

Business advice

In collaboration with Supplydrive and TNO



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Table of Contents

1	Executive summary	2
2	Project goal and scope	3
2.1	Project goal	3
2.2	Project scope.....	3
3	Research question	4
4	Competitive analysis.....	5
4.1	Market position	5
4.2	Market landscape	5
4.3	Supplydrive its competitive edge	5
4.4	Strategic impact.....	5
4.5	Conclusion	6
5	Strategic alignment	7
6	Advice	8
7	Suggested follow-up projects:.....	10
7.1	Ethical and automated skill level assessment	10
7.2	Expand platform flexibility: an approach to client-centric integration	11
7.3	Alternative follow-up project options	12

1 Executive summary

This project, a collaboration between Supplydrive, DataBridge and TNO, was initiated as part of Supplydrive its work for the Nextgen initiative. The NxtGen initiative is an innovation program aimed at accelerating the development and adoption of smart industry technologies to strengthen the competitiveness and sustainability of the manufacturing sector. While Supplydrive does not currently use dynamic work instructions, they aim to expand their portfolio by offering this capability to future clients. The objective of the project was to research, design and deliver a reusable template in the form of a comprehensive explanation that enables companies to create dynamic work instructions within the Azumuta platform.

The project centres on enhancing operator performance by tailoring work instructions to individual skill levels. A 3D-printed bicycle assembly process served as the prototype use case, chosen to represent a generalizable assembly task suitable for demonstration and testing. The current infrastructure includes an existing connection between Azumuta and Supplydrive its ERP system MKG. However, no templates or instruction systems were in place. The desired state involves a fully integrated and dynamic solution where work instructions are personalized based on operator skill levels and linked to a centralized skill matrix. This allows for efficient and scalable instruction delivery across varying user profiles.

Key findings from the project highlight that effective digital work instructions must be clear, modular and visually supported. Instructions should be tailored to operator experience, with beginner, intermediate and expert formats. This customization improves productivity, reduces errors and supports continuous learning.

Operator skill levels were defined and measured using structured frameworks such as the European Skills, Competences, Qualifications and Occupations (ESCO) system and the European Qualifications Framework (EQF). These provide consistent and legally compliant methods for evaluating employees based on knowledge, skills and competence. Skill levels are then used to customize the instruction experience within Azumuta, whether linked to user accounts or workstations. The research followed the DOT Framework, combining methods such as interviews, testing, field studies and literature study. Results confirmed Azumuta as the most suitable platform due to its flexible structure, multimedia support and skill-based configuration options.

In conclusion, this project provides a validated and instructions for implementing dynamic work instructions using Azumuta. It equips Supplydrive with a scalable solution to offer their clients and lays the foundation for broader application across other products, industries and production environments.

2 Project goal and scope

2.1 Project goal

Supplydrive, a specialist in digital supply chain communication and system integration, is expanding into product assembly support. Through its involvement in the NxtGen initiative, the company identified an opportunity to offer clients dynamic digital work instructions tailored to varying operator skill levels.

This project addresses the lack of scalable methods for creating skill-based instructions. By defining and measuring operator expertise and integrating this with the Azumuta platform, the goal is to develop a and guide. This will help companies to generate adaptive work instructions.

2.2 Project scope

The full scope of what is included and excluded from the project is outlined in the table below.

Table 1: Project scope

In Scope	Out of Scope
Development of a prototype for dynamic work instructions tailored to skill levels	Full implementation into a live production environment
Usage of a skill matrix to define and categorize operator skill levels	Deployment of the system across different product lines or companies
Design of digital work instructions for a 3D-printed bicycle assembly	Development of instructions for products other than the bicycle
Definition and demonstration of three instruction tiers: beginner, intermediate and expert	Real-time data integration from live ERP or HR systems
Creation of a reusable template and guide for other companies to follow	Long-term monitoring or maintenance of instruction system
Research into best practices and legal/ethical compliance around skill classification	Actual operational integration with MKG or SCSN in Supplydrive its environment
Documentation of findings in the form of a advice	
Usability testing to refine the prototype	

3 Research question

The main research question: “How can Supplydrive create dynamic work instructions, tailored to operator skill levels, to improve the quality of service provided to clients?”

In conclusion, Supplydrive can support clients in creating dynamic work instructions by providing both a comprehensive implementation guide and technical integration services. Through its core expertise in managing data flows, such as connecting ERP systems with Azumuta, the recommended platform for digital work instructions, Supplydrive can lay the foundation for dynamic work instructions within operational processes.

The guide with principles outlines a high-level, step-by-step approach that organizations can follow to adopt digital work instructions effectively. It also provides practical guidance on how to differentiate instructions based on operator skill levels, enabling tailored workflows across the assembly process.

Azumuta enables a single work instruction to adapt to different operator skill levels by offering three distinct variants within the same process. This ensures that each operator receives guidance appropriate to their experience, which helps speed up production tasks. This not only enhances workforce adaptability but also results in improved productivity, reduces errors and supports continuous learning.

By combining the DataBridge-developed guide with principles with Supplydrive its system integration services, they can offer a complete and scalable solution to help assembly companies improve performance and quality through dynamic, skill-driven digital work instructions.

4 Competitive analysis

This part yields the evaluations of the competitive landscape and how the project positions the organization.

4.1 Market position

Supplydrive has established itself as a specialist in data exchange and supply chain integration, with a strong focus on its flagship solution: the Smart Connected Supplier Network (SCSN). This expertise has positioned the company as an enabler of seamless digital communication between manufacturers, suppliers and their systems.

4.2 Market landscape

The current market features a wide range of providers offering solutions for digital work instructions, operator support and production-floor digitization. These tools differ significantly in terms of complexity, ease of use and their ability to integrate with broader digital ecosystems. Although many companies adopt such solutions independently, achieving seamless integration with existing ERP systems and supply chain networks continues to pose a challenge for most organizations.

4.3 Supplydrive its competitive edge

Supplydrive positions itself as a relatively unique player in the market through its ability to deeply integrate production tools with ERP and supply chain systems. This ensures seamless connectivity across platforms and creates a unified digital environment. In a neutral advisory role, Supplydrive supports clients in selecting the most appropriate work instruction platforms based on specific operational requirements. In addition to platform selection, they can design data flows that connect these tools with existing infrastructure, enabling comprehensive digital traceability throughout the production process.

This project also expands Supplydrive its service portfolio by introducing expertise in dynamic work instructions and guidance that adapts to the skill levels of individual operators. This capability not only strengthens the digital foundation of production environments but also improves assembly performance by delivering intelligent support on the work floor.

4.4 Strategic impact

By incorporating expertise in dynamic work instructions, Supplydrive strengthens its position as a comprehensive partner in digital transformation. Rather than developing its own instruction software, the company concentrates on enabling the implementation of

proven third-party solutions. This strategy ensures efficient deployment and delivers results that align with the actual skill levels of operators. In doing so, Supplydrive moves beyond a purely advisory or supportive role in managing data flows, positioning itself as a valuable partner in enhancing operator performance within assembly environments.

4.5 Conclusion

With this strategic expansion, Supplydrive shifts its role in the market from a technical integrator to a strategic enabler within assembly environments. The combination of expertise in managing data flows and advising on work instruction systems positions the company strongly to support manufacturers looking for practical, scalable solutions in today's evolving industrial landscape.

5 Strategic alignment

This project is strategically aligned with Supplydrive its broader objective to expand its role in digital supply chain integration by entering the domain of product assembly support. Although Supplydrive currently focuses on streamlining communication and data exchange between companies through systems like SCSN and ERP integration, the company recognizes an opportunity to extend its expertise into adjacent services that enhance the efficiency and intelligence of factory operations.

One of Supplydrive its key goals is to diversify and strengthen its service portfolio by offering scalable, high-value digital tools that address real-world challenges in manufacturing environments. The growing interest in smart industry solutions, including dynamic work instructions and operator-centric process optimization, aligns directly with this direction. By developing a prototype and template for dynamic work instructions tailored to operator skill levels, Supplydrive not only responds to emerging client demands but also positions itself as an innovative digital partner for manufacturers.

The project also supports Supplydrive its commitment to interoperability and integration, a cornerstone of its strategy. The use of Azumuta, MKG and SCSN in this prototype reflects the company's vision of building connected ecosystems where data flows seamlessly across platforms. Integrating instruction systems with ERP and supplier networks enhances traceability, improves workforce adaptability and contributes to the overall agility of the production process.

Furthermore, this project strengthens Supplydrive its long-term competitiveness. As manufacturing clients increasingly seek modular and personalized solutions to support their operations, the ability to offer dynamic work instructions as part of a broader digital infrastructure provides a significant differentiator in the market. This capability will allow Supplydrive to address a wider client base while reinforcing its reputation as a forward-thinking, integration-driven company.

In summary, the project contributes directly to Supplydrive strategic goals by broadening its offering, leveraging its core integration capabilities and responding to industry-wide shifts toward intelligent and adaptive manufacturing systems.

6 Advice

This chapter presents a set of strategic recommendations to guide Supplydrive in the further development and implementation of dynamic work instructions following the successful completion of the current project. These recommendations are based on the research, prototype development and strategic analysis conducted throughout the project and are intended to support Supplydrive in strengthening its position as a digital integration partner in the manufacturing sector.

To improve user engagement and comprehension, particularly for less experienced operators, Supplydrive is advised to further enhance the visual and interactive elements of digital work instructions. Expanding the use of multimedia such as videos, annotated images and 3D models can significantly increase clarity and reduce the likelihood of errors. Although Azumuta currently does not support AR or VR technologies, Supplydrive should monitor developments in this area and consider future integration of immersive tools to strengthen training environments and support advanced operator learning.

As Supplydrive expands its services and integrates more data flows between platforms such as Azumuta and MKG, it becomes increasingly important to ensure robust data governance. This includes maintaining compliance with data privacy regulations, ensuring secure data exchange and clearly defining data ownership. While this project focused primarily on technical integration, future initiatives should place greater emphasis on data governance frameworks to support scalability and legal compliance.

While Azumuta has proven to be a powerful and flexible platform for dynamic work instructions, it may not be the best fit for all clients use cases. For simpler implementations or clients with limited digital maturity, Azumuta's complexity could pose a barrier. Supplydrive is therefore advised to regularly assess whether Azumuta remains the most appropriate solution for each client and to remain open to alternative platforms that may offer a better fit in terms of usability, cost or integration capabilities.

To support this, Supplydrive should maintain a curated portfolio of digital work instruction platforms beyond Azumuta, further collaborating with TNO. This could include tools such as Manual.to and Visual Factory, which may offer more lightweight or cost-effective solutions. By doing so, Supplydrive can position itself as a platform-agnostic advisor capable of delivering tailored solutions that align with each client's operational goals and digital capabilities.

Supplydrive is also encouraged to actively support clients in transitioning from static PDF-based work instructions to dynamic digital formats that can be tailored to operator skill

levels. This transition is essential for improving operational efficiency, reducing onboarding time and enhancing instruction clarity across varying levels of operator experience.

Additionally, platforms should be evaluated for their ability to integrate with ERP systems such as MKG, HR tools and quality management systems to ensure seamless data flow and traceability. By taking a proactive, flexible and client-centric approach to this transition, Supplydrive can strengthen its role as a strategic enabler in the smart manufacturing ecosystem and further differentiate itself as a forward-thinking integration partner.

Initially, the project aimed to deliver a fill-in template within Azumuta that companies could use to create their own digital work instructions. However, this approach proved to be insufficient, as a blank template still required companies to determine much of the process independently. In response, the concept evolved into a principle-based guide titled 'Principles of making digital work instructions using Azumuta'.

This guide provides a structured, step-by-step approach that not only explains how to build digital work instructions but also why each step is important. It includes guidance on integrating skill levels, structuring content and establishing connections between ERP systems and Azumuta. Supplydrive is advised to continue developing and refining this guide as a core component of its service offering, using it to support clients in building effective, scalable and skill-based instruction systems.

7 Suggested follow-up projects:

7.1 Ethical and automated skill level assessment

To build upon the outcomes of this project, a follow-up initiative is recommended to investigate the feasibility of automating the assessment of operator skill levels through performance data, while ensuring strict compliance with ethical guidelines and GDPR regulations. Currently, the evaluation of assembly workers often relies on manual supervision and subjective assessment, which can be time-consuming, inconsistent and difficult to scale. Automating this process has the potential to improve accuracy, reduce management workload and enable more responsive adjustments to instruction levels.

The proposed follow-up project should focus on:

- Determining which performance-related data can be ethically and legally captured and stored in compliance with GDPR.
- Identifying key performance indicators (e.g. task duration, frequency of errors, need for corrections) that can serve as reliable input for skill classification.
- Developing an evaluation logic that interprets this data in a transparent, explainable and traceable way.
- Outlining the necessary system architecture and integration with platforms such as Azumuta and MKG.

In preparation for this work, it is advised that mock data sets be developed and used during early phases of prototyping. These data sets can simulate realistic operator performance scenarios, enabling technical teams to:

- Test algorithmic logic safely, without involving real employee data.
- Validate different classification models and thresholds.
- Refine the user experience before deploying in live environments.

Expected benefits of this project include:

- Reduction in manual skill tracking by team leads or supervisors.
- Improved personalization of work instructions based on real-time capability indicators.
- Better alignment of training initiatives with actual performance trends.
- Reinforcement of Supplydrive's position as a provider of scalable, intelligent digital solutions.

It is recommended that this project involve early collaboration with legal and HR advisors, along with client-side stakeholders, to ensure the proposed system aligns with internal data policies and industry standards for workforce management.

7.2 Expand platform flexibility: an approach to client-centric integration

7.2.1 Context and Rationale

The successful implementation of dynamic work instructions using Azumuta has demonstrated the platform's strength in supporting skill-based instruction delivery. However, as Supplydrive aims to scale this offering across a broader client base, it is essential to recognize that Azumuta may not be the optimal solution for every use case. Clients vary in terms of digital maturity, operational complexity, budget constraints and integration needs. Therefore, adopting a platform-agnostic approach will allow Supplydrive to remain flexible, responsive and competitive.

7.2.2 Strategic Recommendation

Supplydrive should position itself not as a vendor of a single platform, but as a trusted advisor and integration specialist capable of tailoring solutions to each client's unique context. This approach enhances credibility, expands market reach and reduces dependency on any single technology provider.

7.2.3 Proposed Actions

7.2.3.1 *Develop a platform evaluation tool*

Create a standardized decision-making tool that evaluates digital work instruction platforms based on key criteria such as:

- Integration capabilities with ERP (e.g., MKG), MES and HR systems
- Support for skill matrix and operator-level customization
- Multimedia and AR/VR readiness
- Usability and learning curve
- Licensing models and scalability
- Data governance and GDPR compliance

This tool can be used internally and shared with clients during the advisory phase to support transparent, evidence-based platform selection.

7.2.3.2 Maintain a Curated Portfolio of Platforms

In addition to Azumuta, Supplydrive should maintain technical knowledge and demo environments for alternative platforms such as:

- Manual.to – optimized for rapid deployment and ease of use
- Visual Factory – strong in visual workflows and skill tracking
- Arkite – offers advanced AR-based operator guidance

This curated portfolio allows Supplydrive to offer tailored solutions that align with the complexity and scale of each client's operations.

7.2.3.3 Offer Platform-Agnostic Integration Services

Leverage Supplydrive's core strength in data flow management to offer middleware and integration services that connect any instruction platform to backend systems. This includes:

- ERP integration (e.g., MKG)
- Skill matrix synchronization
- Real-time data feedback loops
- Product passport and traceability features

This reinforces Supplydrive's value proposition as a systems integrator and digital transformation partner.

7.3 Alternative follow-up project options

In addition to the proposed research into automated skill-level assessment, the following three projects are suggested as alternative directions for future development. While both are valuable from an operational and strategic perspective, they may be less suitable for Fontys student teams, as they align less clearly with the typical learning outcomes related to Business & IT integration, research and stakeholder engagement.

7.3.1 Real-time feedback loop for instruction quality

This project would explore the integration of a lightweight feedback system into dynamic work instructions, enabling operators to rate or comment on the clarity and usefulness of instructions after completing a task. Such functionality would support iterative content improvement and empower users to influence instruction design. However, as the scope is

more focused on interface usability and minor backend processing, it may not provide the strategic depth or complexity often expected in Fontys semester projects.

7.3.2 Instruction lifecycle management system

This initiative would involve designing a system for version control, instruction approval workflows and audit trails. The objective is to ensure consistent quality and traceability of work instructions as they evolve. While this has clear operational relevance, the project centers on process documentation and technical implementation, which may limit the range of business and stakeholder interaction required for student learning goals.

Both projects could be valuable as internal development tracks or implemented with support from external IT professionals but are recommended with consideration of the limited fit for academic project frameworks involving Fontys students.

7.3.3 Pre-assignment of skill levels to production orders

This project would focus on improving production planning by attaching a required skill level to each production order before it is dispatched to the production floor. The system would determine operator eligibility based on predefined criteria, such as accumulated flight hours, experience with similar assemblies, or possession of specific certifications. The objective is to ensure that only qualified personnel can view or initiate certain tasks, increasing efficiency and reducing errors due to underqualification.

While this solution strengthens operational control and workforce alignment, the technical focus lies in rule-based logic and backend and ERP integration with existing KPI and skill matrix systems. As a result, it may offer limited opportunities for broader business analysis or stakeholder-driven research, potentially making it less suitable as a student project.