical department, it's different because you have another mechanical drawing with some signs on it.

Speaker 1
And then for example, with the flow department as a big one, does the work instruction for assembly team, and for example, PBC team, are they similar in a way or is it completely different?

Speaker 2
The layout is similar.

Speaker 1
Just the information itself is different.

Speaker 2
And our shop floor system is not more than like a showbox, for what's in our company software.

Speaker 1
Then, and so you also told me that the task that is done between the assembly and the other teams are different. So does that mean that the informations that they get are completely different? Because they're doing different tasks.

Speaker 2
Only this between the electrical and the mechanical departments and not in the electrical departments.

Speaker 1
Oh not in the electrical, okay. And then, if it's not that different, then is there like a difference between how repetitive that they have to be, because you told me in assembly that you get smaller steps?

Speaker 2
Yeah, for example, the PCB you don't have wires, you have to solder more products on this, or

did this one, and if a lot of components are placed by the machine. But some components like this one have to be solved by hands, and then they have not a wiring list, to wire but to more on this or how to connect this, relates to things to be.

Speaker 1
Okay, so it's not really about repetition of information, more like just smaller things showing.

Speaker 2
Yeah.

Speaker 1
Since there's no repetition that I describe as, I assume that there is no feedback or comment that the team leaders have received that this is annoying for them or something?

Speaker 2
No, there's not.

Speaker 1
Okay. And for the repetition, I guess it's because it's digital, there is not really much needed in this thing? Not really much needed in this work instruction, because it's all pictures, and they can look at the pictures over and over they would just want to.

Speaker 2
Yeah, sometimes we get the test documents. There's a different test document from our customer. And we have to connect to the server, yeah, somewhere in Holland to get our results and be seeing more and more customers doing that we have to test and put online, so every unit we make is unique and has own test protocol. And its own test results, and they are received at not in the cloud, but the server at the customer.

Speaker 1
Do you think it will be helpful for the people with certain characteristics such as lower level, like the, like in assembly department, if they receive information that kind of tells you to do again in the what you did in the step 3 on step 4 or would that be not really good?

Speaker 2
No, we think this information that we have now is enough for that.

Speaker 1
So they do not need more details and more repetition of doing it at the moment.

Speaker 2
No, because when you have more pictures to it, than people get, is detailed enough because you notice that he knows what to do and then he makes it and assembles and click click click, goes few pages further, and to check. I don't know if he's really checking the work instructions because he knows it by his head.

Speaker 1
Yeah, I kind of also saw that people would use the word instruction as a reminder?

Speaker 2
Yeah. Just when you're at home, you have a new equipment and you have a manual and then you would obviously, see what is it?

Speaker 1
Oh yeah, and then I'll be moving into the next factor which is about the amount of work instruction. And when I mean, the amount of instruction, I mean amount of data provided and the amount of information where the employee can handle it is mismatching that causes a problem. Yeah, and was there any feedback from the employees that the amount of work instruction is inconvenient to their work performance? Like, for example, is it too large for them to follow or is it too small for them to follow?

Speaker 2
No, not for that. I never heard of this. Only when something is missing.

Speaker 1
Only when the information is missing?

Speaker 2
Missing, yeah, our customer has ask for something new or different to make another product. What we see sometimes there's a new electronic device that issues, it cannot be solved anymore so we have to put another one in and it's a different picture. Different thing. Then they complain.

Speaker 1
So nobody said anything about this work instruction is too long for me or something like that?

Speaker 2
No, no.

Speaker 1
Does the assembly department have longer work instructions? Because it's the more detailed than

the others?

Speaker 2
More pictures. But it depends on the project they make, because the product that _____ made? The first lady we visited there, that was a quite simple, sticker, sticker placing, very simple but it's on language _____. What I showed with _____ was a big one. But the last one, the fuse box with _____, wasn't very huge thing for the _____, so they have more details.

Speaker 1
But then it is done because it is just needed to be that much show.

Speaker 2
A nicest of that mechanism is that we put, we have an order for the first time, we make them, we make pictures every time and we put all the pictures on the folder on our network, and the folder has the name of the product, so next time when the product is ordered, then it is put in this department for internal order, and then when the name of that article is an internal order, then the system automatically put all the pictures to it. It's no work to make an assembly instruction. Almost, there's only making pictures and put those pictures in a folder and then you're already done. Very simple.

Speaker 1
So all this, the size of the work instruction was not even, you didn't think that it would be problematic, because no matter, the weather is long or not just depends on the product variation and not really on the people's characteristics or something like that.

Speaker 2
The most problem we're facing most is when I think, how it's that picture is not quite clear. It's very difficult to make a good picture. You know, maybe the building instructions from IKEA, and make a good instruction is very difficult. Everyone knows, and when the picture is not clear, then we get questions on that.

Speaker 1
And then I'll be asking for the understanding part with it. And then what I mean by about this is that instructions are formulated in the manner which the reader cannot understand due to a problem, such as it has legal terms that they do not understand what it is, such as higher level term, I will explain in that way, more difficult vocabulary?

Speaker 2
No, they have, because the pictures. No, only the maybe I can show you. Last week, new product. I'm showing a draft document of the specification from our customers, see he stopped

here.

Speaker 1
Okay.

Speaker 2
And then explain some tests here, check, this is test instruction from the, and we have to translate this one to readable documents for our people. And there's more test documents, there's one of the articles in our production dossier.

Speaker 1
And then you guys use the language that is, everybody can understand?

Speaker 2
Yep. But today, these instructions are for our testers, more educated.

Speaker 1
So are your employees then able to understand the work construction without any struggles? Despite what kind of department there is.

Speaker 2
Yeah, if they are not too clear, they have to ask.

Speaker 1
And then the language that is used for the assembly team and also for PCB the same thing?

Speaker 2
It’s all Dutch.

Speaker 1
And also the same level of the terms also?

Speaker 2
Yeah.

Speaker 1
It's just that the assembly team is just has more description of what it is.

Speaker 2
Yeah, more pictures, more detailed pictures.

Speaker 1
More detailed pictures, okay. And then because you mentioned the foreign employees, are they struggling with the work construction because it's only in Dutch, or is it also because they provide in different languages, but they don't understand what it is?

Speaker 2
No, the people we hired, we mostly use the wiring list. So that's quite clear what should be done there. Because it is wiring from A to B, it is a certain color and a certain diameter of the wire, and now with that machine, we have a correct code on it so it’s very straightforward on what they do.

Speaker 1
Okay, so they don't really even need to use Dutch to understand what it is because they have to rely on their previous education that they have learned so far.

Speaker 2
Yeah, it’s wiring list. That is the occasion.

Speaker 1
If people are having a hard time to understand the work instructions due to the language or term reasons, then do you think this is a factor that is concerned in the work instruction then?

Speaker 2
Our team leaders are very sure on the team, very close to the team, they will, uh, discuss this and correct if something's not clear. What we always say there are 3 main things that some people must do before they work on it. That is, one, they get a product from the step before, the product must be okay to work further on it, just the product that they get from the warehouse should be okay. Then um, and the specification should be clear. So what has to be done should be clear and if there are some, your work that is not done, cannot be done by the guy himself, he should say. Because when you have to do something that he's never done, and it's not able to do it because he doesn't know how to solder, or how to weld, then he should say it.

Speaker 1
So it really depends on a lot on about the ability of the team leaders, and where they place the people at.

Speaker 2
To place people on the right spot.

Speaker 1
Do you also think that if the people are having a hard time to understand the terms, then the work instructions should be personalized for them also?

Speaker 2
No, that would be in comment of the… Yeah, make more complete.

Speaker 1
So every single time when there is like a problem like this, then it's not really a big problem, because it can be solved easily by the team leaders and just discuss it?

Speaker 2
Yeah, because it's not it, and when I explained that in earlier days work instructions made here, but that were more word documents, since we changed it to photo reportage. Because I saw that photo reportage, I saw that in Singapore at the company where I worked, they had a complete whole people making assembly for Dutch companies as Austrian companies, Swiss companies, and that was clear so we put it back to here. And when the instructions are made here and you have to be changed, causing a lot of efforts every time, fire the manager and now, it's done easily. No no no steps to get big steps, it’s only a few minutes it is to be changed. When there's something had to be corrected.

Speaker 1
So if it was done in the previous way, then it would be a bit more of a problem.

Speaker 2
Yeah, more problem, because they have to talk about time, how much time this cost. And how long? And when? And now we let me put it on. And the people on the floor can see it by itself, what has to be changed and what has to be improved.

Speaker 1
So the problem, such as the understanding the work instruction and all those kinds of terminology and language problem is not that of a huge problem to deal with anymore due to changed procedure.

Speaker 2
Yeah.

Speaker 1
Almost there. Okay, and now for the final aspect, I'll be talking about too complex content and when I talk about complexity, I mean the complexity of the data and the employees’ ability to

handle the complexity of the information is mismatching. And the reason why this is different from the previous moment, difficult to understand because that one focuses more on the terminology and the language while this one focuses on the information itself. And as the employees of the same department, they share one single version of work construction per product. Has this caused some workers to suffer from the complexity of the content of work instructions?

Speaker 2
What do the workers do?

Speaker 1
And because they share, they have the same one single version of work construction per product, have this caused some workers to suffer from complexity of the content of the work instruction?

Speaker 2
No, I think it's not. What we do is not rocket science. When we make half fabrikaten (?), so this is all yeah, besides from the PCB testing and special work, it's more common work that everyone can do.

Speaker 1
So they do not, they do not suffer from complexity, because the work itself is quite clear. So you do not see any certain characteristics of the workers that suffer from this kind of thing, because everybody...

Speaker 2
Only for the testers.

Speaker 1
Only for the testers? And why is that?

Speaker 2
And then I suspect that is why our customers demands more complexity in testing. Sometimes you need equipment, testing of a PCB can take several hours sometimes, because they want to do to measure whole things, but that's different from our customers.

Speaker 1
So it's also depending on what type of customers that you guys are dealing with.

Speaker 2
Yeah, and the whole complex. For example, the PCBs, the printer circuit boards. With PCBs, I

mentioned these kinds of articles. These PCBs are these testers.

Speaker 1
So far to help the people with certain characteristics such as an assembly team, you use the, your companies tend to use the level of detail as to help them more. And you've also said that there's no other methods other than the details at the moment? Do you guys have any plan in the further to implement something else other than the level of detail, or is that all you think of?

Speaker 2
No, that it's a continued improvement, we call them. It is, if something is not clear, we have to adjust it, And what we use, it's very nice and I think maybe in your study you saw this kind of pictures. This is a quality, time and plan to check it, circle, and we have to move forwards and what we don't want is too many quantities rolling back then, we have to have improvement circles every time they go. Adding more information to the product dossier to get quality at high level. What we do when in order is give in here, then we check if there's a VAK, complain about that article, and kind to get a certain knowledge from “hold on, this one has to be improved”, this mechanism is called the quality of the VAK. that we check the quality of our production dossier. Is the list okay? Is the work instruction okay, is that okay? And you get a certain amount of points. And when sum of those points is the net average, some of those point is below 4, then flag raises as a sign that this production dossier is not okay. And it have to be improved. And what our work preparation do is check for those. I can show you on the screen. And that is a very powerful way of changing the work instructions and the bond list in a better way.

Speaker 1
So those are kind of kept in a way to see to control what is going on so far.

Speaker 2
Yeah, continuous improvement.

Speaker 1
And then can I assume that because there's not much problem within that criteria, is that the reason why other than the level of detail, nothing is kind of planned to be implemented further?

Speaker 2
No, no, when we see a lot of complaints, afwijkingen we called, in certain way, and sometimes we do an improvement action to change it over. For example, they are wiring, they start from wiring a machine from one point to the other, and in the terminal switch, they often make mistakes. Because the holes are very close to each other. They put it in the wrong hole. And then always from the cabinet. Always, they have some problems. And then we say, improvement action. We've changed our wiring list, we start assembling at the left bottom of the terminal

switch and go 1 to 1 to the next one and put it together kind of style. So there's another way of working and that's more improvements on another way.

Speaker 1
And when the, for example, because the workers can give feedback to the work instruction directly through to the team leaders. Does this also make this complex content not really a very important factor like you've said there in the difficulty understanding part?

Speaker 2
When an employee is saying that he has some difficulties with the work instructions, they will always be completed more. And if the team leader thinks it’s important enough to change, he will change, make change.

Speaker 1
You also told me that the R&D is the one that makes the work instruction.

Speaker 2
The preliminary.

Speaker 1
Were there many cases where the ability of the workers did not match the level of the work instruction they provided?

Speaker 2
What we see is mainly that, the energy is delivering to our production is ___ list, material, if the hours and mostly the house does not match the real hours. Because they, too less experience. We do have a kickoff meeting, for example, when it's new here to check how many hours, is this? That asseming from the wires, how many hours is to, how to make this cover? And that is mismatch, what we see often.

Speaker 1
And so it's not, we need the steps itself, but it's more like they underestimate how long it will take to assemble.

Speaker 2
Yeah, but that's more discussion between production and engineering.

Speaker 1
And then other than that, the information they provide to assemble. It is not really has not really been that much of a problem?

Speaker 2
When the list is complete, then that's most important because list, that's the list from where the product starts, picking from our warehouse. And the all orders are brought to the worker. And this should be completed and if it's not complete and the product is not complete, and in the beginning, sometimes things are missing. And for example, the standard items like bolts and nuts, not on the list but need for the assembly, they are missing sometimes. But that's more details. I mean, that's why we always make a proto and then null serie, and then the production serie. And at this point, our production dossier, there's the wiring list, the bom list, developed material, then we have the test document or we have the mounting instructions. That is, the one we get from the customer. And all photo reportage, all this we call production dossier. And we give this production dossier a number, a grade, if it's enough or not good enough. There's more than 4 points. It's okay a bit less than that well, then signal announces.

Speaker 1
And in what cases do they receive less than 4? What are the reasons? Is that because of the information is incorrect or the pictures not good enough or…?

Speaker 2
The pictures are not made by the R&D. For example, this is how many textable documents. But it's not good enough, I think that we are focused on serie, serie work. And when there's new product coming, it's disturbing our flow. And that's a bit of A problem, not some problem of R&D. Well, problem falls on us all because it's new, the product is launched and it has to be settled, and in the beginning, there is too less work to complete this one. Because it's always too late, always. The customers are important, then new products have complaints.

Speaker 1
So it's not really about the work instruction, it's not really about the personal characteristics of the workers that has problem with the work instruction, but more about how product is new and how custom orders need?

Speaker 2
Yeah, and it's more planning thing, because we do not have that many people to solve new products. Because we have to, yeah, you have to hire new people to make it, to flow again.

Speaker 1
So just the experience with the new product is just bit less and that causes the problem, right? So far, I ask you for the factors to use further personalization at the moment, the subjectivity, but there can be more factors that relate to the content that can be personalized. And now I ask you whether Other factors that you think that can be considered for personalization, and I guess the

one thing that you have mentioned is that just new ways of product, that is 1 thing that influences the content of the work instruction?

Speaker 2
Yeah, and for new, mostly new articles we've been assembled. We have a few people that are capable of adding new articles to us. So we have a few people that are always involved in developing new items, because they are, uh, yeah, we call the Dutch _____, and they are people, with think about how can we organize this on a correct way? I think 4 or 5 people on the floor here will always be involved in new products. Because they have the skills to invest.

Speaker 1
Do you think it can, for to solve this problem of this newest product, do you think then more people should be involved in this process?

Speaker 2
Yes, but that has to do with the skills of the people. For example, the people that are always involved at new products are people with a higher education, and curious about technique.

Speaker 1
So for the personalization, so far it's mostly related to the order variation and not really about what the information within the work instruction is.

Speaker 2
Yeah, but you notice that our series are very… we are not a company that's making, day in day out the same article. That article for a day and then 2 months, another article, and it changes every time.

Speaker 1
So that also adds to this uncertainty sometimes, because you have to, you guys have to assemble something new for every once in a while.

Speaker 2
What we do is we check-in our personal education plan that we know by head for sure that “oh in case, look, it’s new on that, maybe can a ___ help him”. So then it will be, uh, yeah, to start and to check and after a kind of a buddy. That’s not a team leader, because the team leader does not know all articles. We've been someone is new on an article, and it is unclear what to do, although the work instructions are very clear, to help people to get confidence to that.

Speaker 1
And you also mentioned about the skill of people is also important in this relation. So do you

think people with higher education would help with this situation?

Speaker 2
Yeah, depends on how handy.

Speaker 1
How handy, so not only the higher education people, but also just people who know how to do manual work.

Speaker 2
Yeah, we also people here that, they don't have a high education because it's not necessary also, but they are very clear, they're very technicians.

Speaker 1
So education doesn't really influence that much at this point, it's more about how handy they are, how precise they can be.

Speaker 2
Yeah, we have people who have a very high education here, but they are doing quite simple work because they like it.

Speaker 1
So it also depends on their just preferences of what they use.

Speaker 2
Yeah, and it's more, how, what kind of people of this, what kind of person is.

Speaker 1
So far you told me that the product variation, task and the customer order variation are the one that influences the content of the work instruction the most. Is there any other that you can also think of that also influence as much as these factors do for the work instructions?

Speaker 2
Yeah, when we get a complaint from our customer and then that could also change the work instruction. Because yeah, it's not make, the definition of quality, I don't know if you heard it, but the definition quality is making it according to specification. That's quality. And when the specifications are not clear, customers complaining about the quality, then something went wrong in the process. Or otherwise, the person make a failure, could be. And what mostly it is because not tested, the assembly guy make a failure, the tester doesn't see it, so actually you have 2 people that make a failure and/or the documentation is not correct.

Speaker 1
Oh, is the documentation not correct because of the customer or is it because it's done wrong in A? Which way is it?

Speaker 2
It's not clear enough to make it very clear how to assemble something. And because the information is missing, maybe?

Speaker 1
Missing information.

Speaker 2
Or yeah, failure. Not right.

Speaker 1
When you say about missing information, how small or big do you see this? If it's like a once, not even a one step, more like ¼ step is missing, would that still be critical?

Speaker 2
No, it's more in the details, more in the details, how to assemble, how to tie it up to something, how cable are. For example, this one, you may have made it work, how to mount these cables in this one and how to organize this, that kind of information. And when it is missing because it's workmanship, that we do it always on that way and new one doesn't know if it's done always on that way. That could be a for example.

Speaker 1
So it's just a, it's just a detail lacking situation.

Speaker 2
Or using the wrong tool to make the cable.

Speaker 1
So far, you have explained that because all these problems that comes out with the complexity and also difficult to understand can be solved so easily, between the team leader and the employees. Is that the reason why you feel the personalized work instruction is not really that necessary for them?

Speaker 2
The only thing what we want to personalize is that we want to know who has made that article

often, the products, because when there's a new product we want to do job rotating. And that means that we want to have everyone in the team make all the articles we make in the team. And that's more personalized thing when we do that, you notice that other people doing the same assembly, that they see other details that they don't understand and then they make remarks like “this is not clear enough for me”. And when everyone within the team made, assembled the article, in the end is complete. So personalise is more the details of the instruction.

Speaker 1
And how do you think this personalization could be achieved?

Speaker 2
Yeah, only by telling people that they must be sharp on it. And normally we don't see. Sometimes in the testing we see, you know, I remember, sometimes, you see some mistakes. And then you go to the documentation and you see that it's not specified well. And then you added to it so next time it will be, uh, correct. It's not a mechanism that we have. Normally we don't change the work instructions so often. When they are ready and they will be completed with small things.

Speaker 1
Other than the level detail, you also mentioned that the other step to take to make it more personalized is not even necessary, is that correct?

Speaker 2
No, because we have the difficulty of the product in the team.

Speaker 1
So each team already has the certain difficulty, then they are just there to fit and therefore, you're saying the ability of the leader to place people is therefore very important.

Speaker 2
Yes, the ability of a leader that is, uh, there's exactly know what certain employee is able to or not. And it plays a role, especially in this assemble team.

Speaker 1
And because the teams are already having their set level of difficulty, does that make creating instructions per team better?

Speaker 2
I don't think what we see is that in the beginning the instructions are very global, it's because we are starting and during the assembling, we face some problems, some difficulties and some

clearness. And then we add more information to it. And the goal is that we want to have it perfect, but not that perfect, that we are busy with all kinds of minor details, more in the beginning. In the end, I think when we have time enough, we would make all those instructions, uh, complete enough always. And for our every team and not only for assembly team or the other teams. When we have more time.

Speaker 1
You guys don't have a lot of time to just spend the full day in one single work instruction to make it perfect?

Speaker 2
For example, we make products for our customers and when customers change our work preparations, mechanical, and analytical also change. There's a lot of work. That's our business and often it's not paid by a customer, because we make it for our team, understandable what to, how to make it.

Speaker 1
So this work construction is just done for the work performance of your employees in general.
Speaker 2
Yeah.

Speaker 1
And then so far, all this lack of details, all those information that's contained is good enough for people? And it depends on the team leaders to put them on the team based on the abilities?

Speaker 2
Yeah, and some team leaders are very handy, with making work instructions, and some people don’t. It's very difficult to make a good work instructions.

Speaker 1
So do you also then think that the characteristics of employees are not that influential factor for personalized work instructions?

Speaker 2
Yeah, because we put them in the team.

Speaker 1
Okay, so as long as the team is formed, then it is not really the case, because they already fit in the team.

Speaker 2
Yeah, and that team also, the lady you spoke at, that one is not the lady with disabilities, but there's new at A, you work for a certain year. But not that technician so she has to learn. You saw a note recite on the desk. That's she checking all the products she made one time, from doing the…their very best to make a complete list of all the articles that they can assemble.

Speaker 1
And also the employees, they don't have certain the timing of the instruction they receive because just do it by themselves also? Like, for example, what I want to mean by is, that they don't need to be on a certain step of work instruction? For example, if the person is unlike by the 10 minutes after they start assembling, they have to be on the step 3 or something? There's no limit like that?

Speaker 2
No, we don't. We don't focus on that. What will be serious, some people are talking too much. And doing other work and work on the job they paid for, and then we have to correct them.

Speaker 1
But that's more of their working habits, and not really the working, uh, skills, they have?

Speaker 2
No, yeah, more than they are disturbed by colleagues. And that's one of the advantages when you have foreign people, they cannot communicate and making jokes and making fun and not working. So and you see the Polish people they work, continues on the products. But when you put some Polish people to each other, they also can talk. And it is not yeah, normally they know. In the early days they didn't know how much a job it should take on time. We spread this information or the person knows exactly how time, how many times that is it may be used and that's the average time.

Speaker 1
But it's not really that much of a consequence, if they, if the worker takes very long for some cases, for example?

Speaker 2
Sometimes, then we have a talk with him, and then it helps for a few months. I think it's more personal thing.

Speaker 1
So it's not really about their ability of working, it’s just depends on personality?

Speaker 2
No, when we had, in this team, more people with disability, and we know this sometimes, times are 4 times. The 4 times the time he needs. And we don't correct it in our system, because we know those people are taking more time to make it.

Speaker 1
Are those people with disabilities, do they in receive same work instruction?

Speaker 2
Exactly the same.

Speaker 1
Was there any complaints that they, that people had received about it?

Speaker 2
No, the building here, there's also working place for people with disabilities, we have 2 or 3 people here sometimes here to do simple, very simple work. With one guy we sent back because he had a disability, he couldn't see it. And he could not read. So then, yeah, this kind of work is not correct. Another guy was also working part-time, but he has a concentration problem. He was always looking around, walking around. And he had too much triggers from outside. He couldn't work there, and he's coming back. So the number of people with disabilities at this moment is very low, but normally we didn't. We don't know, people don't know when you make no difference, there's someone is an own person or in another company.

Speaker 1
So the work instruction in the end is all just universal,

Speaker 2
General, yeah

Speaker 1
And that's just the comments are different by the team.

Speaker 2
It could be different, this is more their own adjustments.

Speaker 1
Yeah, so it really depends on the employees individually themselves to personalize the work instruction by themselves or not.
Alright, that is my interview so far. Thank you so much.

Appendix F. Transcript Company B

Speaker 1: Interviewer
Speaker 2: Work instruction creator
Speaker 3: Team leader of work instruction creation department

Speaker 1: Yes. So my name is _____, and I will be interviewing you guys today to ask questions regarding the current work instructions of your department/company, personalization factors within the work instructions, and subjective content aspects together with worker characteristics that influenced work performances. My goal of this interview is to gather information on existing content, the work instructions, influential worker characteristics, and potential factors for developing personalized work instructions. And this interview will be confidential, and the data will be only used for the RAAK project. Is everything all clear so far?

Speaker 2: Yes.

Speaker 1: Alright. Yes. So first, please, tell me what is your position in your organization and what do you do.

Speaker 2: My position in this organization is to make the work instructions. I create the work instructions, I test them out, and I implement them into the company.

Speaker 3: And I am the team leader of the team where, _____ is in. So, and I've made, in the past, a lot of work instructions. And, yeah, that's about it. Yeah. And I and I've been a production team leader.

Speaker 1: Okay. And also production team leader.

Speaker 3: Yeah. I've been there 2 years ago.

Speaker 1: Okay. So to, organize it, _____, you, you make work instructions for the team, and _____, you're the production team leader plus the team leader of where _____ is at.

Speaker 3: He was the production team leader.

Speaker 1: Oh, he was. Okay. Yes. Sorry.

Speaker 2: Not my team leader.

Speaker 1: And how long have you guys been working in this organization?

Speaker 2: I personally have not been working in just over a year in this organization.

Speaker 3: And I am approximately over 12 years now.

Speaker 1: 12 years. Okay. And do you guys have any years of experience in this field, from different job or something like that also?

Speaker 2: Personally, no. I have been a graphic designer before, so it's not really. It's a different type.

Speaker 3: And for me, I've been graduated in, this company, so this is my only company with experience.

Speaker 1: Okay. And I'll be moving on to the creation/distribution of work instructions. And are you are the work instructions created together by team leaders and experienced worker, or is that not the case?

Speaker 2: At the moment, the work instructions are created by me. And I mostly make them together with process engineering. Process engineering is in different departments. They are responsible for if the product is possible to be created by people. They make tooling and, I'll call the, fix the workspace for people.

Speaker 1: Okay. Is there anyone else who's also involved into this process of creating work instruction, or is that all?

Speaker 2: We did ask for feedback from the, I thought the assembly, assembly workers, but we have taken that part out of it. We now, now it's just me and process engineer that are making.

Speaker 1: Okay. Is there a reason why that part has been taken out?

Speaker 2: We made rules for the work instructions. So all our work instruction are, we are trying to make them more uniform, so we set up rules. The rules are tested in the, body assembly, what do you call it? Assembly made the workers, and they are, how do you call it, they understand the rules. So if we make a work instruction based on the rules, we expect it to be, on quote, clear enough for the worker or assembly workers to be able to make the product. So we are not going to ask the assembly, assembly workers to, for the input and more because we expect that rules are clear nowadays.

Speaker 3: Those rules are, tested with the assembly workers itself in the past.

Speaker 1: Well, in the creation of the work instruction, it's already tested with the assembly workers themselves.

Speaker 3:Yep.

Speaker 1: And is the work instruction, is it a paper or digital form?

Speaker 2: At the moment, we have two forms. We have them on paper and digital. We are trying to move away from the paper version, but it's still work in progress. So we are now, maintaining 2 systems, so paper and digital.

Speaker 1: Okay. Is there a reason why it's not fully moved away from paper form at the moment?

Speaker 2: I got hired here a year ago to make that happen. But the process in converting the paperwork instruction to digital takes a while. We also want to not just move them from paper to digital. We also wanna make a change to the setup of the work instruction and how we present it to the, employees. So we are recreating all the work instructions in different formats, so that takes some time instead. So that's the reason why it's not all, in one format at the moment.

Speaker 1: Alright. So but you're still working on the process.

Speaker 2: Yes. We are trying to get it all digital, but it just takes some time.

Speaker 1: Okay. When it comes to both paper and a digital form of the work instructions, are they mainly in text, or is it picture based?

Speaker 2: The work construction on paper is 50-50, so a lot of text with a lot of photos. And the digital ones that we are redesigning are mostly images. So that is, like, 95% images, 5% test.

Speaker 1: Okay.

Speaker 3: I think we can show some, examples.

Speaker 1: Yeah. That'll be great.

Speaker 2: One second. Show you a work instruction. Like, these are the old ones. So text image. You just go from top to bottom. It shows you how it works to sell a box. And let me go to a

newer one. One second. One second for this. This is a newer type of work instruction. You see that we are mostly images. So you see it's very deprived of text.

Speaker 1: And, so this is the work instruction that is provided to all the workers in the assembly team that makes this product?

Speaker 2: Correct.

Speaker 1: And, since you're making, since you're currently in the process of making all the paperwork instructions to digital work instruction, is there any option for the content of the work instruction to be personalized, such as giving it more detailed pictures or descriptions to those who need it?

Speaker 2: We do not do that. The main reason is, that's a lot of work. If you wanna make everyone on separate work instruction, you need to make a working instruction that has everything, very detailed, and then you need to cut in it if you have a more experienced worker. But sometimes you cut too much, sometimes you cut a little. So it's always a balance. So we always just give them every information that they have, then they can choose how they wanna use the work instructions for us. We also have, at the end, of our work instruction are, how do you call it? Control page? These are the critical points of the, the component. Experience workers most likely will go to this page immediately. They can just in one, one view can see what's, how to make a component, what are the critical parts, what to do, and they use this as their experience work instruction. But we do not make a personalized work instruction based on the needs and experiences of the employees.

Speaker 1: So when it comes to this kind of stuff, then you just let the, you just let the workers to choose what works out for them.

Speaker 2: Yes. We expect them to deliver a product that is correct and make according to the work instructions, but they are free in how they are how do you call it? How they how, they how they used work instruction. So it's not the holy bible anymore, work instruction. The holy bible is the end product. The end product needs to be correct. The work instruction is a tool to help them make the end product. We also try to incorporate that more.

Speaker 1: Okay. Do you think the employees take the work instructions more as a reminder to themselves or actually a step by step guide for them?

Speaker 2: More of a reminder. Most of the time, we also expect them if they need to make 50 boxes, we expect them to go through the work instruction once or twice. And after those two

times, we expect them to be able to make the box without needing the work instruction and then to just be able to, complete the box by themselves.

Speaker 1: Okay. So you just expect the workers to already get used to the process in their own head that they don't need to really look at the work instruction that much anymore?

Speaker 2: Yes. We also try to make the boxes, as, how do you call it,fool proof as possible, so that's the connectors can't be, changed. So all the connectors only go into one place, so you can't mess that stuff up. And a lot of things are pretty much, are made so that it only fits one way. So we also try to design the box in a certain way that it's easy to make for the, operators.

Speaker 1: So with the, aspect of how the product is easy and no not easy, clear and straightforward way enough to assemble it and also the work construction just use as a 1 or 2 times guide, then you think those two aspects help the workers just to get used to it and know it and buy their head in the in the end.

Speaker 2: Yes. That's, that's correct.

Speaker 1: Okay. So the work instructions, I assume, in your company are made based on the products or and the customer orders?

Speaker 2: We design our own boxes for the vehicles that are on the market. So when our pros, product engineers make or design a box, process engineers design the method how to assemble it, and then that method is translated into a work instruction that I make.

Speaker 1: Okay. So someone already does in the beginning, and then you transcribe the process into the work instruction.

Speaker 2: Right. I most of the time, I go with the process engineer. To make these images, the, and assemble a box. For the first time. So I make images, then I make the work instruction of the images and those this work instruction will be then tested by the process engineering team to see if it's correct or not, and then we're going to release it to the assembly workers.

Speaker 1: And how long does this process usually take?

Speaker 2: New box to a finished box. Only the work instruction, I would say, around 3 weeks.

Speaker 1: Alright. So it is quite a long time.

Speaker 2: Yes. Making the pictures, making the work instruction, getting feedback, pressing the feedback, and getting it down into the, into the hands of the assembly production workers takes some time.

Speaker 1: Okay. So in the end, when you create a work instruction, you just want to give the assembly team the finalized version that doesn't need any more, correction or any more adding into the stuff.

Speaker 2: Yes. We try to make it as fool-proof as possible.

Speaker 1: Okay. And when in the process of, because you mentioned before that within this process of creating a work instruction, you also do this testing with assembly workers. And in that situation, what kind of feedback do you receive the most?

Speaker 2: Most of the time, they say that something sometimes it's easier to assemble or, mount before something else, or some connectors are easier to connect before, and then set up later or something like that. That's that's always a bit a bit free for the assembly workers themselves to decide how to, how to make that or how to assemble it. But a lot of things are decided by the process engineers. Like, if you obviously like here, we need to use a bolt 10 with 7 millimeters. That's just decided. That's decided by the engineer, process engineer makes tuning for it, nice set, put it in, in the work instruction. No one can say if we're gonna put it this on for, section today because, an SMB worker says, yeah, I like to build 6, but that's just impossible. So a lot of things are just set on stone. Like, they can't be changed. That's why we also have, again, the rules. The rules that we have set up are pretty clear. So a lot of things the assembly work does not have a say into how to assemble something. We just tell them you need to do this, and then they need to do it because it's, like, it's set.

Speaker 1: Okay. And so most of the time, the feedback that you receive are the steps within the work instructions, so which one is more convenient for the workers to do so?

Speaker 2: Yes. Like, here, we put in, 5 cable ties. Sometimes in a 70 mil worker says, yeah, maybe you can also put in the 6 point here before, like because you're already busy building in 5. Why not put it in also the 6 point? Like, something like that small step that we can add or not add, take out because that is up in the air. That's a lot of things are just set in stone.

Speaker 1: Was there any feedback that you received that relates to, the cognitive abilities or physical abilities of the workers?

Speaker 2: Yes. Just these are all images. Sometimes it's not clear enough what you're looking at. Like, say, for example, this image here in one corner, sometimes they can't see what the image is

from, which angle, what what what's item it is. So, yes, we do have sometimes, questions about the work instruction not being clear enough because an image is not clear enough. That is the extent of problems at the moment.

Speaker 1: Okay. And to solve that problem, then you use circle highlights or extra details on it in the in the beginning before you provide them the full work instruction.

Speaker 2: Yes. Which can be a new image, can be more highlighted, can be some explanation of text in.

Speaker 1: Right. And, is there any kind of information that the work instruction must have contained in?

Speaker 2: All working instructions at the moment have a change lock at the start, start page. It tells you what type of work instruction is, what to call it, product number, provision, date, alter, station that's made on. This is the change log. Change log tells you what's changed from p p version to the new version, why it changed, and sometimes also the page number and some modification and date on the change. Next to that, there are also very important this page, the control page that I showed you, this is also containing almost all work instructions. So we have, assembly workers, and we also have controllers. The controllers are there to check on the work that they send the assembly workers to or make, and they use this page as reference to see what they need to check and what they need to, yeah, Control.

Speaker 1: Alright. And then I'll be moving on to the characteristics of the employees and option for possible personalization. And, because you have to when you're in the process of making a work instructions and then you get a feedback from the assembly team and the others, you have to consider them also. Considering these different types of characteristics of the, workers, is there any specific characteristics of workers that seems to impact their work performance through the work instruction?

Speaker 2: I don't know, really.

Speaker 1: Okay.

Speaker 2: So we have one employee that is, for it's not special needs, but, yeah, I do not know how to say that correctly. To be honest. But it's, he has yeah. But he has a little bit more problems with work instructions, you know, I've made but the keys also put by the team leader on just one workstation mostly. So he knows the products by heart more or less that he needs to make. So I do not have extra problems making more instructions for him. Rest of the employees

are all pretty skilled, pretty good educated. So we don't have problems with the difficulty with the work instruction, especially now that we've taken out a lot of text.

Speaker 1: Okay. And you mentioned that taking out a lot of text has changed this situation. Does that mean that with the text, it had more problems before?

Speaker 2: In my experience, yes. Because the images were a lot smaller and darker. So but as human beings, we're lazy. We only look at the image. You see that something is, added to the image. You just do that instead of reading the text that says what you need to do. So by removing a lot of text and only putting a text where it's necessary, we try to encourage people to read the little text that there is, see if there's something important or not. So that's our way of trying to motivate people to read the text.

Speaker 1: And is there any characteristics of the workers, that influence the work performance in general or no? Is that all the same for all the employees in your company?

Speaker 2: My experience, there's no influence.

Speaker 1: Okay. Alright. And then I will be moving to the next section of the interview where I'll be asking you questions regarding to the subjectivity of the content of the work instruction. And what I mean by this is that in my research, there are 5 dimensions of the subjectivity that I'm focusing in creation of the work instruction. There's a framework that has been published by the art by the paper a scientific paper, but his definition that he used in the dimensions were quite subjective in a way because none of them can really be set in stone. So I want to see if these dimensions can be more straightforward with the data that I'm collecting. And so the first dimension is to repetitiveness within, work instructions. And when I mean by repetition, I mean by within a one single instructions for one product within a department. And I want you to first think about 1 paper-work instruction and also the 1 digital work instruction in your mind when you're answering these questions. And when it comes to the paper one, does, is there a certain type of information or content of the work construction that must be repeated?

Speaker 2: In the sense of you need to make multiple parts or in the sense of you need to make the products or the steps are repeating itself in the work construction?

Speaker 1: I think both situation counts.

Speaker 2: Yes.

Speaker 1: And, what kind of informations is it? Is it, like, repeat this step several times or what is said in the previous step is repeated in the next step, those kind of thing?

Speaker 2: It's more from our employees themselves. They see doing repeating the steps multiple times is easier than finishing a product from a to z. So need to pick up fast. Example, a work instruction that I can show you. One second. This is a newer work instruction. We need to create a, measurement device for the height. This is what you need for it, and this is what you do. You need to put into screws and tighten them on 3 millimeters. But you also need to do this, only this part, and tighten it all by the _____, and then you need to fix everything together. So what we see in practice is that people see this work instruction and do this step as many times as the products or as the order is first, and then they do step 2 as many times as per other is, and then they do step 3 as many times as the order is. So, yes, I see it happening that people are doing repeated steps, but, no, we do not specifically tell people to do the repeated steps in a work instruction themselves.

Speaker 1: Okay. And was there any situation where the employees complained about the level of repetition in the paper-work instruction?

Speaker 2: No. And We don't tell them to repeat it. We just tell them how to make a finished product. They can decide themselves if they wanna do the repeating steps multiple times. Or that they wanna switch from tooling all the time and just make one at a time.

Speaker 1: Okay. So it depends more on their own freedom of how they want to do the task.

Speaker 2: Yeah. We do encourage them to do it that way. To make multiples of the same same same same component and then just multiple times of this bracket and then screw them altogether multiple times, that's, that's yeah. Work instruction doesn't, specifically it's specifies it that you need to, maintain that working order.

Speaker 1: Okay. And I also because you show me the example of the digitalized version of work instruction, and I saw that it's mainly pictures, and there is no repeating pictures within the work instruction. Am I correct?

Speaker 2: Yes.

Speaker 1: Okay. So there is no repetition of same information throughout both paper work instruction and, the digitalized work instruction at the moment?

Speaker 2: No.

Speaker 3: Not as much.

Speaker 1: Alright. Okay. And then I'll be moving on to the second, subjectivity dimension, which is too large amount. And the definition of this is the amount of data provided and the amount of data which the employee can handle is mismatching because it just gives too much data for them to deal with it. Have you ever received a feedback from your employees, in the paper-work instruction that the instruction is too big for them to follow?

Speaker 2: I personally did not. I think I've broken down the steps you need to do pretty well. They are unsure how to make it or do it. There are, most of the time, multiple steps before they are head up, at my desk. Because the in 70, in 70 worker, will have a controller. That is our expert in the company. They know how to make the product. They can do their first for questions, feedback. If they can't figure that out, they can go to the team leader. Team leader can't figure it out. They can go to process engineer, and process engineer can't figure out. They come to me. So that's quite a few steps between them and me to fix a work instruction.

Speaker 3: I do think, oh, I hear myself twice. _____, can you mute? Yeah.

Speaker 2: Yeah. Yeah. Yeah. Yeah. Yeah.

Speaker 3: Yeah. I do think, we had it in the past, that people receive too much information like, the people who did it for the first time. So new employees, they see a lot of text and a lot of information, and they are not experienced with products. So, that makes them it makes it pretty hard. But, at the moment, we have a lot of, experienced workers. And, in the past, we put all the data we had in, in one instruction. Now we're scaling it back to, to make it easier, like, only show pictures. But we also, want them, new employees and experienced employees, to have a certain level of experience. So, some basic training, they will receive, when they are new. So we don't have to put all the information in the work instruction. Like, say, every time you cut a air tube, for instance, make sure the, there's no dust in it or something. In the past, we, we repeated that message every time, every step. But if you have, seen this information once, you don't have to see it the second time. So we're trying to make the work structure now a lot easier and, and simplify it. So we don't repeat the message anymore. We tell it once in the basic training, and then that's it.

Speaker 1: Okay. So if the workers, they pass the basic training, then they do not receive this repetitive message within the work instruction.

Speaker 3: Yeah. Yeah. I think that's the situation right now. We did that in the past, but it's changed now. So yep.

Speaker 1: And did the because you mentioned that it's the new, newer employees that was a bit unhappy about the situation, and I just want to make it clear. Was it because the message was too repetitive, or was it just because that repetitive message was causing more for them to read?

Speaker 3: Depends on the employee, but I think people are struggling with too much text. To understand, what we did, we put all the text in it. So, if you read it, it's functionally it's not really functioning anymore. It's correct, the text, but it's not really easy for people to read. So, it was just too much. And together with inexperienced, and and, they get, how you say it, they are, it would combination of of a lot of text, a lot a lot of data, and some pressure to produce and make it right. That gives some stress. So, I think to make the work instructure, easier and simplify it, it will reduce the stress, I think, somehow. But I'm not sure it's what we call stress, but, the pressure. It will make easier for new people to start, I think. And they also get, some kind of, the, the colleagues, experienced colleagues, colleagues next to them will also help them. That is not where, will help, so we don't have to put all the information in the work instructure.

Speaker 1: Okay. So, if I organize what you said, so the new employees, they just had too much text for them to read in the past, and that caused them to be more stressed about it and the fact that they cannot really make mistakes by reading this, instruction to produce a product. And in the end, did that, that worked negatively toward the new workers.

Speaker 3: Yeah. I think so. Yeah. Yep.

Speaker 1: And and when that was the case, did that result in their worker performance to be bad? Like, they made more mistakes or their product was not in a really good quality?

Speaker 3: I'm not really sure. It's hard to say because we have, like, _____ already said, we have, people who do some quality checks. So the product in the end will be alright. But I think, yeah, it's hard. When you're new, you're not really experienced. So the process will take longer. But, yeah, the difficulty of the work structure will not help, to get quicker so.

Speaker 1: Okay. And but that's the past problem now? I understand that now it is changed and the work instruction has been simplified than the before would by having way less text and more pictures.

Speaker 3: Yeah. I think that this will help. Yeah. The new situation.

Speaker 1: Then are we moving to the next dimension, which is, connecting to what is what we were discussing before. It was difficult to understand. And what I mean by difficult to understand in this definition is that it's a representational problem within the work instruction where the work instructions are formulated in the manner where terminologies are a bit too

difficult for workers to understand. And I want to ask, are your employees able to understand their work instructions without any struggles? Like, there's no word problem or terminology problem, something like that they experience.

Speaker 2: We have introduced a lot of colors as you see in these work instructions. So sometimes and also icons. Like, these icons. Sometimes they will come to us and ask what the icons mean or what do you call the screen. That's the only struggle nowadays. But we try to fix that by making good handouts. To show what that thing is and, like, explain. That is more than that, not really just the text is pretty minimalistic. So we would expect them to know what everything means.

Speaker 1: Are the text in the digitalized work instruction, are they more about just extra information within the text?

Speaker 2: Yeah. Sometimes it's easy to explain something with text than an image. Sometimes you need, like, 5 images to explain something in images instead of just one line of text. Then we just choose to use text like, for example, let's see where I have text like this. We need to test the compressor box. We tell them go to the this is the work instruction for the, for testing. And use this, program for testing. Like, it's two lines. It's easy to just say that the text instead of make 20 images from how, what , what to click, where which spot you need to do instead of just telling them you need this confirmation and this testing program. So that is something, like, we just choose to use text instead of images.

Speaker 1: Is there any foreign employees within your company?

Speaker 2: Not natively, Dutch speakers. No.

Speaker 1: Okay. So all of everybody in your company are native Dutch speaking?

Speaker 2: For the assembly workers, no. But in the whole company, yes.

Speaker 1: Okay. So, have was there any situation where the non-native Dutch speaking assembly workers were struggling with the work instruction?

Speaker 2: We don't have non-native Dutch speaking assembly workers, but in the whole companies and also process engineers. Or engineers, those are non-native, Dutch speakers. So, no, we do not have any problems with text.

Speaker 1: Alright. Alright. So in total, there's a picture and the text itself is simplified version and every and then you kinda assume everyone would understand the work instruction due to

very straightforward step by step, then you don't think that the difficult to understand dimension is a factor of a concern within the work instruction for yours at the moment. At the moment,

Speaker 2: No. Like this image is also a very nice one for explanation. Yeah. You need to cut this cable tie and place it here. I can make a lot of images just make this image work with the cable tie, putting it in there. But just using a little bit of text helps to clarify what you need to do because it's a different type of working, different type of stuff that you normally do. So a little bit of that will help, a lot.

Speaker 3: What I also, think in the future, we are going to produce more locally. Globally. Sorry. Just so produce, like, for instance, in America or in Asia or somewhat, then we can use these images, but use the English text or in the text there, you know, their, their needs are. Yeah. Now it's all in Dutch because we only produce in, in the Netherlands. But I do think, there will be, in the future, a moment, we're going to change to English maybe or and I know, in our digital work instructure program, VKS, we use, we can, add the Dutch translation and the English translation in one step. So depends on the user they can choose if they want it in Dutch or in English. So that will help us eventually, I think. To get, to help the workers, the employees.

Speaker 1: Okay. And this is does this only apply for the digitalized version of the work instruction, or is it also for the paper-work instruction at the moment?

Speaker 3: At the moment, it's it's, I think, only for the digital ones because, but we don't have the English version in the paper version. And But it's possible. We can do it. But yeah.

Speaker 1: And to when it comes to the paper-work instruction, is it still termed as in, I say jip-en-janneke taal so that the people would understand it better?

Speaker 3: Yeah. Yeah. Yeah. We tried, and I'm going to fill this in for _____, but, we try to get a text as, yeah, Jip-en-janneke as possible. Because it will be easier for everyone. Also, for people who are, not really disabled with reading or but it will make it easier. So we don't have any discussion of what's the meaning of the text.

Speaker 1: So already from the creation of the work instruction process, you already kinda consider there might be people who will not understand this terminology, so we have to be as simple as possible already when it's being written down.

Speaker 3: Yeah. I think so. Okay. Maybe _____ can add some add some comments on this.

Speaker 2: Yes. We also try to use the wording that we use inside our, part list. So if you need a certain part, we also try to name that part all in the text so you can just match it with what you

have on paper. And then, yeah, we also try to as simply as possible, tell them what to do. Like, yeah, it's, as you say, Jip-en-janneke taal.

Speaker 1: Okay. And we have the next one. Too complex. The dimension is too complex content, and this defines the complexity of the data and the user's ability to handle and complexity is mismatching. So, as the employees of the one department have a single version of work instruction per product. Has this caused some employees to suffer from complexity of the content of work construction?

Speaker 2: Not that I know of. I don't think we are having complicated work instructions nowadays. We try to make it as easy as possible and as clear as possible.

Speaker 1: And as you mentioned before, does the fact that your boxes are also simplified, does that also help the situation at the moment?

Speaker 2: I believe so. In my experience. Yes, we do have some boxes that are just out of the box. Let's put it that way. But most of them are pretty…it's the same build up all this time. Like, you need a compressor. The compressor needs to have a stance that needs to have a string in it and a bolt on 7 millimeters. Like, a lot of things are standardized. So, yes, we, most people can be able to make a box with just these simple working instructions.

Speaker 1: And you also mentioned before that when it comes to receiving feedbacks from the assembly team in the creation of the work instruction, people kinda give you feedback about some steps should be changed the other ways to make it better for themselves. Was there also, like, a feedback that relates to how the content, the information of the work instruction is a bit too difficult or complex for them to understand as with from a picture or from a text?

Speaker 2: So I noticed too before. Sometimes pictures are not clear enough, then I can retake a picture or highlight it or something. But the more or less the look and feel of the work instruction is standardized, so they do not really have an input in how the work instruction is created and how images are made. Like, all images should be on a white background with highlights when something is added on the backwards or millimeters or what's called screw downs added in. So standardized for you. We have made rules about this.

Speaker 1: And the final dimension is, that I'm moving on to is untimely. This is talking about how the time of the information provided is mismatching to the workers' ability to assemble. And, does your paper when it comes to the paperwork instructions, is it, in a format where the workers can just, flip the pages as they go when they need to, or is there a certain time where the workers have to finish this certain task within the steps?

Speaker 2: We do not have time pressure or time management in the work instructions. I mean, we have set certain time for our products to be made in our company. You get that amount of time in a day to make x amount of units. If you that's our call for today, and that's what they try to make in a day. That's there's no time on the work instruction how long it takes for a certain individual to make a box to or look at the image to figure it out.

Speaker 1: And there is also no specific, given you have to do this step 1 and step 2 and step 3 in the whole work process either. You mentioned before that it is up to the workers their own free idea interpretation to assemble something first?

Speaker 2: Yes. Like, take these these two images, for example. Here, I say put all the cable ties in. Here, I say use 2 of the cable ties and then, put in this connector into the back of, of the bracket. If they do not want to put this cable tie in and this cable tie in, it's up to them. If they want to do that later. It's not it's not a problem to us. But problem the only thing is you need to have those cable ties in at the end to use them. Like, you see that they use them later on. If you want to put them in later, it's no difference to us.

Speaker 1: So it's only about their own timing and their own personal choices, preferences, and the freedom. It's just that the product in the end has to be exactly what it should be.

Speaker 2: Yes. Correct.

Speaker 1: Okay. And I'll be moving on to our final section of the interview, and this is to talk about options for the personalization or the why there is no option for the personalization. And you already mentioned beginning in the work in the creation of the work instructions, you receive feedback from the assembly team and then try to give out the finished version of the work instructions to people and expect them to be okay with it. But if people still need, still think that they need more information within this work construction or that something needs to be changed, can it be changed easily between them and the team leader or their coworkers?

Speaker 2: Yes. We always change work instructions, with their feedback. But we also try to standardize a lot of things. That's a little bit of balance between those two. Okay. If it's within the standardization that the image is not clear or whatever. Then, of course, we change it. That's no problem. But if they wanted something very different than what is standardized, then we need to figure out if that is correct or not for this, work instruction if they need to note the the extra information.

Speaker 1: Okay. And, is there any room for the workers to write their own comment or their own highlight of the markers within the work instruction in the system?

Speaker 2: Yes. The team leader of the assembly team does 2 weeks, 2 times a week, a stand up with every employee, and then we can give feedback on everything. Also, work instructions. So, yes, they have enough opportunities to get their feedback on certain things. They also do that more than 2 times a week when I go downstairs. Sometimes they fix something. They come up to me or one of the process engineer, and then they give feedback to change stuff, but that is normal in our company.

Speaker 1: Okay. So within the company culture, it's kind of easy for the assembly workers to approach the work instruction creators to suggest something to be improved if they want.

Speaker 2: Yes. I always, I try always to improve it for them because they are the end user. But I also try to, on the other hand, try to make it uniform. So it's always a balance for me between making it better and making it uniform. So I always try to find a way to make it uniform, but better than what they have.

Speaker 1: Do all the workers within the your company, even though they're in a different department, do they receive all of the same types of work instructions in the end?

Speaker 2: No. This work instruction that you see on the screen are specifically for the assembly workers.

Speaker 1: And for the others, it's a bit different than this one.

Speaker 2: It’s all different. We all have different work instructions.

Speaker 1: And so other than, the type of product that you guys produce in the work instruction, there's not really much of a defined influential factors for the work instruction other than that?

Speaker 2: I did not get really what you meant by that.

Speaker 1: Sorry. I'll explain again. So, you said the work instructions are created when somebody is trying to make the product and then you take a photo of the process and then how to do it. And other than the product itself being changed from the previous version to the new version, and then you change your work instruction, That is, like, one of the main influential factor why the work construction fully changes and not the other smaller situations where this person doesn't like a certain image angle, so you change the entire thing. That's not really how the case works. Right?

Speaker 2: We try not to. We do have a lot of complications to our products. We try always to improve it. So our process engineers also make new tooling or new ways to assemble it. Those

are the main reasons why we update the work instructions. So when tooling or the, the box itself changes.

Speaker 1: Okay. And how often does this change product occurs that makes you to change the full work instruction?

Speaker 2: Most of the time, it's not change the full work instruction. Most of the time, it's changing a few steps. Like, they have a new tool to, snip off the cable ties. And then I just put in 2 of the cable ties into the work instruction. So it's not a remake of the whole work instruction, but it's just a little change. Update.

Speaker 1: And this update can happen how often?

Speaker 2: Whenever it's needed, to be honest. We don't have a set time from we work instruction is, we reintroduced the work instruction, then you can't change it for a month or 2. We just change it when it's needed when the employees come or when the work instruction doesn't correspond to real work anymore. Then we just change it.

Speaker 1: Okay. So the there's no, specific timeline where it actually has to change. It just happens when the things happen. I just want to ask how often those changes happen, like, in average, like, a year or 2 years, that kind of thing.

Speaker 2: Normal work instraction. These boxes most of the time, maybe once a year. Two times a year max.

Speaker 1: So it gives the employees, quite long time for them to get adjusted to the new work instructions so it goes in their head, and they can memorize it in the end.

Speaker 2: Yes. Yes. And that's also why we made this change log at the start. So when it changes, we put it down. Yeah. They know the old work instruction. They see there's something changed, what changed. They know which page it jumped to change, and we just they can work from there.

Speaker 1: Okay. I I also wanted to ask, you mentioned previously that you in your end goal for the employees is for them to fully get used to the work instructions that they reach the point where they don't really need to look at the work instruction anymore. Is there a reason why you expect them to do that in the end?

Speaker 2: We don't expect them to do that. They do that themselves because it's again, a lot of we get into our business, a lot of components will look or at least some of the methods will be

pretty much the same. Like, you work 8 hours a day on a box, you will get these 30, 40 steps pretty fast. So it's not like you need to make a different box 10 times a day. It's you make maybe 3 boxes a day, different type of boxes, and most people are well trained and what, for certain amount of time. A lot in the company that they will know the boxes.

Speaker 1: And you also mentioned previously that the reason why personalization or work instruction for your company is not an option because it takes too much time. And is there any other reason other than that why that option is not really available for you guys?

Speaker 2: I want to get them just all the information. They need to make a box. That's our end goal. And because they are this experience with the boxes that they don't need to use the work instruction every time to make one box. It is not necessary to make a shorter version of a work instruction if they're not using the working instruction after 2 or 3 boxes anymore. So it's, for us, useless. Just to make a different type of work instruction next to the one that we provide them.

Speaker 1: Okay. So it's more like you lead up to their own choices whether to fully use it or not, and then you're and then it's not really the company's job to provide another version of work instructions for them when they don't even going to use it in the end.

Speaker 2: Yes. More or less because then we have, a fail safe of our controllers that's checked product at the end. Then we have multiple checkpoints. So if they make 50 boxes, we check every 10th box. So the box will always be checked by the controllers, and they see if the box is correct, then it's good. If it's not correct, then you fix it. So there is always a safety part. That's we can expect that we have a, correct product at the end.

Speaker 1: And, also, as a reminder, there are no specific characteristics of the employees that stands out to influence all this box production quality in the end. Right?

Speaker 2: No. We don’t have that.

Speaker 1: Okay. So, in total, is the the task itself is straight, clear, clear, and straightforward, and the work instructions are simple enough for the workers to understand, and it's not needed to make a separate work instruction because they are going to do the same job for 8 hours a day for many years, so they don't need to look at the same look at the even the shorter version anymore because they memorize it in their hand.

Speaker 2: Correct. And, again, we do not expect them to go through the work instruction. For every box, if you need to make it, the box should then go through step 1 to 40, 50 times. Okay. We expect them to do it once, twice, 3 times. And then most of the time, they will know how to make it, so we don't need shorter version instruction for that. That still needs to go through it.

Speaker 1: Okay. And the work instruction for them in the end is just a reminder of what they and what their task is?

Speaker 2: Yes. It’s more or less a checklist for them to check what the everything is correct, or I guess everything done.

Speaker 1: Okay. And and what matters in the end is the final product being the completely what is what it should be even though the freedom range of freedom is quite high for the way how the employees use the work instruction.

Speaker 2: Yes.

Speaker 1: Yeah. Okay. Alright. Thank you so much. That's my interview so far.