Principles of making digital work instructions using Azumuta

In collaboration with Supplydrive and TNO

Written by: Bongers. N, Grote. E & Velthausz. J, Wind. J

Date: 12/06/2025

Version: 1.0

Note: An active Azumuta account is required to use this guide.

Contents

1 Introduction 3
2 How to create work instructions 4
2.1 Creating work instructions 4
2.2 How to implement these steps in Azumuta 6
3 Skill levels in Azumuta 15
3.1 Research on skill levels 15
3.2 How to create skill levels 15
3.3 Workstation/Account management in Azumuta 17
3.4 Linking skill levels 19
4 System Integration 23
4.1 Data 23
4.2 API's & Triggers 26
4.3 Docx report generation 28
4.4 Management control 30
5 Appendix – Research skill levels 33
5.1 Good and bad practices 33
5.2 European Skills, Competences, Qualifications and Occupations 36

1 Introduction

This document is structured to provide a comprehensive understanding of how to create, implement and manage work instructions and skill levels within the Azumuta platform, as well as explore related system integrations and research insights. It begins with an introduction that outlines the purpose and scope of the document. The next section explains the fundamental steps for creating effective work instructions, including best practices and how to implement these steps specifically within Azumuta. Following this, the document focuses on skill levels in Azumuta by presenting relevant research, instructions on how to create and manage skill levels, guidance on station management and how to link different skill levels within the system. The subsequent section covers system integration topics, including data management, available APIs for integration and document reporting features such as DOCX report generation. Finally, the appendix provides deeper insights into skill levels through a review of good and bad practices, including legal and ethical guidelines, practical do's and don'ts and an explanation of European standards regarding skills, competences, qualifications and occupations. It clarifies important concepts such as the differences between occupations, jobs and careers, as well as the definitions of knowledge, skills and competence.

2 How to create work instructions

To create clear, easy-to-follow and accurate work instructions, several key principles must be considered. This guide is designed to help convert existing instructions, whether digital or on paper and to support the creation of new ones from scratch. Using the example of a 3D-printed bicycle, it will illustrate best practices throughout. While each situation may differ, this guide focuses on the fundamental elements that make up effective work instructions.

2.1 Creating work instructions

To ensure a work instruction is effective, it is important to follow a structured approach. Each step should contribute to clearly capturing the full scope of the task. The visual below outlines a step-by-step process that helps ensure all necessary information is included, making the instruction complete, clear and easy to follow.

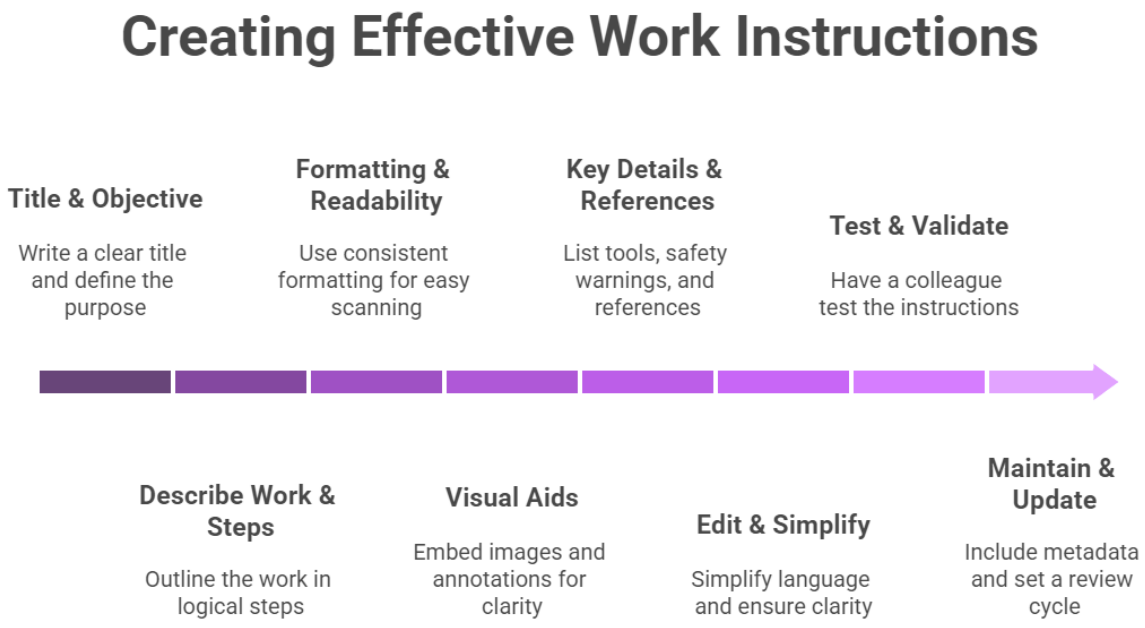

Figure 1: Creating effective work instructions (*How to Write Work Instructions That Are Easy to Follow*, n.d.)

2.1.1 Title & Objective

Start by writing a clear and concise title that immediately informs the reader about the task at hand. Then define the purpose of the task, why it needs to be done, the scope of the instruction, meaning what it does and does not cover and who the intended user is. This could be an operator, technician, new hire or another relevant role.

2.1.2 Describe the Work & Break into Steps

Next, outline how the task should be performed by breaking it down into logical and sequential steps. Make sure each step is short, focused and written in the active voice using the imperative form. For example, use ‘Press the start button’ instead of ‘The start button should be pressed’. This makes the instructions clearer and easier to act on.

2.1.3 Formatting & Readability

Use a consistent and structured layout that supports readability. This includes using templates, consistent headings and good spacing. Structure the instruction in a way that helps the reader quickly understand the content such as grouping similar actions together and highlighting warnings or important information in a distinct format.

2.1.4 Visual Aids

Include relevant visuals such as images, diagrams, icons or videos that show exactly what needs to be done. Ensure that the visuals are clear, high quality and relevant to the step they are illustrating. Where necessary, add annotations like arrows, circles or labels to draw attention to specific parts of the image or area of focus.

2.1.5 Key Details & References

Provide additional essential information such as tools and materials required, safety warnings, expected inputs and outputs and useful tips to avoid mistakes. Where applicable, link to related documents, data sheets, procedures or manuals to provide further context or clarification.

2.1.6 Edit & Simplify

Review the text to remove any unnecessary complexity. Rewrite any unclear sections and simplify the language wherever possible. Ensure that each instruction focuses on one action and uses one verb per sentence to maintain clarity and prevent confusion.

2.1.7 Test & Validate

Have a colleague or someone from the target user group follow the instructions exactly as written without prior explanation. Observe where they struggle or make assumptions and use this feedback to improve the clarity and effectiveness of the work instruction.

2.1.8 Maintain & Update

Finally, make sure your work instructions remain accurate over time. Add metadata such as the version number, author and last updated date. Set a regular review cycle such as every six months and establish a simple way for users to report issues or outdated content so the instruction can be revised as needed.

(How to Write Work Instructions That Are Easy to Follow, n.d.)

2.2 How to implement these steps in Azumuta

Following the development and management of work instructions, the next phase involves integrating these instructions into a digital platform. This part of the document outlines the process of implementing work instructions using Azumuta, a comprehensive tool designed for digital work instruction management. A link to the corresponding part in the knowledge base of Azumuta will be given for each subject.

2.2.1 Objective

The objective of this part is to provide a focused guide on utilizing Azumuta for the creation and management of work instructions. While Azumuta offers a wide array of functionalities, this report will concentrate on the essential features relevant to this specific use case.

2.2.2 What is Azumuta?

Azumuta is a digital platform that supports the creation, distribution and monitoring of work instructions, audits, training and more. It is designed to enhance operational efficiency and ensure standardization across production environments. For more information, please refer to Azumuta their website and their corresponding knowledge base.

2.2.3 How to use Azumuta

This section of the document covers the basic usage of Azumuta. For more detailed information, links to the relevant sections of the Azumuta knowledge base will be provided.

Modules

This section will cover all the models available in Azumuta looking at what each model is used for. Figure two shows an overview of these models.

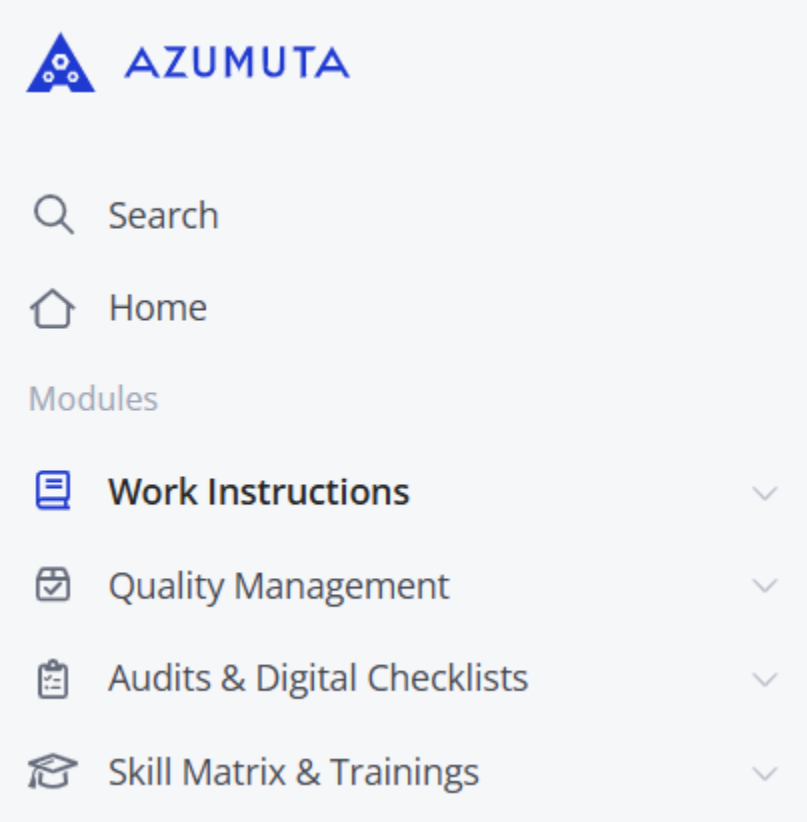

Figure 2: Azumuta its modules (Azumuta)

Work Instructions

The Work Instructions module in Azumuta serves as the central hub for creating, managing and accessing digital work instructions. These instructions provide step-by-step guidance for operators on how to perform tasks efficiently and consistently. Within this section, users can also create freely consultable work instructions, which are always accessible to employees for reference, even outside of active production tasks. This ensures that critical knowledge is readily available on the shop floor, supporting training, standardization and continuous improvement.

Quality Management

The Quality Management module in Azumuta is designed to help organizations systematically monitor, document and improve product and process quality. It enables users to create and manage quality checklists, perform in-line inspections and log non-conformities directly within the production environment. This module supports real-time quality control by integrating seamlessly with work instructions and operator feedback, ensuring that issues are identified and addressed promptly. By digitizing quality processes, Azumuta helps reduce errors, enhance traceability and maintain compliance with industry standards.

Audits & Digital Checklists

The Audits & Digital Checklists module in Azumuta allows organizations to digitize and simplify their audit processes. It enables users to create tailored checklists for audits, inspections and safety checks directly on the shop floor. The module supports real-time data entry, photo documentation and automatic issue tracking to ensure that deviations are captured and addressed immediately. By embedding audits into daily operations, Azumuta helps maintain compliance, improve accountability and support continuous improvement.

Skill Matrix & Trainings

The Skill Matrix & Trainings module in Azumuta provides a clear and dynamic overview of employee competencies across various tasks and roles. It allows organizations to track individual skill levels, identify training needs and assign targeted learning paths. By linking skills directly to work instructions and quality requirements, this module ensures that only qualified personnel perform specific tasks. It also supports continuous development by enabling managers to schedule and monitor training sessions, helping to maintain a well-trained, adaptable workforce. This will be covered in depth in 3. Skill levels in Azumuta.

2.2.4 Creating a work instruction

Let's start by creating the first work instruction following the steps provided earlier in the document. As an example, one will be using the work instructions set made for the development of a 3D printed bike.

The first step is to create a title for the article. This will be done under the Quality Management (QM) module. Hereafter, by going to 'Quality Procedures' and right clicking that option, one will be met with the following options.

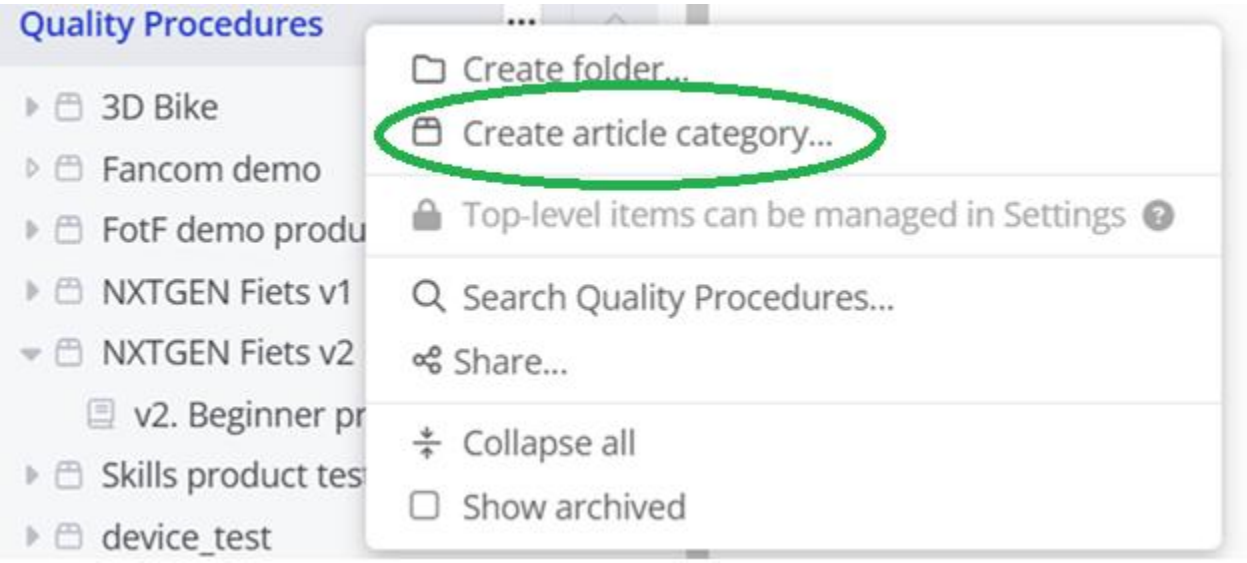

Figure 3: Right click after Quality Procedures (Azumuta)

To ensure proper organization within Azumuta, it is essential to create a new article for every task or product that requires work instructions. This not only keeps the platform structured but also facilitates future integration with the Skill Matrix module. Once the Quality Management (QM) module is opened, users will see an overview of all existing articles within that module. For this guide, the examples are based on the article titled 'NXTGEN Fiets v2'. An overview of this article can be found on the following page.

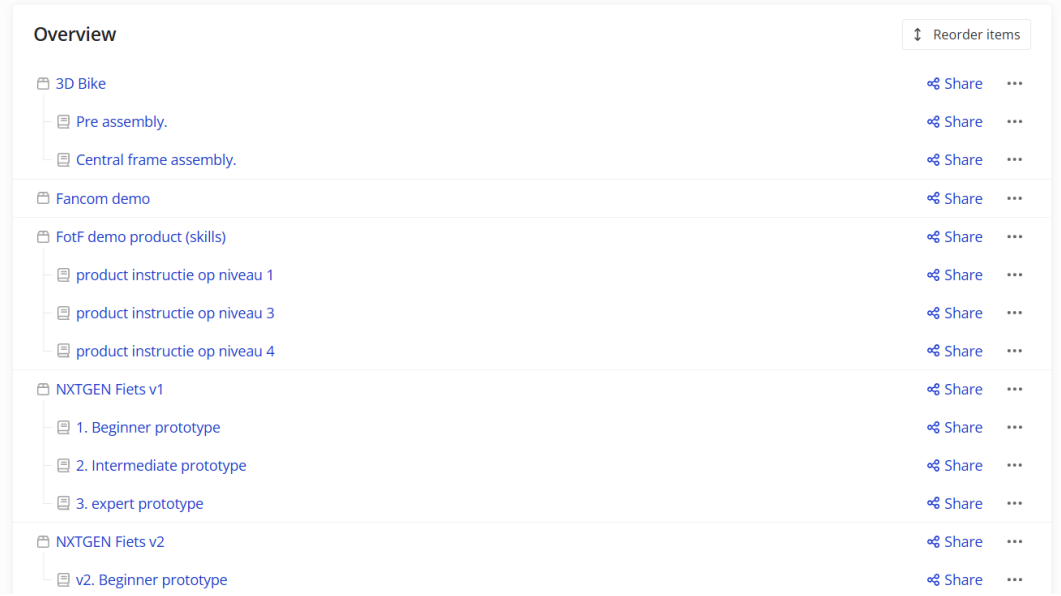

Figure 4: Overview in QM module (Azumuta)

Upon accessing the QM module, users are presented with an overview of all created articles within that module, seen in figure 4. These articles represent individual quality-related records or processes.

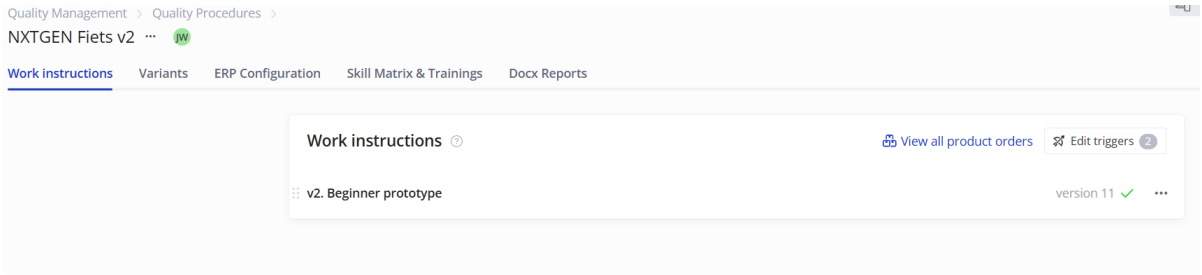

Figure 5: Content of the 'NXTGEN Fiets v2' article (Azumuta)

Each article within the QM module can contain multiple sets of work instructions, depending on the complexity of the product or process. For this specific use case, only one set of work instructions is available, as shown in figure 5. These instructions pertain to the assembly of a 3D-printed bike, which serves as the example throughout this guide. The assembly takes place at a single workstation operated by one person. The process is divided into five main steps, each clearly defined and structured within Azumuta to guide the operator through the build.

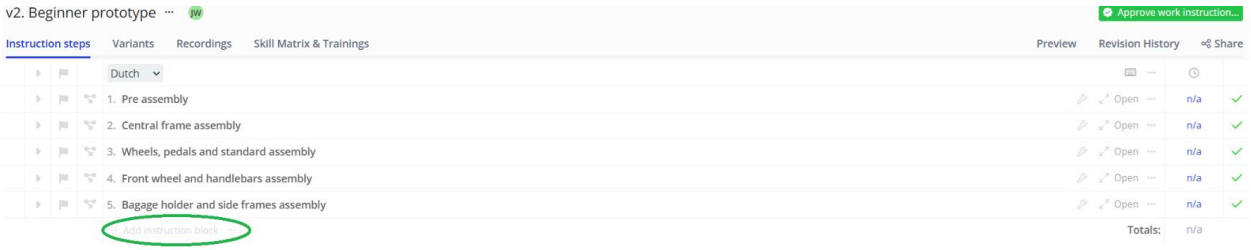

Figure 6: 3D bike assembly steps (Azumuta)

Figure 6 illustrates five distinct steps, each representing a specific part of the assembly process. These steps are organized into what are referred to as instruction blocks, which provide a clear overview of the components or actions involved in each stage. To create a new instruction block, users can click on the greyed-out area labelled '+ Add instruction block', highlighted in green in figure 6.

Once instruction blocks are defined, it is useful to clarify the intended outcome of each one. Beginning with the expected result helps operators visualize the goal more effectively. Including an initial block that lists the necessary tools and materials can further support preparation and ensure a smooth start to the assembly process.

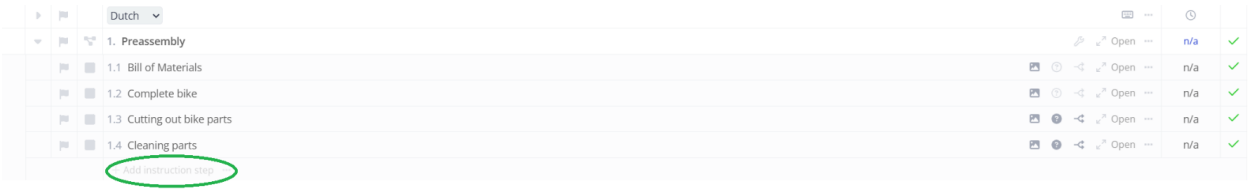

Figure 7: Preassembly 3D bike (Azumuta)

In the example shown in figure 7, the 'Preassembly' block provides key information such as the Bill of Materials (BOM) for the product, a visual of the completed bike to illustrate the expected result and preparation steps like cutting and cleaning the necessary parts. This block helps operators understand what is needed before beginning the assembly process. To add individual instruction steps within a block, click on the area highlighted in figure 7.

Each step within a work instruction in Azumuta offers a variety of configuration options. These include the ability to add images, videos, safety notices and quality checks to enhance clarity and effectiveness. Due to the extensive range of available features, this guide will focus on key considerations and commonly used elements. Examples will be provided to demonstrate how these options can be applied to support clear and consistent instruction delivery.

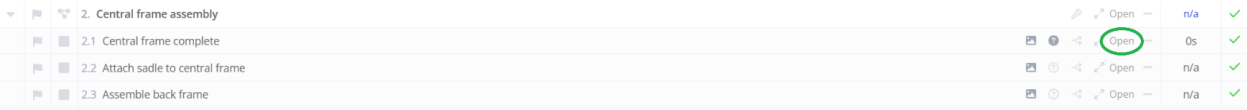

Figure 8: Central frame assembly example (Azumuta)

Figure 8 displays the sequence of steps involved in assembling the central frame. To examine the configuration of the step titled 'Central frame complete', the 'Open' button, highlighted in green, can be selected. This action provides access to the detailed setup of the step, including any associated visuals, instructions and quality checks.

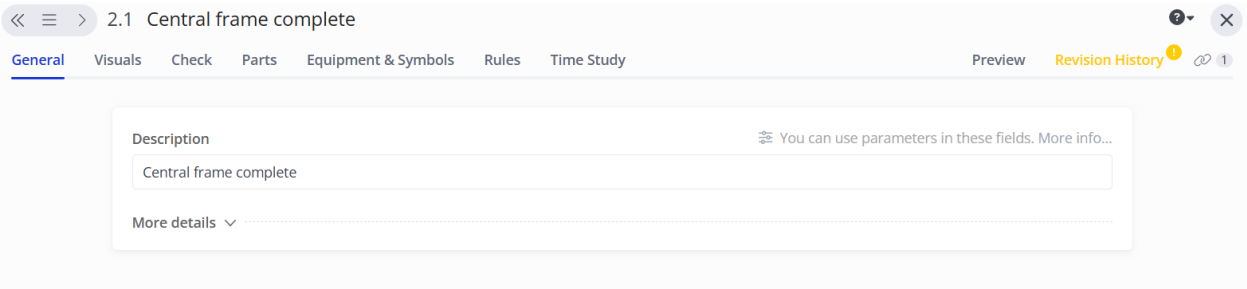

Figure 9: Overview option in an instruction step (Azumuta)

Each section available in the top bar of an instruction step can be used to define specific aspects of that step. The table below outlines each section, its purpose, level of importance and other relevant notes or considerations.

Table 1: Top bar overview in a work instruction step

Section	Purpose	Importance	Notes / Metrics
General	Provides basic info like title and description of the step	High	Always required; sets context for the operator
Visuals	Adds images or videos to visually support the step	High	Improves clarity and reduces errors; recommended for all visual tasks
Check	Adds verification points or confirmations	High	Useful for quality assurance and operator accountability
Parts	Lists required components/materials	High	Prevents incorrect part usage; critical in assembly and production steps
Equipment & Symbols	Defines tools, equipment and safety symbols	Medium	Important for safety and clarity, especially with complex tools

Rules	Sets conditions that control visibility or completion of the step	Low	Useful in variable workflows or when customization is needed
Time Study	Records expected time for completion	Low	Helps in performance tracking, balancing and optimization

The ‘Check’ part in the top bar is important to indicate critical steps. These will be used to show whether a step is necessary for completion.

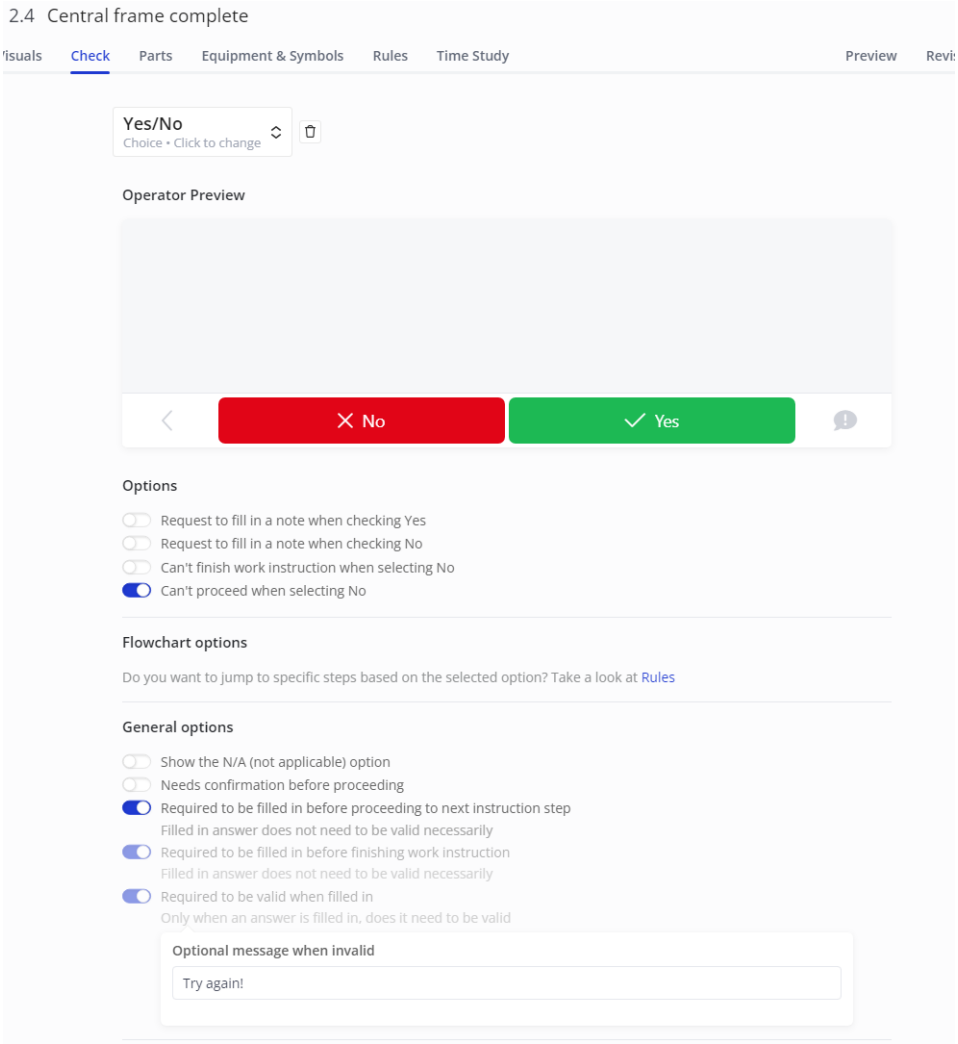

Figure 10: ‘ Check’ top bar (Azumuta)

Figure 10 shows the option available, in this case one has selected the Yes/No check. To indicate that this step is a ‘critical step’ one must check the ‘Required to be filled in before proceeding to the next instruction step’ button. Also, if the product cannot be finished without this step being completed, one must check the ‘Can’t proceed when selecting No’

button. Also, there are options to request written feedback together with other checks for other use cases.

After completing all the necessary steps for a particular work instruction, it is important to use the preview function to get a sense of how the instruction will be presented. By clicking the preview button in the top right corner, as shown in figure 9, the screen displayed below will appear.

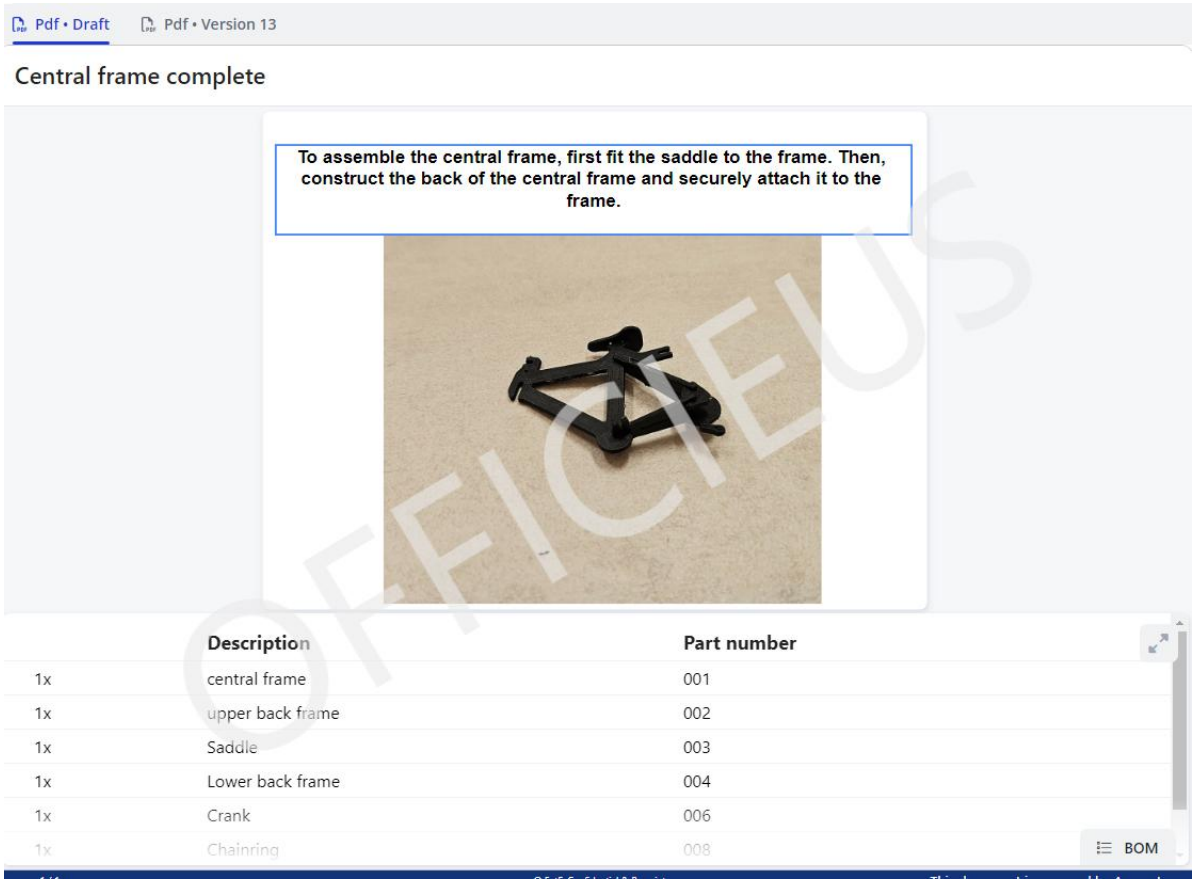

Figure 11: Preview of 'Central frame complete' (Azumuta)

In this preview field, seen in figure 11, one can evaluate whether this instructions step meets expectations.

After completing these steps, one part of the instruction set is finished. The process must now be repeated for each remaining part until the entire instruction set is complete. For a more in-depth exploration of Azumuta's functionality, please refer to the knowledge base.

3 Skill levels in Azumuta

Once the creation of work instructions has been completed, those instructions must be linked to the skill levels of the operators. Before this can be done in Azumuta, it is essential to define, measure and assign skill levels within an organization. If skill levels have already been established and distributed within the company, proceed directly to the section titled 'Linking skill levels'.

3.1 Research on skill levels

Before skill levels are assigned, it is important to gain a deeper understanding of the subject. Therefore, one can refer to the research on skill levels, focusing on the legal and ethical considerations related to this topic, examples of good and bad practices and guidance from the European Union, found in the appendix 'Research Skill Levels'. This knowledge is essential to ensure that the measuring and assigning skill levels are conducted in a fair, compliant and effective manner.

3.2 How to create skill levels

Defining, measuring and assigning skill levels within an organization can be accomplished through a series of structured steps. Below one can find a concise and coherent plan outlining the actions an organization can take to define skill levels.

3.2.1 Define the job – step one

The first step is to clearly define the job that needs to be done and identify the specific skills required for it.

This can be done by following the three pillars established by ESCO. When describing a job, clear criteria should be defined for each pillar to determine what is truly necessary for someone to be eligible to work in that role. Once somebody meets all these criteria, the person can be hired and be assessed what skill level they have.

3.2.2 Define skill level – step two

Before an operator is hired, the person must meet certain minimum requirements. To determine the skill level of an individual, clear criteria must first be established. As outlined in the 'Good and bad practices', there are various matrices and guidelines that indicate what should or should not be followed.

A company can utilize a set of Key Performance Indicators (KPI's) to evaluate employee performance. These KPI's can vary depending on the specific context and type of assembly involved. Each organization determines its own relevant indicators. Several general

examples of KPI's include metrics such as flight hours, the number of times a product has been assembled, average production speed and error rate. These indicators help monitor efficiency, consistency and quality in production. Additionally, the completion and regular renewal of mandatory training programs serve as important KPI to ensure workforce competence and compliance with safety or regulatory standards.

Ultimately, there should be a structured list used to evaluate employees. Based on that list, a matrix can be created to see where an employee stands within each sub-area of a skill.

3.2.3 Measure skill level employee – step three

Now that the skill levels have been defined in the previous step, each employee can be evaluated against this list to measure the individual skill level. This assessment must be conducted fairly. So, not solely based on a supervisor's opinion or intuition, but also grounded with factual data. For example, someone may appear to work slowly, while performing at the same pace as others. By comparing objective data with subjective observations from supervisors, a balanced and accurate evaluation can be achieved. In this way, every employee is assigned a skill level, giving the employer an overview of where each employee stands.

3.2.4 Assign skill level employee – step four

Based on the third step, each employee is now assigned to a specific skill level. The employer can use this information to adjust tasks and responsibilities, ensuring that employees are doing work that aligns with their strengths, as indicated by their skill level.

This helps the company operate more efficiently by leveraging the capabilities of its workforce. Additionally, the employer can identify areas where an employee excels or struggles. This insight can be used to provide targeted training, helping to close any skill gaps. Over time, this approach not only improves individual performance but also strengthens the overall skill base of the organization.

3.2.5 Repeat the steps – step five

An employee can grow within their role and enhance their skills over time. However, it is also possible for certain skills to decline if they are not regularly practiced or tested. That is why ongoing reassessment is essential. Figure 2 clearly illustrates this cycle. It is important to revisit this process periodically to determine whether anything has changed – such as improvements resulting from training or certifications. Regularly repeating this cycle ensures that both the employee's development and the company's expectations remain aligned.

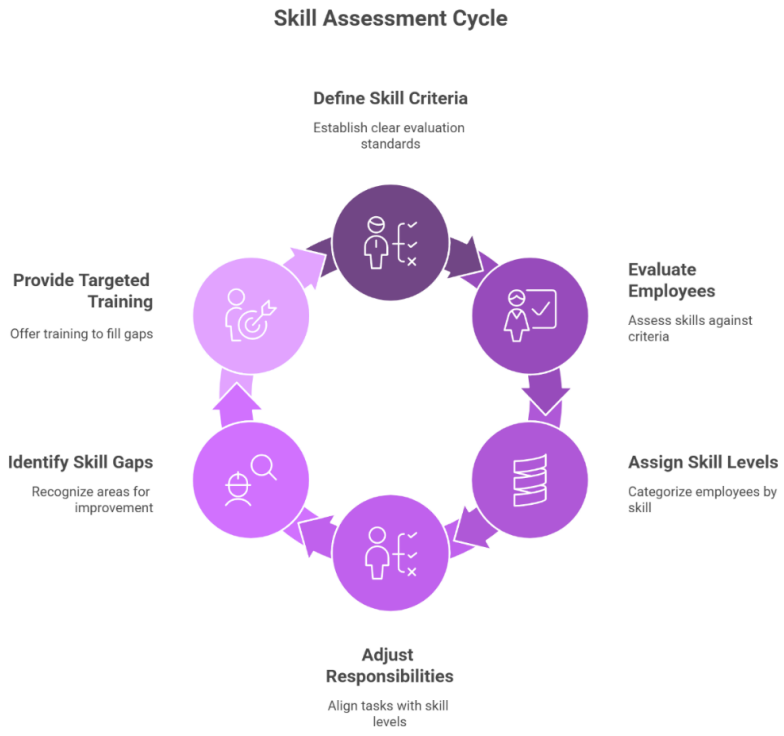

Figure 12: Skill assesment cycle

3.3 Workstation/Account management in Azumuta

Accounts within Azumuta can be utilized in various ways. Each operator can be assigned an individual account, although this incurs additional costs. Not every subscription plan includes an unlimited number of accounts.

Figure 13 illustrates the settings available per user profile. For instance, it is possible to configure the interface language within Azumuta. Additionally, the individual's role within the organization can be specified.

Personal accounts offer the advantage of accommodating language preferences. In environments where employees come from diverse backgrounds, this allows each person to work in their preferred language. However, it is important to note that this setting only affects the interface language. Work instructions themselves are not translated.

Another advantage of using personal accounts is that a company can manage each operator’s skill levels directly within Azumuta. This also enables the assignment of task-specific clearances based on those skill levels, ensuring that only qualified individuals are granted access to certain operations.

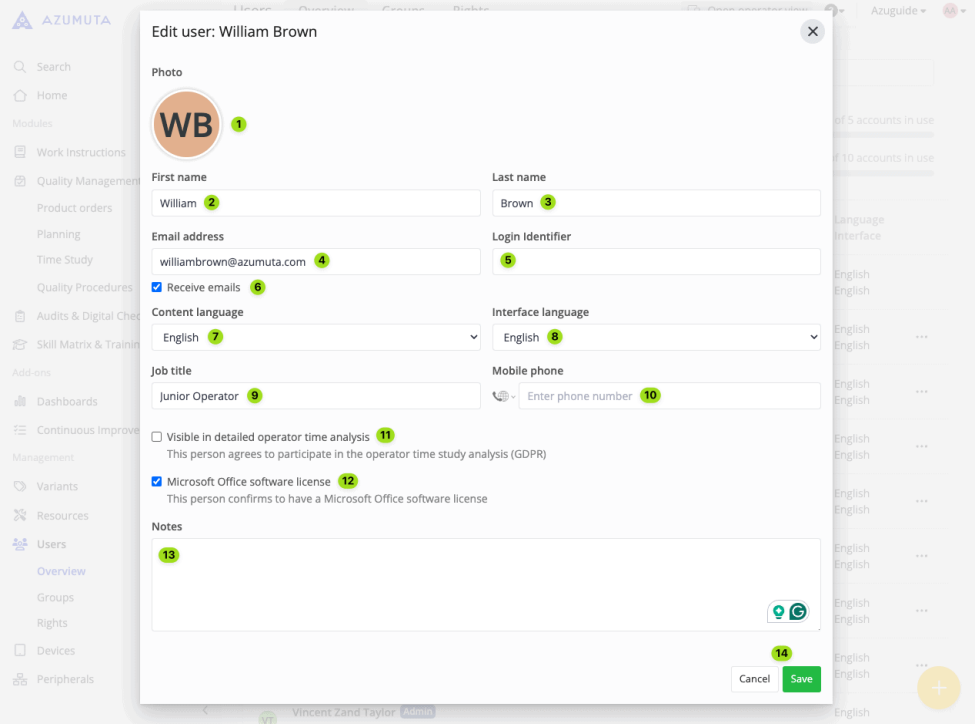

Figure 13: Example user (Azumuta)

For each shift an operator can log in using their personal account. The individual proceeds with assembling products using digital work instructions. These instructions are tailored based on the operator's skill level. For example, a more experienced worker may receive a condensed version of the instructions, while someone new to the process is provided with more detailed guidance for the same task.

It is also possible for a company to opt out of having unlimited user accounts within its subscription plan. Even with this choice, skill levels can still be utilized within Azumuta.

An alternative approach involves assigning one account per workstation rather than per operator, which reduces the total number of accounts required. In this setup, documentation related to individual skill levels is managed outside of Azumuta. Each workstation is assigned a specific skill level and the corresponding work instructions are adapted accordingly. When multiple stations are arranged side by side, operators simply work at the station that matches their own skill level. This method provides a practical workaround for organizations that choose not to use personal accounts.

A notable advantage of working with dedicated workstations, each operated by different individuals, is the ability to create a high-level overview within the organization. Azumuta tracks detailed information per account regarding assembly tasks, including which steps

were completed and the time spent. This data can be instrumental in identifying process inefficiencies, such as bottlenecks in specific steps.

While personal accounts provide highly detailed insights into who performed which tasks and how, the resulting data may be more fragmented from a managerial perspective. In contrast, using workstation-based accounts combined with clear shift tracking offers a more top-down view of the production process. This makes it easier to pinpoint where bottlenecks occur and to determine whether these are isolated to specific individuals or reflect broader issues across multiple operators.

3.4 Linking skill levels

This section explains how to work with skill levels within Azumuta. A key disclaimer is that within the following paragraphs it is assumed that a skill level system is already in place within the organization, with levels assigned to operators and actively maintained. If this is not yet the case, it is recommended to first follow the steps outlined in the previous chapter 'How to create skill levels'.

Figure 14 presents an example of how a skill matrix is structured within Azumuta. It shows that each operator has an assigned skill level, ranging from one to five, which is visually represented through colour coding.

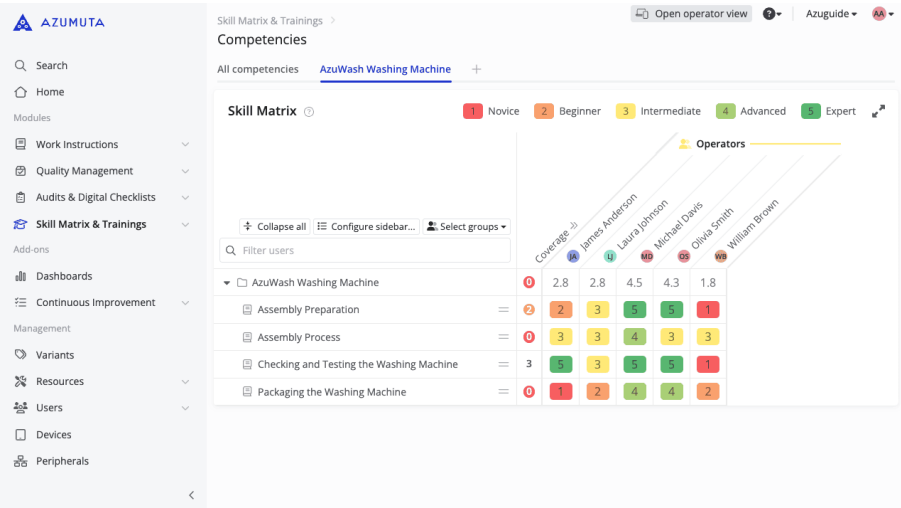

Figure 14: Example Skill Matrix (Azumuta)

Each assembly step displays the operator's corresponding skill level. In this example, James Anderson is classified as an 'Expert' in testing, while he is still a 'Novice' when it comes to packaging the product. This clearly illustrates that operators often have varying strengths across different parts of the production process.

As an expert, Anderson can work with a streamlined version of the work instructions for testing. However, for packaging, he requires more detailed guidance to complete the task successfully.

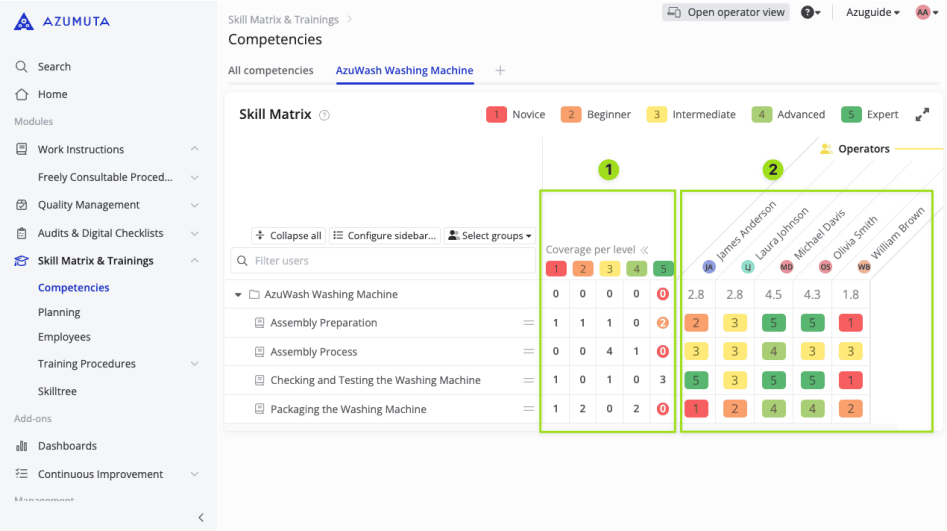

Figure 15: Example Skill Matrix including Coverage (Azumuta)

The 'Coverage' view can be expanded to show how often an operator has followed a specific work instruction, including a breakdown by skill level.

Updating a skill level is simple: clicking on the current rating opens the option to modify it, something also demonstrated in Figure 16.

Figure 16: Way to change skill level (Azumuta)

Within the DataBridge project, work instructions have been developed for the 3D bicycle. In this case, three distinct skill levels were defined, although only levels 1, 3 and 5 are used in this example. Level 2 and 4 are not applied. In the following paragraphs an example is given of what can be done with skill levels.

When an operator is assigned skill level 5, the Fast Forward mode is automatically enabled. This is indicated in the top-right corner of the interface, next to the Training button. A level 5 expert only follows the critical steps of the process. As the operator progresses, non-essential steps are automatically skipped, based on the assumption that an expert does not require them. This results in a faster assembly process.

However, even experienced operators may occasionally need a reminder. In such cases, the expert can manually disable Fast Forward mode and proceed through all steps as usual. Additionally, the operator can navigate freely by selecting any step from the instruction list on the left side of the screen.

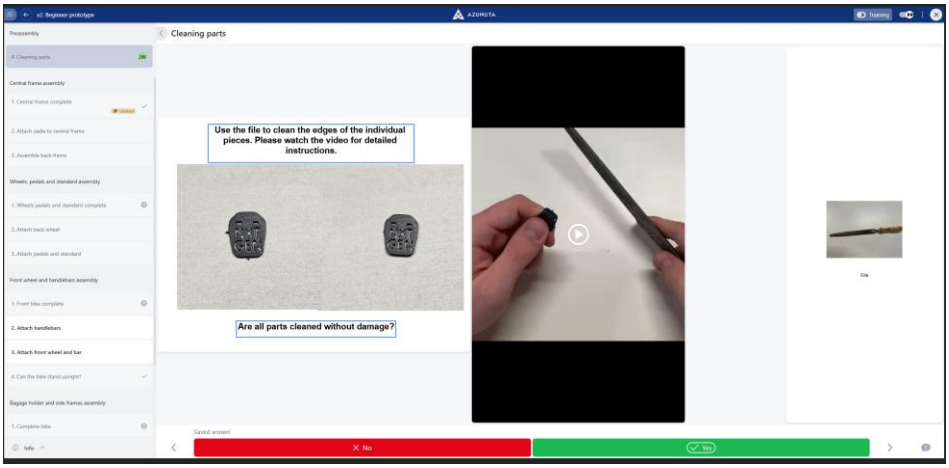

Figure 17: Example Fast Forward (Azumuta)

Skill level 3 introduces a minor difference compared to level 5. The Fast Forward mode is turned off by default but can be enabled if wanted. Operators at this level also have access to the full list of instruction steps, allowing them to navigate freely through the process.

In contrast, skill level 1 represents a much more restricted experience. As shown in Figure 18, the instruction list is intentionally hidden. This design choice ensures that beginners follow every step in sequence without the possibility of skipping ahead. While it is still possible to go back to previous steps, the absence of the step list prevents accidental or intentional omissions. Additionally, Fast Forward is disabled and cannot be activated. The novice must proceed through each step in order, without shortcuts.

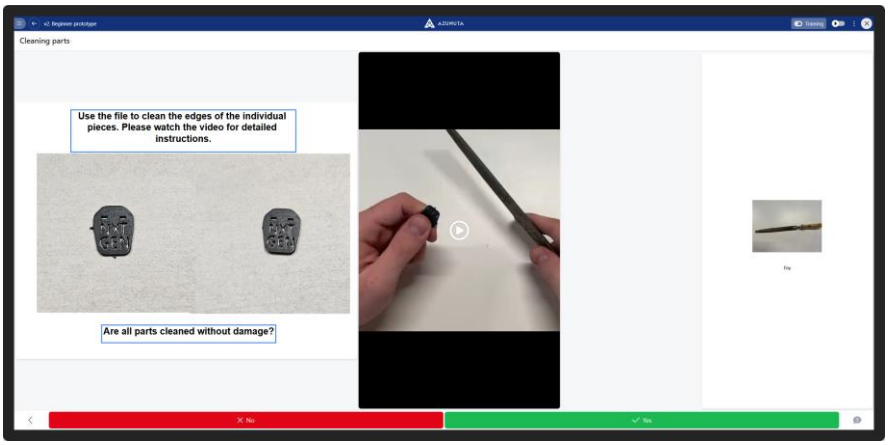

Figure 18: Example Novice level display (Azumuta)

Unfortunately, the display settings based on skill level cannot be automated within Azumuta. To configure this manually, an admin must navigate to ‘Devices’ under the ‘Management’ section. There, it is possible to adjust the interface settings per account. As shown in Figure 19, the option ‘Enable instruction step list…’ must be set either for all users or for none.

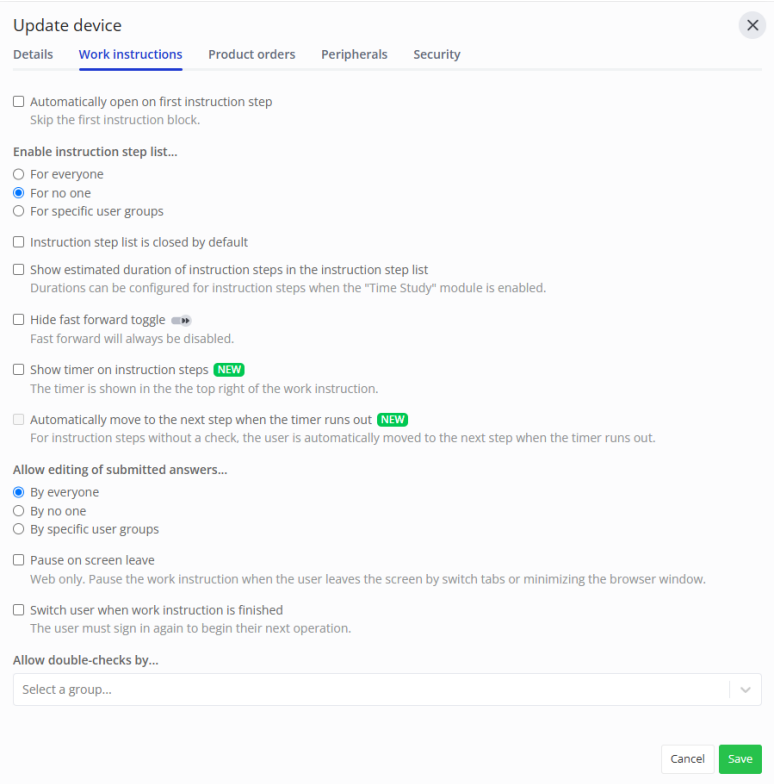

Figure 19: How to change display (Azumuta)

Azumuta also provides a comprehensive online manual that covers all functionalities within the platform. The Skill Matrix is thoroughly explained as part of this documentation. For more information about the Skill Matrix, please refer to this link.

4 System Integration

Azumuta offers an extensive range of features to support businesses. A multitude of software solutions have easy to configure connections available with Azumuta. If not, it is still possible to integrate a new system, for example how Supplydrive has done with their Smart Connected Supplier Network (SCSN) which they have used to connect their ERP to Azumuta.

4.1 Data

Azumuta allows data to be both imported and exported, enabling integration with external systems such as ERP, MES and PLM platforms. Production orders, quality metrics and skill level data can all be synchronized via structured formats such as CSV or JSON through the API. This facilitates real-time data exchange across platforms and minimizes manual data entry.

To prepare Azumuta for receiving external input, such as a production order, the system requires contextual information. Most notably an item number. This ensures that the correct set of work instructions and associated quality requirements are selected and triggered automatically.

The configuration can be set up within the Quality Management module. In our example, the article category NXTGEN Fiets v2 includes a dedicated page named ERP Configuration, where such item-specific mappings can be defined (see figure 20). By setting parameters like item number Azumuta can match incoming data to the correct procedure.

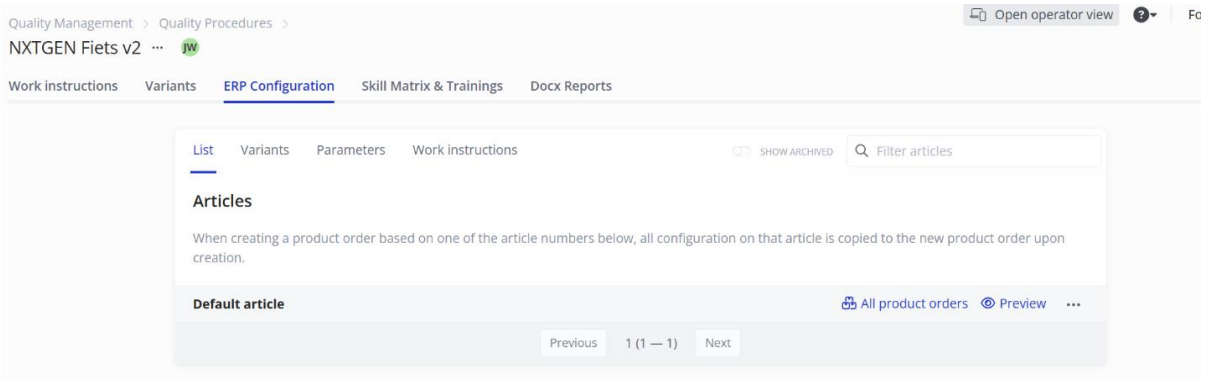

Figure 20: ERP Configuration (Azumuta)

A new item can be configured by selecting the yellow button (see figure 21) located in the bottom-right corner of the screen.

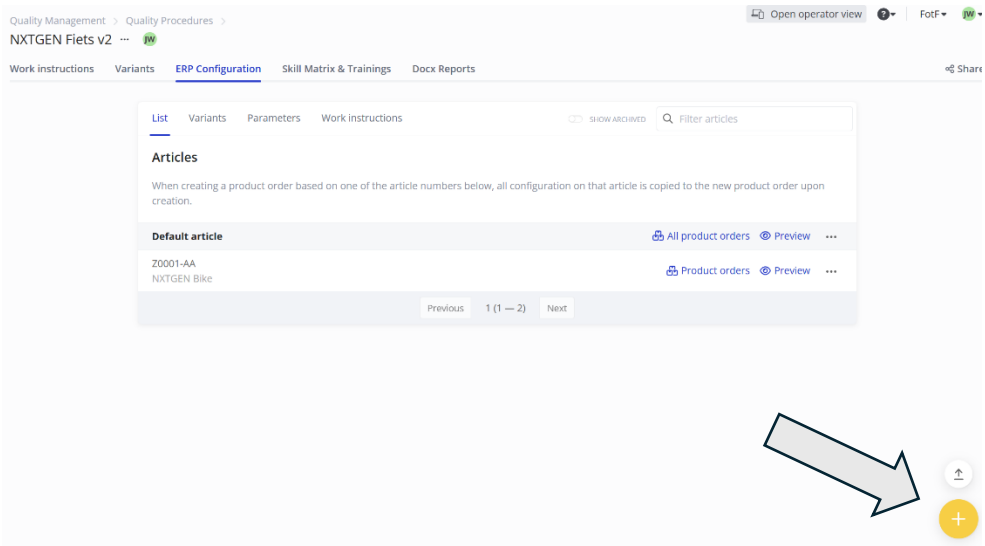

Figure 21: Article creation yellow button (Azumuta)

This action opens the article creation menu (see Figure 22), which enables the definition of all relevant parameters required for integration.

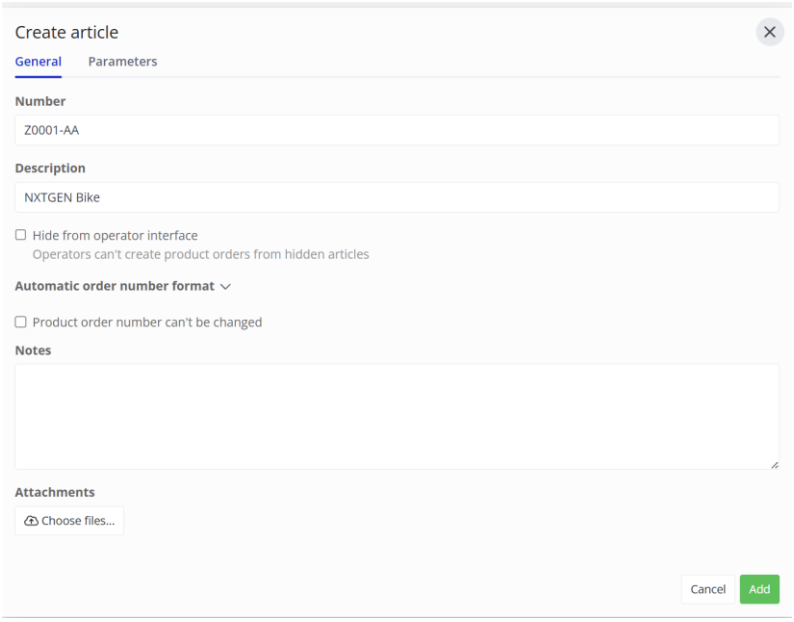

Figure 22: How to create an article (Azumuta)

In the context of this guide, only a basic item number is used without additional parameters. More advanced configurations are addressed in subsequent sections. When entering the item number, accuracy is essential, as this field determines the correct linkage with ERP or MES data. An optional description can be added to improve the clarity of the item's purpose. Once all required fields are completed, selecting the green Add button finalizes the setup.

One can also provide a description for the article to help identify its purpose more easily. Once the fields are completed, click the green "Add" button to create the item and finalize the setup.

Within the same article creation menu, the Parameters section (see figure 23) provides functionality to define key-value parameters, allowing Azumuta to distinguish between different versions of the same article. This is particularly useful when similar products share a base process but differ in specific characteristics such as material composition, size, or additional requirements.

Azumuta supports three types of parameter values: text, number and true/false. Text parameters are used for string-based values, such as material types or model codes. Number parameters allow for the entry of numerical data, including sizes or quantities. True/false parameters represent binary options, such as whether a product requires an additional quality check.

By applying parameters effectively, Azumuta can dynamically adjust instruction sets based on incoming production data, creating a more flexible and accurate workflow.

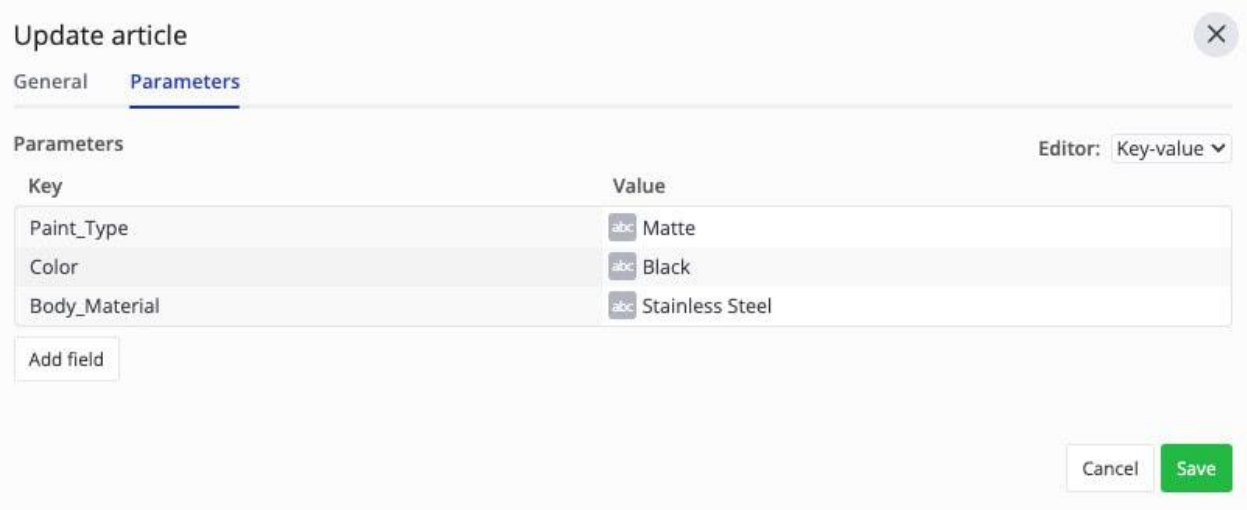

Figure 23: Configuring article parameters (Azumuta)

Further explanation is provided via Azumuta's extensive knowledge platform were further explanation and configuration of article parameters is available. Please refer to this link.

4.2 API's & Triggers

Azumuta supports system integration through a combination of RESTful APIs and event-driven triggers. These features enable more automated workflows, a more seamless data exchange and synchronization between Azumuta and external systems.

The RESTful API framework allows external systems to interact directly with Azumuta's data and functions. This includes operations such as importing production orders, synchronizing operator skill levels and training records, retrieving quality control or audit data and dynamically assigning parameterized work instructions. Data can be transmitted in structured formats, such as JSON, and all communication is secured through token-based authentication.

Azumuta provides extensive API documentation tailored to the specific environment of each user. This documentation includes detailed endpoint references, supported request and response structures, authentication requirements and example payloads. It reflects the unique configuration of the organization's Azumuta instance, making it easier to implement and maintain integrations. A user can access this documentation by selecting the question mark sign in the upper right corner and selecting API Docs (see figure 23).

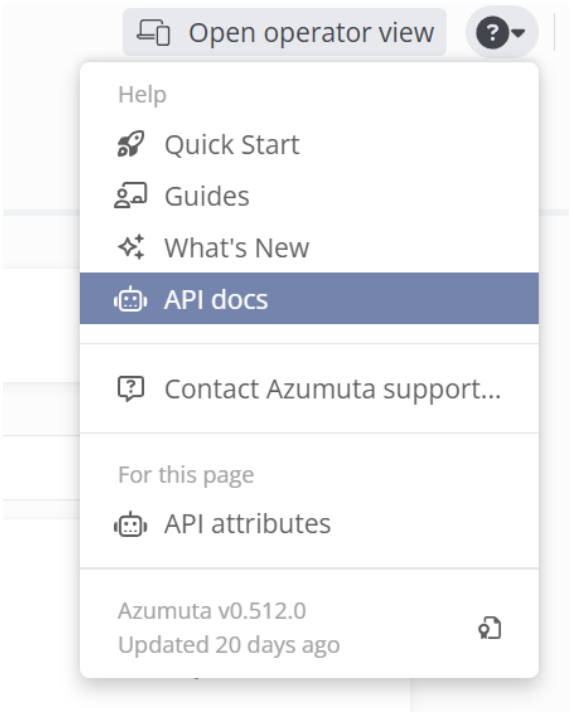

Figure 24: Accessing API documentation (Azumuta)

In the Azumuta environment, it is possible to configure triggers that enable the automatic execution of predefined actions when specific events occur. This section outlines the configuration process using a work instruction trigger as an example.

To begin, navigate to the Quality Management module and open the relevant article category in this guide, that is NXTGEN Fiets v2. Within the Work Instructions menu, an “Edit triggers” button is available (see figure 24). Selecting this button opens the trigger configuration interface, where new triggers can be created and existing ones modified.

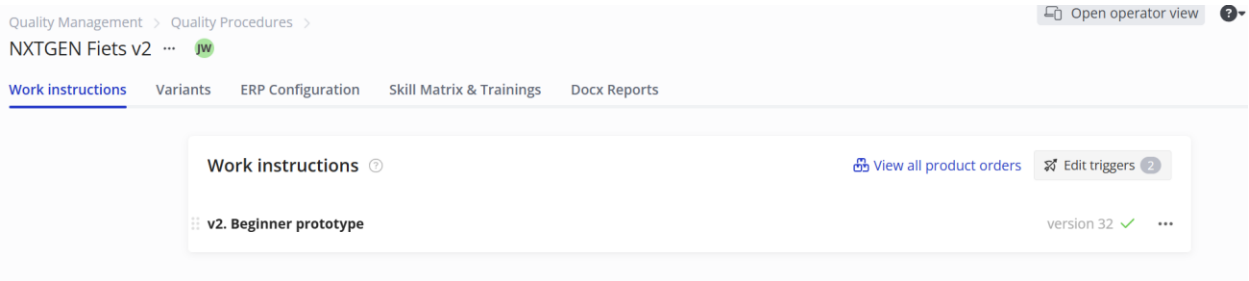

Figure 25: How to find and configure triggers (Azumuta)

The configuration process begins with selecting the appropriate options from a series of dropdown menus. In this case the scope is already selected being the chosen article category.

Next, the What field specifies the type of trigger action to be executed. Available actions include sending an email, sending a Slack notification, calling a webhook, scheduling an audit using the planning tool, or exporting a DOCX report (see figure 25).

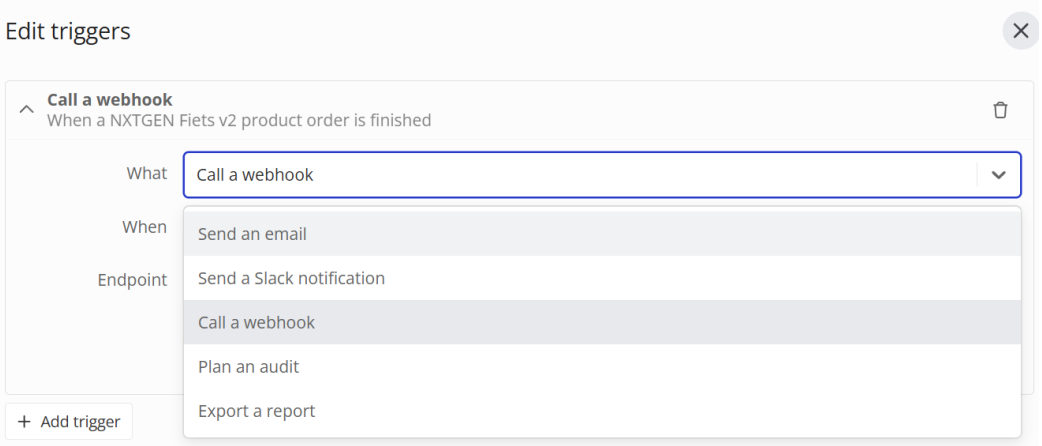

Figure 26: Trigger configuration: What (Azumuta)

The When field defines the event that activates the trigger. This could be, for example, the approval of a production order or the failure of a quality check (see figure 26).

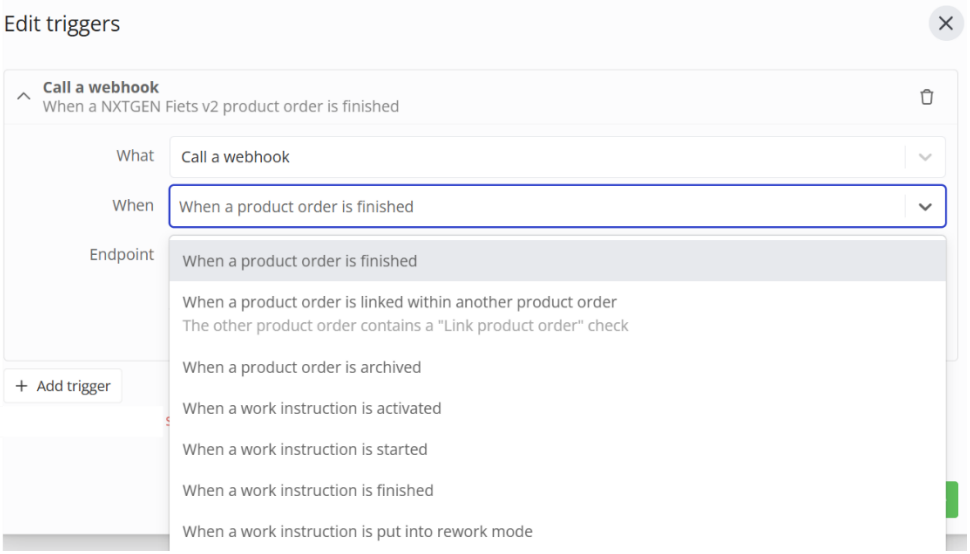

Figure 27: Trigger configuration: When (Azumuta)

After both the “What” and “When” fields are selected, the Attributes field will dynamically display additional configuration options relevant to the selected trigger type. To gain deeper knowledge on each type of trigger please refer to this link.

Once the trigger is fully configured, it can be activated by selecting the “Add” button.

4.3 Docx report generation

Azumuta provides functionality to automatically generate DOCX reports from real-time production data. These reports serve as a bridge between digital work execution and enterprise reporting needs, enabling organizations to document, analyze and share operational insights in a standardized format.

DOCX reports are created using custom Word templates that incorporate dynamic tags. These tags are placeholders that are automatically filled with data from production orders, operator actions, quality checks and system timestamps of report generation. Tag categories include order identifiers, operator details, dates, check results and other operational metadata. A full list of supported tags including basic data, answer values and conditional logic is available in Azumuta’s documentation through this link.

To implement a DOCX report, the process begins by navigating to the Quality Management module and selecting the relevant article category in this guide, NXTGEN Fiets v2. Within this

category, the Docx Reports menu can be accessed (see figure 27). This menu provides the interface for uploading and managing Word templates used for automated reporting.

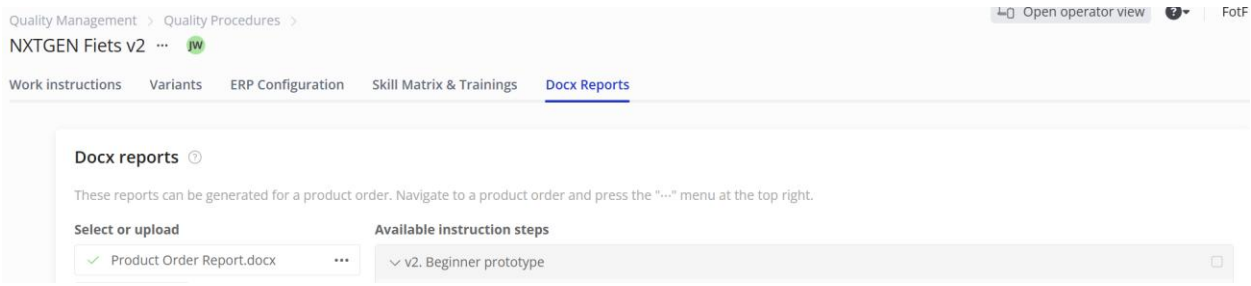

Figure 28: Implementing Docx reporting (Azumuta)

Azumuta allows DOCX reports to be generated automatically based on production data. These reports are created using custom Microsoft Word templates that include dynamic tags. These tags act as placeholders and are replaced with live data from production orders, operator input, timestamps and quality check results at the time of report generation.

To implement this functionality, users attach a formatted DOCX template to a Quality Procedure. Once an order is completed, Azumuta populates the document with corresponding values. This allows the same template to be reused across different product variants or orders while still producing fully customized output. For example, fields such as {ordernumber}, {duedate}, {startdate} and {check_answer} will be filled with precise information from the system (see figure 28).

Order Number: {=identifier}	**Order Number:** A60240087-1
Planned Start Date: {=executionDate}	**Planned Start Date:** 20/5/2025
Due Date: {=dueDate}	**Due Date:** 20/5/2025
Finish Date: {=finishDate}	**Finish Date:** 20/5/2025

Figure 29: Docx report example tags usage (Azumuta)

DOCX reports can be exported manually by a user or triggered automatically as part of a broader workflow. When combined with Azumuta's event-based trigger system (see Section 4.2), reports can be generated and sent in response to defined actions such as completing a production order, failing a quality check, or reaching a milestone in the workflow.

In addition to serving documentation purposes, these reports also support data circulation. For example, in collaboration with Supplydrive, the generated reports can be used to send information back to an ERP system via a connected infrastructure, such as the Smart Connected Supplier Network (SCSN). This creates a circular data flow: production instructions are triggered by ERP, work is executed and recorded in Azumuta, and results are returned to ERP in structured form closing the loop and increasing the data traceability.

4.4 Management control

Azumuta offers an easy to configurable dashboard designed to provide comprehensive oversight of operations. Dashboard creators can add widgets that display key performance indicators and process metrics even allowing aggregation across workstations or specific article categories

To create a dashboard, navigate to the Add-ons section and select Dashboard. Within this menu, a new dashboard can be initiated by clicking the yellow plus sign (see figure 29). This action opens the configuration interface where widgets can be added and customized.

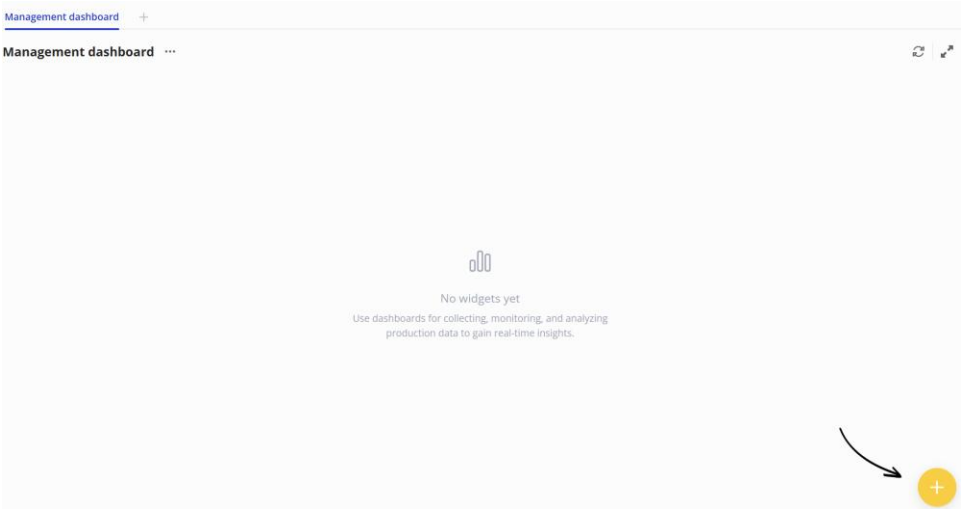

Figure 30: Starting a dashboard (Azumuta)

Widgets can include elements such as visual gauges, charts, tables, timelines, and compliance indicators. Commonly used examples are current production order status, instruction-step completion rates, quality-check pass/fail statistics, operator activity logs and skill-level coverage summaries (see figure 30).

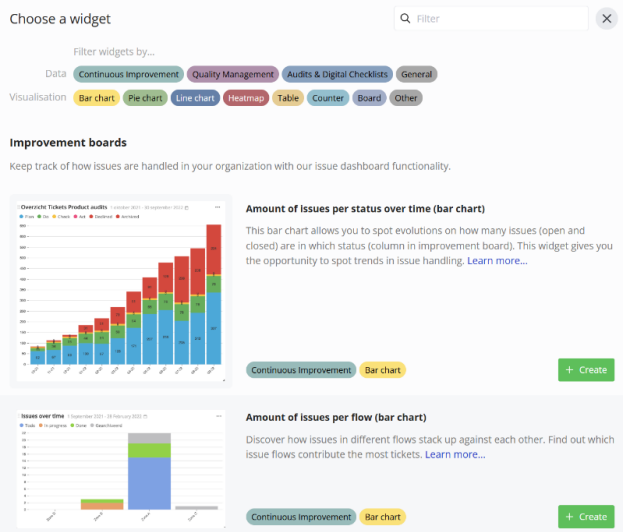

Figure 31: Dashboard widget selection

Dashboards support both real-time monitoring and historical analysis. Live data is collected automatically during production activities no manual actions are needed. Historical data remains accessible for pattern detection and performance benchmarking, enabling targeted process optimizations or training allocations.

Access to dashboards is managed through role-based permissions. This ensures that users can only view data relevant to their responsibilities. For example, a frontline team lead may have access limited to dashboards for their specific workstation or shift, while a quality manager may be granted broader visibility across multiple article categories or production sites. These access controls safeguard data confidentiality while maintaining operational relevance.

Figure 31 below presents an example of a dashboard layout, illustrating how key production and quality metrics can be visualized in a clear and actionable format. Additional guidance on dashboard creation and management is available in Azumuta's documentation, accessible via this link.

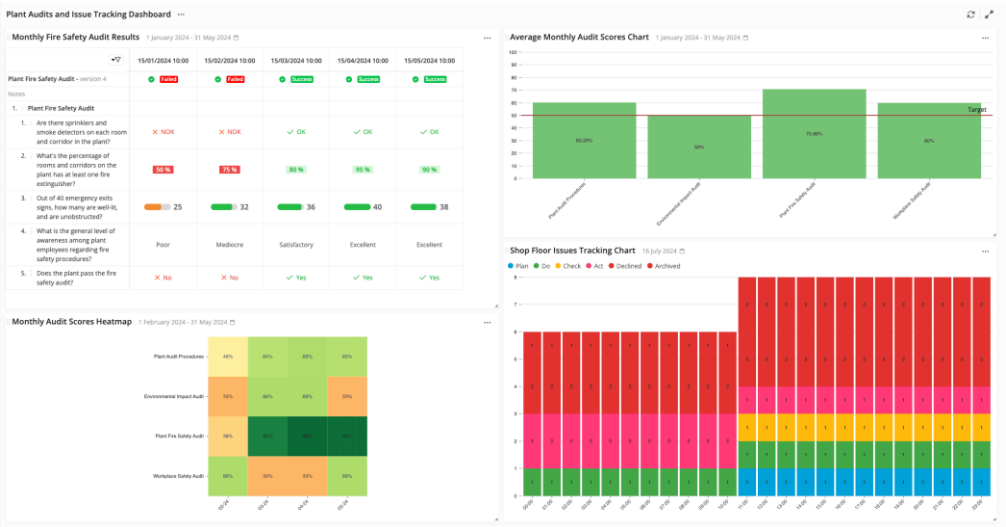

Figure 32: Examplary dashboard

5 Appendix – Research skill levels

This appendix contains research on skill levels. It includes studies on legal and ethical guidelines, examples of good and bad practices, as well as directives from the European Union related to ESCO.

5.1 Good and bad practices

Classifying work instructions based on operator skill level is essential for ensuring that tasks are assigned appropriately, enhancing efficiency and maintaining safety. This part examines the legal and ethical guidelines for this classification process and highlights good and bad practices. For both topics a table is made that outlines the good and bad practices within the assembly line and factory occupation.

5.1.1 Legal and ethical guidelines

Since capturing employee data is quite a sensitive topic, it is important to adhere to legal guidelines when it comes to the storage and capture of it. Not only that, but there are also other legal restrictions when it comes to classifying operators. Table 1 shows an overview of general good and practices when it comes to adhering to legal and ethical guidelines.

Table 2: General good and bad practices

Good	Bad
Organizations should follow established classification standards such as the European Skills, Competences, Qualifications and Occupations (ESCO) system and guidelines from the International Standard Classification of Occupations (ISCO). These standards ensure consistency and fairness in job classification.	Avoiding arbitrary or inconsistent classification of work instructions is crucial. Such practices can lead to legal challenges and undermine the credibility of the classification system
Classifications must not discriminate based on race, gender, age, disability, or religion. Compliance with laws such as the Employment Equality Directive (EED) is essential to avoid legal repercussions.	Failing to adhere to established classification standards or other related legal guidelines could result in non-compliance with set rules, thus resulting in repercussions.
Ensure compliance with GDPR requirements for the collection and storage of employee data.	Keeping the classification criteria and process vague may result in dissatisfaction among employees. The determinant factors should be clear.
The classification process should be fair and logical. All (new) employees should have equal opportunity to be classified based on their skills and experience.	Ignoring feedback from employees that either passed or failed could result in more inaccurate classification.

(*European Skills, Competences, Qualifications and Occupations ESCO Handbook ESCO Handbook European Skills, Competences, Qualifications and Occupations*, 2017).

(European Commission, 2023)

5.1.2 Do's & Don'ts

Table 2 and 3 outline the do's and don'ts for assigning, defining, and measuring skill levels. These provide general guidance on what to do and what to avoid, when implementing and distributing skill levels within an organization (How to Measure Knowledge Skills and Abilities Effectively, 2024).

Table 3: Skill level do's

Do's	Explanation
Objective criteria for assigning skill levels	Do not rely only on the opinions of team leaders. Include measurable data such as time registration, quality control results and performance metrics to ensure fair and accurate evaluations.
Regular reassessment of skill levels	Skills can improve or decline over time. Regular reassessments help ensure that skill levels reflect the current abilities of each employee.
Transparency to operators	Employees should know their current skill level, understand the reasons behind it and be aware of what they need to do to progress. This promotes fairness and motivation.
Structured list of skills	Clearly define which skills are needed for each skill level. This helps employees understand expectations and provides a clear path for development.
Role-based skill level	Different job roles require different skills. Make sure the criteria for assigning skill levels are tailored to the specific responsibilities of each role.
Standardized scheme	Use a consistent and clearly defined system to assess all employees. This ensures fairness and clarity. If the framework changes, communicate this clearly to all employees.
Use tests / certifications	Tests and certifications are useful tools to objectively verify whether an employee has mastered a specific skill. They complement practical experience and observation.
Use Skill Matrix	A skill matrix provides a visual overview of the skills and levels of all employees. It helps identify strengths, gaps and training needs across the team.
Use results as training	If certain skill gaps are identified, use that information to offer targeted training. This ensures that development efforts are aligned with actual needs.

Table 4: Skill Level don'ts

Don’ts	Explanations
Assign skill level on gut feeling	Making decisions based on intuition rather than data can lead to unfairness and inconsistency. It increases the risk of favouritism and undermines trust in the evaluation process.
Lack of feedback / Evaluation	Without regular feedback, employees may remain stuck at the same skill level. Constructive feedback is essential to help them understand how to improve and grow.
Self-assessment	Employees often misjudge their own abilities. They either overestimating or underestimating themselves. Self-assessment alone is not a reliable method for determining skill levels.
Ignoring soft skills	Focusing only on technical skills can give an incomplete picture. Soft skills such as communication, teamwork and adaptability are also critical for overall performance.
Too much trust in certifications	While certifications are helpful, they do not always reflect real-world expertise. Holding a certificate does not necessarily mean an employee has mastered the skill in practice.

Adhering to both ethical and legal guidelines is crucial when defining operator skill levels. By employing standardized methods that are applied equally to all operators, organizations can ensure that skill levels are determined in a fair and unbiased manner. This approach not only promotes compliance with regulations but also fosters a transparent and equitable work environment.

5.2 European Skills, Competences, Qualifications and Occupations

ESCO (European Skills, Competences, Qualifications and Occupations) is a multilingual system that classifies and organizes the skills, qualifications and job roles that are important across Europe its labour market and education systems.

It was created by the European Commission with several goals:

- To help education and training systems communicate more effectively with the labour market.
- To promote both job and geographic mobility within Europe.
- To make data about jobs and skills clearer and more accessible for stakeholders like employment services, educational institutions and statistical agencies.
- To make it easier for employers, educators and job seekers to exchange information across different languages and countries.
- To support policymaking by providing better tools for analysing real-time data on skills demand and supply using big data.

ESCO is organised through the usage of three pillars:

- The occupations pillar
- The knowledge, skills and competences pillar
- The qualifications pillar

These pillars are interlaced with each other as can be seen in the figure below.

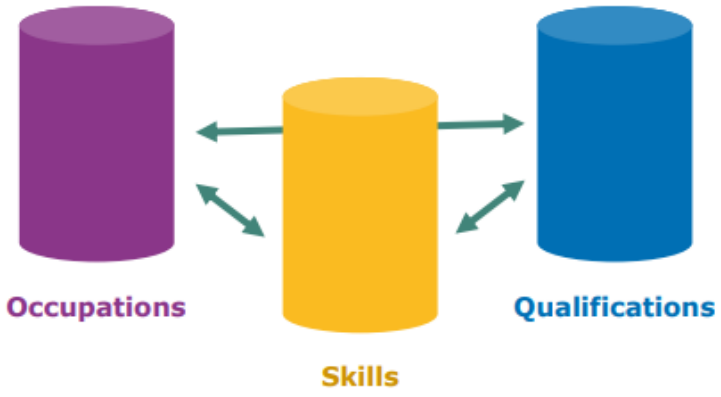

Figure 33: Correlation ESCO pillar structure

Employers can use ESCO to explore occupations and skills that are relevant to the labour market. However, it is also important to consider whether an occupation is subject to legal

requirements. Therefore, any laws regulating access to certain professions must also be considered.

Each ESCO occupation there are essential and optional concepts regarding skills, knowledge and other competences. Essentials are the ones that are always relevant within the occupation. Optional is there for specific employers, or different working contexts within the same occupation. As an example, a pilot should always be knowledgeable on how to contact the tower at the airport (essential) but might need optional knowledge when flying a different airplane (*European Skills, Competences, Qualifications and Occupations ESCO Handbook ESCO Handbook European Skills, Competences, Qualifications and Occupations*, 2017).

5.2.1 Differences between an occupation, a job or career

An occupation is a broader term that describes a category of work that involves similar tasks and requires a particular set of skills and training. It encompasses many different jobs that fall under the same professional field. For instance, the occupation 'teacher' includes jobs such as a software developer or college lecturer. These roles may vary by workplace but are united by common functions and qualifications.

A job refers to a specific position held by an individual within a company or organization. It includes duties, responsibilities and tasks assigned to that role. A job often has a title and is usually performed for a certain wage or salary. It can be part-time, full-time, temporary, or permanent. Examples include a front-end developer at a startup or calculus professor at the Technical University of Eindhoven (TU/e).

A career would be to enveloping term of the three. It shows the journey taken by an individual, possibly including multiple jobs within one or more occupations (*Career Services*, n.d.).

5.2.2 The concepts of knowledge, skills and competence

To define these concepts of knowledge, skills and competence the table below structures eight levels of these concepts. It outlines basic requirements needed that are specified per occupation or job.

Table 5: Levels of knowledge, skills and competence (Description of the Eight EQF Levels | Europass (n.d.))

EQF Level	Knowledge	Skills	Competence
Level 1	Knows simple, basic facts	Can do basic tasks with simple tools	Needs close supervision and works in a clearly structured setting
Level 2	Understands key facts in a specific area	Can solve routine problems with simple methods	Can work with some independence but still under guidance
Level 3	Knows main ideas and how things generally work in a field	Can choose and use basic tools to complete tasks and solve everyday problems	Takes responsibility for finishing tasks and adjusts to changes
Level 4	Has solid knowledge and some theory in a broad area	Can solve specific problems using a variety of methods	Manages own work and may supervise others in mostly predictable situations
Level 5	Has detailed knowledge and understands where the limits are	Can think creatively and solve unusual problems	Manages change and helps others improve, taking initiative when needed
Level 6	Understands complex ideas and principles in depth	Can apply advanced methods to deal with difficult or changing situations	Leads projects, makes key decisions, and helps others grow professionally
Level 7	Has deep, expert knowledge, often used for research or new ideas	Can solve new, complex problems and combine knowledge from different areas	Thinks strategically, leads in uncertain situations, and advances the profession
Level 8	Understands the newest and most complex knowledge in their field	Creates new knowledge or practices through innovation and research	Leads with authority, develops original ideas, and drives change at the highest level

With the previously outlined information regarding ESCO, legal and ethical guidelines and examples of good and bad practices in mind, the process of defining skill levels within a company can begin.