SKILL-UP BATTERY CIRCULARITY

Digital Product Passport (DPP) training to support battery industry response to the EU Circular Economy Action Plan

PROJECT PARTNERS

UCRS – UddannelsesCenter Ringkøbing-Skjern(Coordinator)

EWF – European Federation for welding, joining and cutting

FAN3D – Favoritanswer – Consultoria Em Engenharia, LDA

AIMEN – Asociacion De Investigacion Metalurgica del Noroeste

ASA – Automotive Skills Alliance

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Executive Summary

The Digital Product Passport (DPP) initiative, undertaken by the Project PIECE consortium, focuses on developing and implementing effective training strategies to support the adoption of Digital Product Passports in the battery sector.

This report seeks to identify the current engagement levels, barriers, training needs, and future expectations related to DPP implementation, with a particular emphasis on the battery industry. The primary objective is to facilitate DPP adoption through targeted educational initiatives, thereby enhancing product traceability, sustainability, and regulatory compliance across various industries.

To achieve these goals, the project conducted two comprehensive surveys targeting both training institutions and industry stakeholders. The survey for training institutions evaluated the current state and expectations of DPP-related training, while the industry survey explored operational challenges, training needs, and future perspectives on DPPs. Together, these surveys provide critical insights that will guide the development of effective training programs and support the broader implementation of DPPs.

The survey data were collected from February 29th, 2024, till April 2nd, 2024.

Key Initiatives and Findings

1. **Initial Consortium Activities:**

   The project commenced with an online meeting where consortium members discussed project intricacies, established a cohesive visual identity, and began collaborative efforts to design the inaugural survey. This survey is intended to assess existing knowledge levels about the Battery Digital Product Passport among industry and educational stakeholders.

2. **Survey Development and Industry Needs Assessment:**

   The consortium's first milestone involves the development of tailored surveys for both industries and Vocational Education and Training (VET) providers. These surveys are critical in identifying the specific training needs and challenges faced by the battery sector in adopting DPPs.

3. **Surveys and Data Collection:**

   Two comprehensive surveys were conducted, targeting both training institutions and industry stakeholders, to assess current engagement levels, barriers, training needs, and future expectations related to DPP implementation.

4. **Significant Training Gaps Identification**:

   Early survey results indicate that most educational institutions currently lack specific training programs focused on DPPs, revealing a substantial need for capacity building to prepare these institutions for the emerging industry demands.

5. **Varied Industry Engagement**:

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Engagement levels with DPPs vary widely across sectors. While digital technology and IT sectors are more proactive, other sectors, such as manufacturing, show hesitation due to concerns about the complexity and cost-benefit ratio of DPP implementation.

6. **Core Training Needs**:

There is broad agreement on the need for training in areas like regulatory compliance, environmental impact assessment, and best practices for DPP implementation. However, there is a need for clearer communication and targeted training on advanced topics such as blockchain technology.

7. **Implementation Barriers**:

Key barriers to DPP adoption include the complexity of implementation, resource constraints, and varying levels of understanding of customer expectations. Addressing these barriers is essential for wider adoption.

8. **Preferred Training Formats**:

Online courses, webinars, and customized on-site training are the most preferred formats, indicating a strong demand for flexible and accessible training solutions.

9. **Future Expectations**:

There is a general expectation that DPPs will become standard practice across industries, with a strong focus on meeting regulatory requirements and ensuring cost-effectiveness.

10. **Roundtable Discussion:**

An online roundtable was organized with external experts from both education and industry sectors to validate the survey results. The discussion highlighted the need for increased awareness of DPPs, strategies to mitigate implementation costs, the importance of technical expertise, and the benefits of real-world examples. This feedback will inform the development of training curricula and materials.

Next Steps

The insights from this report will guide the next phases of the Project PIECE initiative, helping to shape training programs that effectively support the adoption of DPPs across various sectors. By addressing identified gaps and leveraging existing strengths, the project aims to enhance the overall sustainability and regulatory compliance within the industry, ensuring that the battery sector is well-equipped to meet the EU's Circular Economy goals.

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Glossary

Term / Abbreviation	Description	Definition
DPP	Digital Product Passport	A Digital Product Passport (DPP) is a digital record that contains detailed information about a product's lifecycle, including its materials, manufacturing process, and end-of-life handling. It aims to enhance traceability, sustainability, and compliance within the supply chain.
VET	Vocational Education and Training	Vocational Education and Training (VET) ensures skills development in a wide range of occupational fields, through school-based and work-based learning. It plays a key role in ensuring lower school dropout rates and facilitates the school-to-work transition.

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Introduction

Definition and Concept of Digital Product Passport

A Digital Product Passport (DPP) is defined as a comprehensive data set associated with a product, accessible electronically through a data carrier such as a QR code. This data set includes detailed information about the product's origin, composition, repair and disassembly possibilities, and recycling or disposal methods. The European Commission (EC) envisions DPPs to facilitate the collection, processing, and sharing of product-related information among supply chain businesses, authorities, and consumers (Adisorn et al., 2021). The DPP concept is a response to the increasing need for transparent and detailed product information to support sustainable practices. By encapsulating a product's lifecycle data, DPPs aim to enhance traceability and promote circular economy strategies. This includes predictive maintenance, repair, remanufacturing, and recycling, thereby informing stakeholders about the sustainability characteristics of products and materials (Adisorn et al., 2021).

In the contemporary digital and environmental landscape, DPPs are critically important for several reasons. Firstly, they align with the global sustainability goals outlined in the United Nations' Agenda 2030 (United Nations, 2015) and the European Union's Green Deal (EU, 2019) and Circular Economy Action Plan (EU, 2020). These frameworks emphasize the need for sustainable development indicators and comprehensive data to drive policy action and measure progress.

DPPs facilitate the transition to a circular economy by ensuring that all relevant product information is readily available to stakeholders. This transparency supports informed decision-making regarding the design, production, usage, and disposal of products, thereby reducing environmental impacts. For instance, by providing detailed information on the repairability and recyclability of products, DPPs can significantly reduce waste and promote resource efficiency (Adisorn et al., 2021).

Digital Product Passports in the Battery Sector

The concept of a DPP is particularly relevant in the battery sector. As the European Commission pushes for more sustainable and circular economy practices, the implementation of DPPs for batteries is gaining traction. These passports aim to encapsulate comprehensive data throughout the lifecycle of a battery, supporting sustainability and circularity efforts (Berger et al., 2021).

The new regulations are coming in the battery sector to implement DPP, according to the EU Commission, these new regulations will be mandatory for batteries (European Commission, 2020b). With these regulations it is expected that transparency and traceability will be improved throughout the battery lifecycle. This regulation covers all batteries with capacities above 2 kWh, including portable, automotive, electric vehicle, and industrial batteries (European Commission, 2021). Additionally, the Eco-design for Sustainable Products Regulation (ESPR) sets the foundation for DPPs by establishing the requirements for product-specific data that must be accessible via electronic means. This includes information on product composition, reparability, reusability, and recyclability, as well as environmental impact indicators such as carbon footprint (European Commission, 2023).

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Besides the national and regional level standards, there are also international standards for consistent implementation and interoperability of DPPs across different regions and industries The International Organization for Standardization (ISO) has developed several relevant standards that are essential for the deployment of DPPs. For example, ISO 14040 Series, standards, provide guidelines for life cycle assessment (LCA) and are crucial for documenting and assessing the environmental impacts of products throughout their lifecycle, provides information is integral to the data collected and managed by DPPs (European Commission, 2020). ISO 9001, standard focuses on quality management systems, helps in maintaining the quality and reliability of the data recorded in DPPs. Finally, ISO 14067, principles and guidelines for quantifying and communicating the carbon footprint of products, supports the inclusion of detailed environmental impact data in DPPs, promoting transparency and sustainability.

Advantages of Digital Product Passport

The implementation of DPPs offers several significant advantages across various industries, particularly in enhancing sustainability, transparency, and efficiency in product lifecycle management.

Promotion of Circular Economy Practices

DPPs are instrumental in promoting circular economy practices by facilitating the reuse, remanufacturing, and recycling of products and materials. By providing detailed information on a product's composition and lifecycle, DPPs enable more efficient resource management and reduce waste. For instance, in the context of EV batteries, DPPs can support second-life applications, where batteries are repurposed for less demanding uses after their initial automotive application, thus extending their useful life and reducing the need for new raw materials (European Commission, 2020). This not only conserves resources but also minimizes environmental impact by reducing waste and emissions associated with battery disposal and production.

Improved Product Lifecycle Management

DPPs enhance product lifecycle management by offering detailed insights into the performance, maintenance history, and potential end-of-life options for products. This information is valuable for manufacturers, service providers, and consumers, as it helps optimize the use and longevity of products. For instance, in the automotive industry, DPPs can provide real-time data on battery health, maintenance needs, and performance metrics, enabling proactive maintenance and efficient resource allocation (Götz et al., 2022). This can lead to significant cost savings and improved product reliability.

Barriers of Digital Product Passports

Despite DPP contributes to sustainability, circular economy and so on, there are some barriers in front of the DPP deployment in the relevance sector. These challenges include technical, data privacy, and organizational domains, each with its own set of complexities.

Technical Barriers

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Integrating and managing extensive data throughout the product lifecycle is a significant technical challenge for DPPs. Ensuring data accuracy, consistency, and accessibility across various stakeholders and systems requires robust technological infrastructure and advanced data management techniques (Berger et al., 2021). The complexity increases when considering the need for real-time data tracking and secure data sharing across supply chains (Götz et al., 2022). Additionally, ensuring interoperability between different systems and platforms is critical for the seamless operation of DPPs. This involves standardizing data formats, communication protocols, and ensuring compatibility with existing information systems. Lack of interoperability can lead to data silos and hinder the efficient flow of information (European Commission, 2023). Protecting the vast amount of data collected and stored by DPPs from unauthorized access and breaches is another significant challenge. Implementing robust encryption methods, access control mechanisms, and ensuring compliance with data protection regulations like GDPR is essential to safeguard sensitive information (Heinrich & Lang, 2019). Balancing transparency with data privacy laws while ensuring the security of the data is crucial (Jansen et al., 2023).

Data Privacy

Balancing the need for transparency with the protection of intellectual property (IP) and commercially sensitive information is another delicate issue. Companies are often concerned about disclosing too much information that could potentially harm their competitive advantage. Defining clear criteria for what information should be included in DPPs and who has access to it is essential to address these concerns (Plociennik et al., 2022). Clearly defining the legal responsibilities and liabilities of different stakeholders involved in the DPP ecosystem is crucial. This includes determining who is responsible for the accuracy of the data, how updates are managed, and what happens in case of data breaches or inaccuracies. Addressing these legal issues requires a comprehensive framework that outlines the roles and responsibilities of each participant in the DPP system (European Commission, 2023).

Organizational and Operational Challenges

Successful implementation of DPPs requires the active engagement and collaboration of various stakeholders, including manufacturers, suppliers, regulators, and consumers. Coordinating efforts and aligning interests across these diverse groups can be challenging. Establishing clear communication channels and collaborative platforms is necessary to ensure all parties are aligned and working towards common goals (Götz et al., 2022). Implementing and maintaining DPP systems can be costly, especially for small and medium-sized enterprises (SMEs). Developing economic incentives and support mechanisms to help businesses, particularly SMEs, manage these costs is crucial. Without proper incentives, companies may be reluctant to invest in the necessary infrastructure and processes for DPPs (Circular Economy Initiative Deutschland, 2020). Furthermore, the successful deployment of DPPs requires a skilled workforce proficient in digital technologies and data management. There is a potential skill shortage in sectors like waste management and construction, which could hinder the implementation and maintenance of DPP systems. Investing in training and capacity building is essential to address this challenge and ensure that there are enough qualified professionals to support the DPP ecosystem (Götz et al., 2022).

The barriers can be addressed with adequate training and education programs. At this stage of DPP deployment, management-level training would be useful to understand the new implementation and regulations, and to make decisions that strengthen their position in market competition. By investing in capacity building and continuous professional development, organizations can ensure that their employees are well-equipped to handle the

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technological and regulatory aspects of DPPs (Götz et al., 2022). Such educational efforts not only enhance the overall competence of the workforce but also promote a culture of continuous improvement and innovation, which is essential for the successful integration of DPPs into existing business practices. The training requirements of the battery sector were identified through surveys and online roundtables. The outcomes of these needs analysis studies are given in the following chapters.

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Methodology

To achieve the survey's objectives, a structured, multi-phase approach was employed, involving two surveys: one focusing on industry and the other on educational institutions.

Stage 1: Desk Research

The first stage involved comprehensive desk research, conducted by all project partners. This phase focused on reviewing existing literature, best practices, and relevant data concerning the current state of Digital Product Passports, particularly in the battery sector. The desk research provided a foundational understanding of the existing challenges, opportunities, and educational gaps, guiding the subsequent stages of the needs analysis.

Stage 2: Surveys

Building on the insights from the desk research, two targeted surveys were developed: one for industry stakeholders and another for educational institutions. These surveys aimed to assess the current engagement with DPPs, identify barriers to implementation, determine training needs, and understand future expectations.

- **Industry Survey:** This survey targeted manufacturing companies, research and development organizations, service providers, digital technology providers, and IT companies. The survey questions were designed to capture the opinions and experiences of these stakeholders, with a focus on the applications and challenges associated with DPPs in various sectors, especially the battery industry.

- **Education Survey:** The education-focused survey targeted training institutions, vocational education and training (VET) providers, and other educational stakeholders. It aimed to evaluate the current state of DPP-related training, the adequacy of existing resources, and the methodologies employed in teaching DPP concepts.

Objectives of the Survey

The primary objectives of the survey were to:

1. Assess the current engagement levels with DPPs across different sectors.
2. Identify the main barriers to DPP implementation.
3. Determine the training and educational needs for effective DPP adoption.
4. Identify preferred training formats.
5. Understand the future expectations of entities regarding DPPs.
6. Gather insights to inform targeted recommendations for enhancing DPP adoption.

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The surveys were disseminated between February 29th and April 2nd, 2024, using a predominantly quantitative data collection method. Respondents participated voluntarily and anonymously, with the option to disclose their names and contact information. The distribution leveraged the partners' existing industrial and professional networks to ensure broad reach while maintaining privacy. All data collected was handled in compliance with the General Data Protection Regulation (GDPR) 2018.

Stage 3: Roundtable Discussion

The final stage involved an online roundtable discussion, which brought together an expert panel comprising external representatives from both the education and industry sectors. The purpose of the roundtable was to validate and adjust the results obtained from the previous stages of desk research and surveys. Utilizing interactive tools like Mentimeter, the roundtable facilitated a deeper analysis of the survey findings, allowing for real-time feedback and discussion. This collaborative approach ensured that the final insights were robust, well-rounded, and reflective of the actual needs of the industry and educational sectors.

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Training Institutions Survey Report Analysis

Questions 1 to 5 - Sample characterization and DPP implementation (training survey)

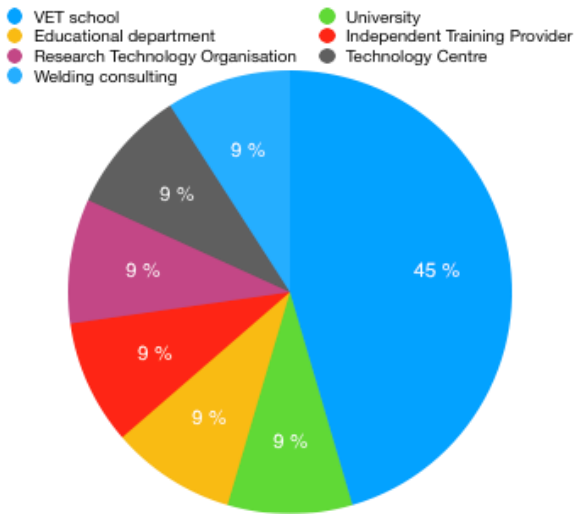
The following section includes analysis of questions 1 to 6. These questions are related to sample characterization; therefore, they are analyzed together.

Questions:

1. Name of the Training Center - confidential
2. Country
3. Your e-mail (optional) - confidential
4. To which type of organisation do you belong?
5. Please select your main position in the center
6. Has your organization ever delivered any training on Digital product passport (DPP)?

Entity Descriptions (training survey)

FIGURE 1 - TYPES OF ENTITIES PARTICIPATING IN SURVEY.



- **Entity 1**: An educational institution specializing in vocational education and training (VET) located in Denmark. The respondent is a department manager who has not implemented Digital Process Pathways (DPP) before.

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- **Entity 2**: A technology centre based in Portugal. The respondent is an owner or legal representative who has not implemented DPP before.
- **Entity 3**: Another VET institution from Denmark. The respondent, a department manager, has not previously implemented DPP.
- **Entity 4**: Yet another VET institution from Denmark. This entity also has a department manager who has not implemented DPP before.
- **Entity 5**: A consulting firm specializing in welding, located in North Macedonia. The respondent, an owner or legal representative, has not implemented DPP before.
- **Entity 6**: A research technology organization based in Spain. The respondent is a team manager who has not implemented DPP before.
- **Entity 7**: An independent training provider from Romania. The respondent is a department manager who has not implemented DPP before.
- **Entity 8**: An educational department in Denmark. The respondent is a training manager who has not implemented DPP before.
- **Entity 9**: A VET institution in Portugal. The respondent, a team manager, has not implemented DPP before.
- **Entity 10**: Another VET institution in Portugal. The respondent is a department manager who has not implemented DPP before.
- **Entity 11**: A university located in Italy. The respondent is a teacher or trainer who has not implemented DPP before.
- **Entity 12**: A VET institution in Finland. The respondent is a teacher or trainer who has previously implemented DPP.
- **Entity 13**: A university in Portugal. The respondent is a researcher who has not implemented DPP before.
- **Entity 14**: Another VET institution in Portugal. The respondent is a teacher or trainer who has not implemented DPP before.

Conclusion

Location: The entities are spread across Denmark, Portugal, North Macedonia, Spain, Romania, Italy, and Finland.

Types of Organizations: The entities include VET schools, technology centres, consulting firms, research technology organizations, training providers, educational departments, and universities.

Roles of Respondents: Respondents hold various roles including department managers, owners/legal representatives, team managers, training managers, teachers/trainers, and researchers.

DPP Implementation: The majority of respondents have not implemented Digital Process Pathways before, with only one respondent having previous experience with DPP implementation.

Overview of the Respondent Demographics (training survey)

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The survey received responses from 14 entities representing various types of organizations involved in the battery industry. The respondents included:

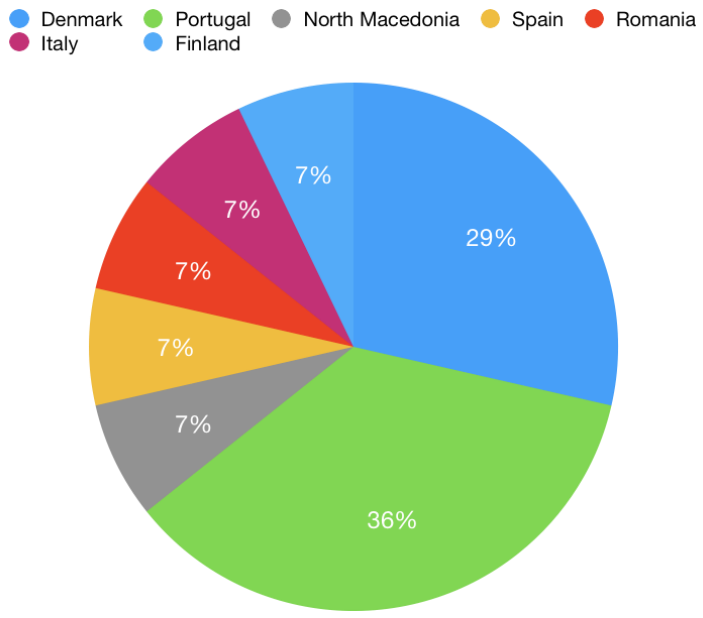
- **VET Schools:** Entities 1, 3, 4, 9, 10, 12, 14
- **Technology Centres:** Entities 2, 6
- **Universities:** Entities 11, 13
- **Independent Training Provider:** Entity 7
- **Welding Consulting:** Entity 5
- **Educational Department:** Entity 8

This diverse representation ensured a comprehensive understanding of the different perspectives and needs.

Geographic Distribution of Entities (training survey)

Geographic Distribution (Country) The respondents were from a variety of European countries, indicating a broad geographical interest in the Digital Product Passport (DPP) initiative. The countries represented include:

FIGURE 2 - GEOGRAPHIC DISTRIBUTION OF ENTITIES



- Denmark: 4
- Portugal: 5
- North Macedonia: 1

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- Spain: 1
- Romania: 1
- Italy: 1
- Finland: 1

Conclusion

The entities are distributed across 7 countries, with Denmark and Portugal having the highest number of participating organizations (4 and 5 respectively). The remaining countries each have one participating entity.

Breakdown of the Types of Participating Organizations by Country (training survey)

TABLE 1 - COUNTRY / ENTITY BREAKDOWN

Country	Number of Entities	Entity Types
Denmark	4	3 VET schools, 1 educational department
Portugal	5	3 VET schools, 1 technology centre, 1 university
North Macedonia	1	1 welding consulting firm
Spain	1	1 research technology organisation
Romania	1	1 independent training provider
Italy	1	1 university
Finland	1	1 VET school

Conclusion

The majority of participating organizations are VET schools (7). Other types of organizations include technology centres, consulting firms, research technology organisations, training providers, educational departments, and universities. Each type of organization is represented by at least one entity in the survey.

Summary of Main Positions Held by Respondents (training survey)

TABLE 2 - SUMMARY OF MAIN POSITIONS HELD BY RESPONDENTS

Role	Nr. of Respondents	Locations	Number of Organizations
Department Managers	5	Denmark (3), Portugal (2)	VET school (4), Independent Training Provider (1)
Owners/Legal Representatives/Directors	2	Portugal, North Macedonia	Technology Centre (1), Welding consulting (1)
Team Managers	2	Spain, Portugal	Research Technology Organisation (1), VET school (1)

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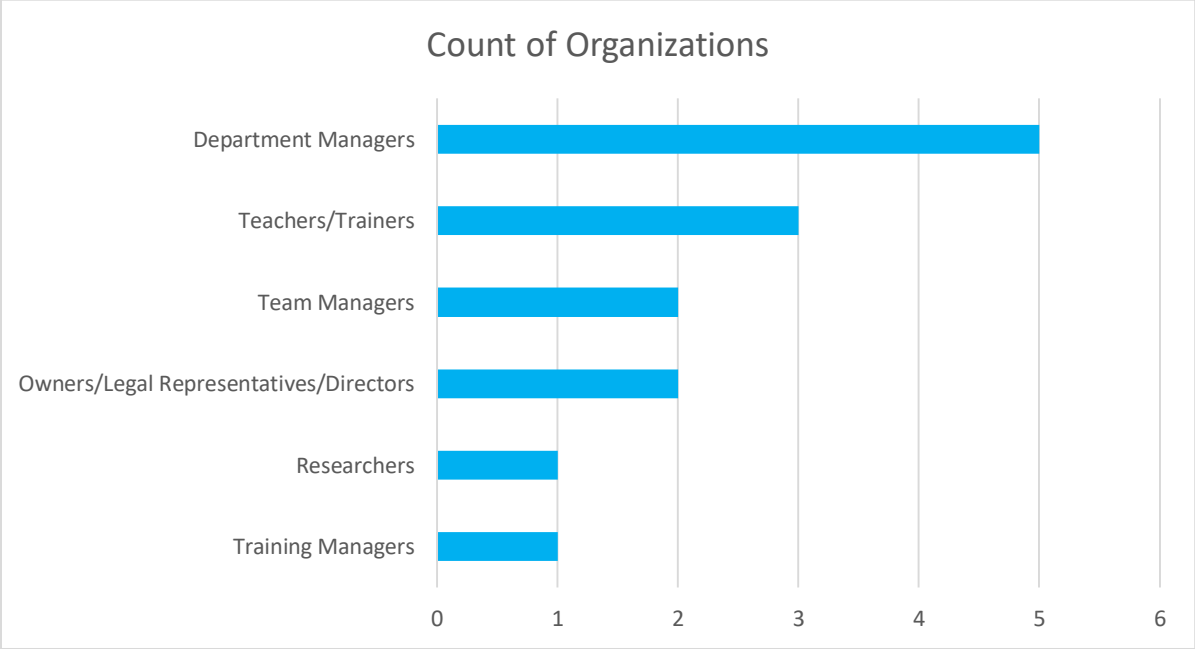
Training Managers	1	Denmark	Educational department (1)
Teachers/Trainers	3	Italy, Finland, Portugal	University (1)
Researchers	1	Portugal	University (1)

FIGURE 3 - NUMBER OF ORGANIZATIONS BY ROLE



Analysis of How Roles Within Centers Influence Perspectives on DPP Training

Department Managers

Influence on Perspective: Department managers are often directly involved in the implementation of training programs and policies within their departments. Their perspective on DPP training is likely shaped by practical considerations such as resource allocation, staff training, and curriculum integration.

Potential Perspective: They might be cautious about implementing new training protocols like DPP without clear evidence of benefits, given their responsibility for department performance.

Owners/Legal Representatives/Directors

Influence on Perspective: As the highest decision-makers, these respondents likely focus on the strategic benefits and financial implications of implementing DPP training.

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Potential Perspective: They might evaluate DPP training in terms of return on investment, overall organizational benefit, and alignment with long-term goals.

Team Managers

Influence on Perspective: Team managers oversee specific groups or projects, making them concerned with the operational efficiency and effectiveness of their teams.

Potential Perspective: They may view DPP training as a tool to enhance team performance and productivity, provided it does not disrupt ongoing projects.

Training Managers

Influence on Perspective: Training managers are focused on the development and delivery of training programs. They are likely to be keenly interested in the methodologies and outcomes associated with DPP training.

Potential Perspective: They might see DPP as an innovative approach to improve training efficacy and learner engagement but would need to be convinced of its practical advantages over existing methods.

Teachers/Trainers

Influence on Perspective: Teachers and trainers are on the front lines of delivering education and training. Their perspective is shaped by direct interaction with students and the practicalities of teaching.

Potential Perspective: They might be sceptical of DPP if it requires significant changes to their teaching methods but could be supportive if it demonstrably enhances student learning and engagement.

Researchers

Influence on Perspective: Researchers tend to focus on evidence-based practices and innovations in their field. They are likely to evaluate DPP training through the lens of its theoretical and empirical support.

Potential Perspective: They might be proponents of DPP if it aligns with current research findings and offers new insights into effective training practices.

Conclusion

Managers and Directors are likely to consider the strategic and operational implications of DPP training, weighing its potential benefits against the cost and effort of implementation.

Teachers and Trainers focus more on the practical impact of DPP training on their day-to-day teaching and student outcomes.

Researchers evaluate DPP from an evidence-based perspective, considering its alignment with current educational research and its potential to contribute to the field.

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Understanding these perspectives is crucial for designing and promoting DPP training programs that address the concerns and needs of different stakeholders within educational and training organizations. During the survey evaluation process, it has been often discussed who needs to get the DPP training and into what extent. Typical questions were does the top management need to get the training and what would be the scope for specific job roles. What should be emphasized to these roles. The answer to this question lies in the combination of the size of the company / institution, nature of the operations and the role the specific position plays in the DPP implementation process and decision making.

Question 6 - Experience with DPP Training (training survey):

Question 6: Has your organization ever delivered any training on Digital Product Passport (DPP)?

Answers:

- **No:** 11 entities
- **Yes:** 1 entity
- **Yes, through Research Projects as part of dissemination of the project results:** 1 entity
- **A small part, about battery passport:** 1 entity

Analysis of Responses:

VET Schools:

- Majority (5 out of 6) reported not delivering any DPP training.
- One VET school mentioned delivering a small part of training related to the battery passport.
- VET schools, despite their significant representation, largely lack experience in DPP training. This indicates a potential area for development and capacity building within these institutions

Technology Centers:

- One technology center reported having delivered DPP training.
- However, it appears to be Safety passport, which is unrelated to Digital Product Passport. This demonstrates the lack of clarity on this topic. **We have not considered this entity as one with DPP implementation experience for the purpose of this survey.**
- Despite their advanced focus, technology centers have not delivered DPP-specific training, indicating an area for future growth.

Research Technology Organization:

- Technology Centre indicated delivering DPP training through research projects as part of dissemination.
- Research organizations contribute to DPP training, especially through project-based dissemination, which highlights their role in pioneering and spreading innovative practices.

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Independent Training Provider:
Reported not delivering any DPP training.

Conclusion:
There is a minimum experience in with the DPP implementation in the education sector, which according to the expectations reflects that fact that the DPP topic is new.

Universities:
Both universities reported not delivering any DPP training.
Conclusion: Despite their academic and research capabilities, universities in this survey have not yet significantly engaged in DPP training, indicating a gap between academic research and practical training implementation.
Welding Consulting and Educational Department:
Neither reported delivering any DPP training.
Conclusion: These specialized sectors might need tailored strategies to integrate DPP training into their operations, reflecting their unique focus areas.

Overall Insights:
Low Overall Experience: The majority of respondents (12 out of 14) reported no experience in delivering DPP training, indicating a significant gap in current training provisions.

Sectoral Variations: Technology centers and research organizations have some engagement in DPP training, suggesting they could serve as models or partners for other sectors looking to develop similar programs.

Potential for Growth: VET schools, given their prevalence and central role in vocational training, represent a key opportunity for expanding DPP training. Support and development programs targeting these institutions could have a broad impact.

Need for Strategic Initiatives: The lack of DPP training in universities and specialized sectors like welding consulting and independent training providers points to a need for strategic initiatives to integrate DPP concepts into diverse educational and training contexts.

Conclusions
There is a clear need to expand DPP training across various types of organizations, particularly within VET schools and universities. Leveraging the experience of research organizations could help in designing effective training programs. Collaborative efforts and targeted support will be essential to bridge the current gaps and promote widespread adoption of DPP training.

Question 7 - Industry Focus (training survey):

Question 7: If yes, what is the product or industry focus of the most relevant training(s) you provided on DPP?

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This question is intended as a follow-up for respondents who indicated in Question 6 that they have already implemented the DPP. Questions 7, 8, and 9 collectively focus on analyzing the experiences with DPP implementation.

Out of three responses, only two were considered relevant. One company mentioned implementing a Safety Passport, which is not related to the DPP was not considered as demonstrating adequate experience.

The relevant responses were:

- An overview of the DPP using a Mobile Phone/Battery use case.
- Battery Passport.

Question 8 - Name of Relevant Trainings (training survey):

Question 8: What was the specific focus of the relevant DPP training provided?

This question follows up with entities that previously indicated participation in DPP implementation in Question 6.

Three responses were received, but only two were relevant:

- A technology center conducted a training titled "Adoption of the Digital Product Passport (DPP) to Drive Circularity," focusing on using DPP to enhance circularity within the industry.
- A VET school offered a broader course related to batteries, which included a segment specifically on battery passports.

One response focused on safety, which was excluded as it does not pertain to a DPP project.

Entity 6 – Technology centre:

Training Name: "Adoption of the Digital Product Passport (DPP) to drive circularity."
This training emphasizes the role of DPP in promoting circular economy practices.

Entity 12 - VET School:
Training Name: "It was a part of another course related to batteries."
This indicates that DPP training was integrated into a broader curriculum focused on batteries.

Conclusions and Insights:

1. **Limited Experience with DPP Training:** The majority of organizations have not yet engaged in delivering DPP-specific training, indicating a significant opportunity to expand these educational initiatives.

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2. **Research and Circularity Focus:** The training provided by Entity 6 (Technology Center) highlights the potential of DPP to support circular economy goals, an area ripe for further exploration and development.
3. **Integration into Existing Courses:** Entity 12's approach of embedding DPP training into existing battery-related courses demonstrates a practical method for introducing DPP concepts without the need for standalone courses.
4. **Clarification Needed:** The misreporting by one entity (related to safety) underscores the need for clearer explanations of DPP to prevent confusion in future surveys and reports.

By assessing the current landscape and the varied experiences with DPP training, stakeholders can better direct their efforts to expand and enhance DPP educational programs across different sectors.

Question 9 - Frequency of the training (as-is situation) (training survey)

Question 9: How often does your organization deliver DPP training?

This question examines the frequency of DPP training provided by organizations that have previously indicated implementing such training in Question 6.

Only one response was received:

- **Entity 2** reported delivering 'Safety' training on a daily basis. However, since this training is unrelated to DPP, it is not relevant for the analysis.

Question 10 - DPP Training topics (training survey):

Question 10: To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)?

FIGURE 4: LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 10.

In this figure the options are sorted by the number of entities that expressed some form of agreement with given option.

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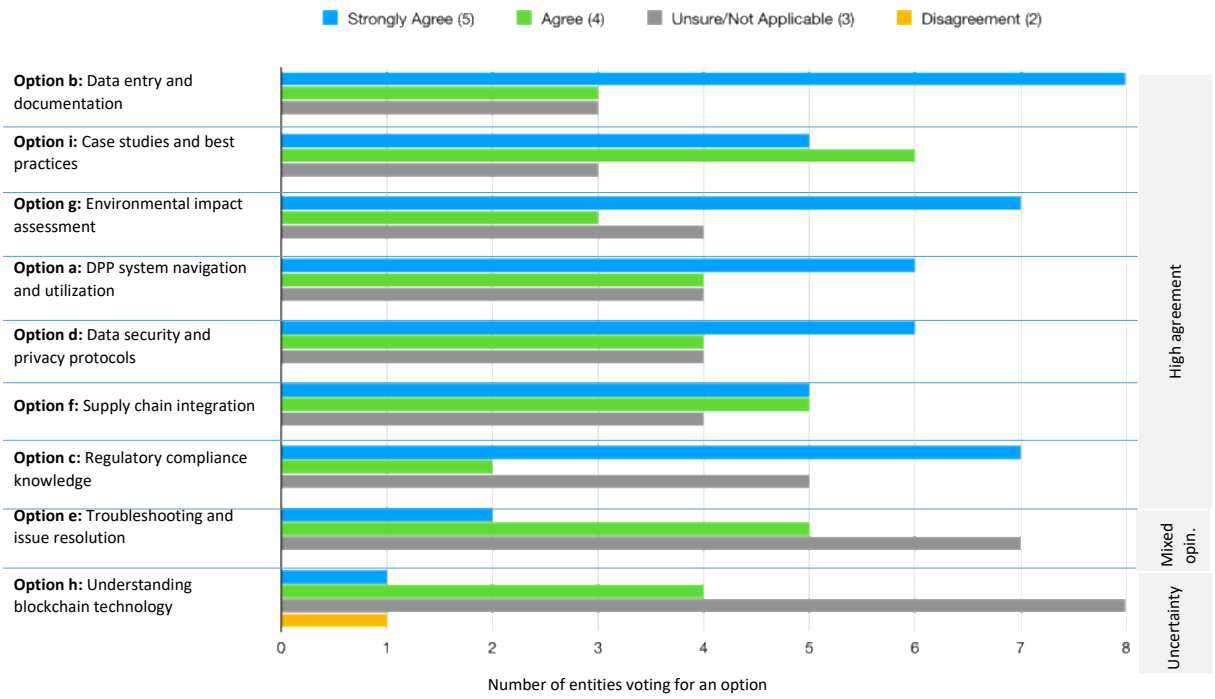

Conclusion:

Strong Agreement on Core Areas:
Respondents agreed with vast array of topics as important such as **data entry and documentation**, **case studies and best practices**, **environmental impact**, **DPP system navigation and implementation**, **data security**, **supply chain integration**, **regulatory compliance**, indicating they understand their importance and indicating these are seen as foundational for DPP training.

Varied Importance of Advanced Topics:
While **blockchain technology** and **troubleshooting** received mixed responses, they are still considered important by a significant portion of respondents. This suggests a need for basic and advanced modules within training programs.

Emphasis on Practical Learning:
The high importance placed on case studies and best practices indicates that respondents value practical, real-world examples to guide their implementation of DPPs.

Differing Levels of Familiarity:

The "Not sure" and "Not applicable" responses, particularly from Entity 4 and Entity 8, suggest that some organizations may still be unfamiliar with DPPs or uncertain about their specific training needs. This highlights the necessity for introductory training to build a foundational understanding before delving into advanced topics.

While key areas such as data handling, regulatory compliance, and environmental impact are clearly recognized as important, there is a need to address uncertainty and enhance understanding in areas like blockchain technology, troubleshooting. Practical examples through case studies and best practices are also crucial for effective training.

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From the perspective of the educational types:

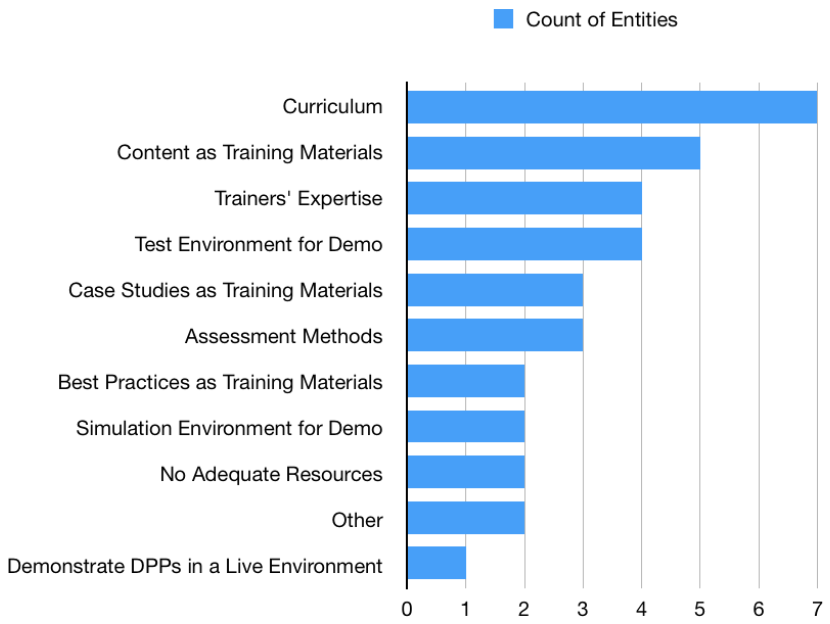
- Educational institutions prioritize accurate data handling and compliance knowledge, reflecting their structured and regulated environments.
- Technology centers and research organizations emphasize security and compliance, crucial for their innovation-driven operations.
- Consulting firms and independent training providers value practical examples and environmental impact, aligning with their client-focused and sustainable approaches.
- Uncertainty around Blockchain Technology and Troubleshooting suggests a need for clearer training objectives and communication across all entity types.

Question 11 - DPP training resource adequacy (training survey):

Question 11: "Do you have adequate resources for DPP training in your center? Select all adequate resources."

The goal of Question 11 is to assess whether organizations have the necessary resources to effectively deliver DPP training, helping to identify gaps in curriculum, training materials, and trainer expertise.

FIGURE 5: ADEQUATE RESOURCES FOR DPP TRAINING



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It appears that most of the **entities may have listed resources they are missing rather than those they already have**. It is unlikely that the entities who have never provided training and in some cases are not even thinking about it would possess e.g. curriculum.

In case of entities that stated they already have provided some kind of training it seems they also misunderstood the question, because they did not list e.g. curriculum e.g. Entity 6 and Entity 12. Which they should have. The only exception is Entity 2, but this entity misreported implementation of DPP (they implemented a project unrelated to DPP], so in fact they do not have any DPP training material.

Therefore, we will interpret the responses as indications of resources that the entities need to improve their DPP training capabilities. It would be strange if the companies who haven't implemented the DPP yet would have all listed adequate resources.

But we have two entities who indicated having no adequate resources. Those entities we consider as those who understood the question correctly.

Conclusion:

High Demand for Improvement: A significant number of entities (86%) indicated that they lack certain resources necessary for effective DPP training. This highlights a substantial need for **better curriculum materials**, **training content**, and **trainer's expertise**.

Critical Needs Identified: The most commonly identified needs include curriculum (50%), content as training materials (36%), and trainers' expertise (29%). This confirms that foundational elements of training programs are not adequately addressed in many centers, which was expected.

Strategic Recommendations: It is recommended that initiatives focus on developing **comprehensive curricula and high-quality training materials**, as well as enhancing the **expertise of trainers**. By addressing these gaps, training centers can improve their capability to deliver effective DPP training, thereby supporting the broader adoption and implementation of Digital Product Passports in the industry. We suggest also to include to the resources **best practices** which can be useful in **practical hands-on approach,** which were both required in other questions in the survey.

Question 12 - DPP training methodologies (training survey):

Question 12: What training methodologies do you find effective for teaching DPP concepts and implementation strategies?

The goal of Question 12 is to identify the most effective training methods for teaching DPP concepts and strategies, helping to guide the development of effective DPP training programs.

FIGURE 6 - DPP TRAINING METHODOLOGIES

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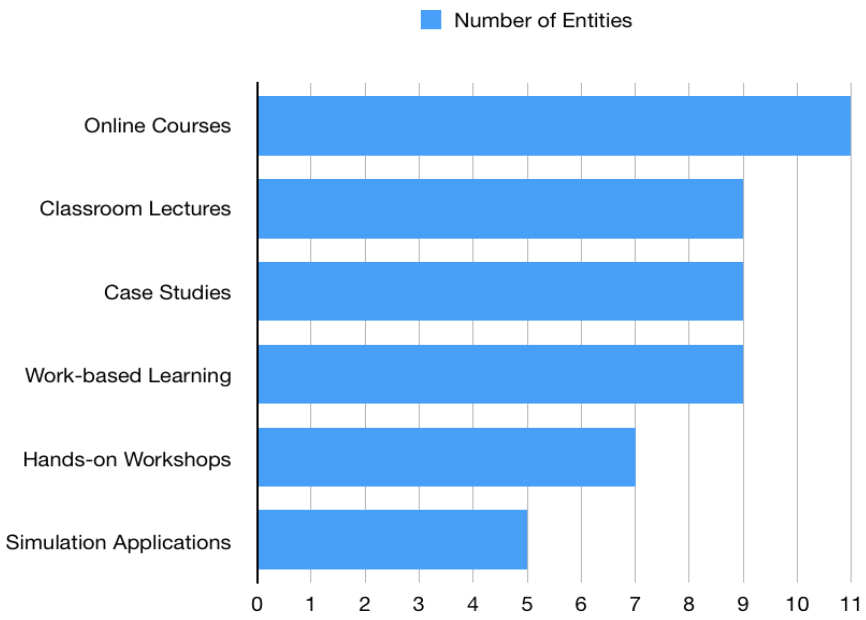

Conclusion

The analysis of Question 12 reveals a strong preference for a combination of traditional, online, and experiential learning methodologies. The most favored methods are **online courses** (10 entities) and **classroom lectures** (9 entities), followed by **case studies** (9 entities) and **work-based learning** (8 entities). **Hands-on workshops** (8 entities) are also significant, highlighting the importance of practical and interactive learning experiences. **Simulation applications** (4 entities) received lowest number of votes. Only one entity reported having no idea on effectiveness of methodologies.

Recommendations

Generally speaking, all listed methods were found useful by most entities. Except for one they all received more than 8 votes. Based on these findings, it is recommended to develop a blended learning approach for DPP training that incorporates:

- **Online Courses:** To provide flexible and accessible learning options.
- **Classroom Lectures:** For foundational knowledge and interactive discussions.
- **Case Studies:** To illustrate real-world applications and enhance critical thinking.
- **Hands-on Workshops:** For practical skills development and active participation.
- **Work-based Learning:** To connect theoretical knowledge with practical workplace applications.
- **Simulation Applications:** Offer immersive and risk-free learning experiences. However, it received the lowest number of votes. Simulation applications may be a great tool to exercise different tasks in the process of issuing DPP. It is likely that the educational institutions viewed this as a nice to have thing, not as a necessary thing.

This multi-faceted approach will cater to diverse learning preferences and enhance the overall effectiveness of DPP training programs.

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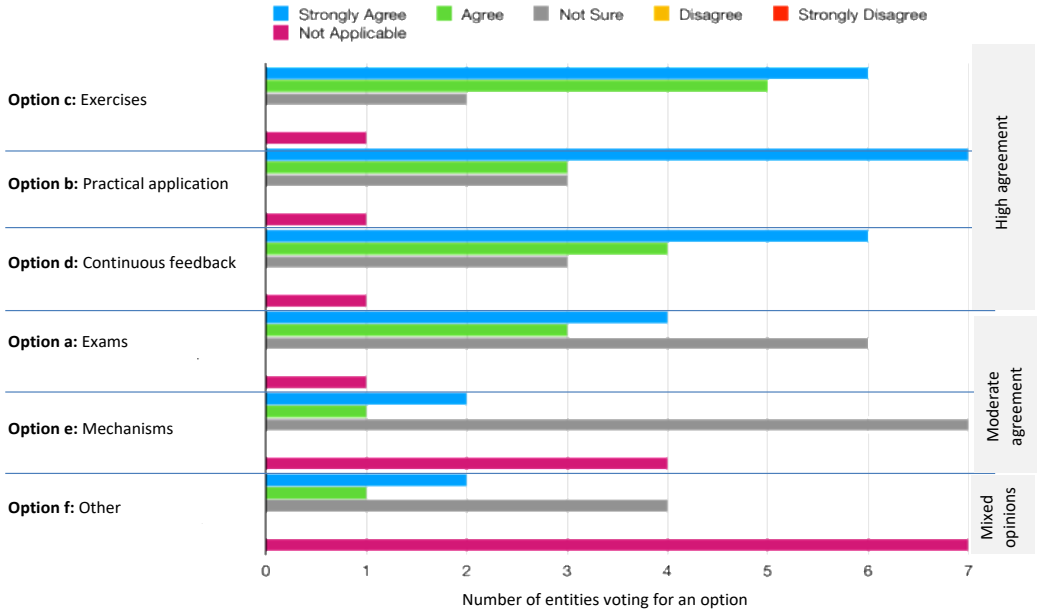
Question 13 - DPP training evaluation methods (training survey):

Question 13: Agreement with Methods of Evaluation for Assessing DPP Training Effectiveness

The goal of Question 13 is to identify preferred methods for evaluating the effectiveness of DPP training among entities.

FIGURE 7 - LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 13.

In this figure the options are sorted by the number of entities that expressed some form of agreement with given option.



Conclusions

Exercises, Practical Application, and Continuous Feedback are the most favored methods for assessing the effectiveness of DPP training, with high levels of agreement. **Exams** have moderate support but show significant uncertainty indicating preference for more practical skills and/or recent trends in Education and Training Methods like continuous feedback allow for ongoing improvement and learning, rather than a one-time assessment. This can be more valuable in a training context, where the goal is not just to assess knowledge but to practically use the knowledge. **Other** option shows mixed opinions with higher levels of uncertainty or non-applicability, suggesting these areas need further clarification or are less relevant to some entities.

The analysis indicates a clear preference for practical and interactive evaluation methods, such as **exercises, practical applications,** and **continuous feedback**. These methods are seen as more effective for assessing DPP training, especially in manufacturing, engineering, and research sectors. **Traditional exams** still hold relevance but are less favored compared to **hands-on methods**. **Other** methods are largely not viewed as necessary by most institutions.

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Recommendations

- Focus on **Practical Application**, **Exercises**, and **Continuous Feedback** in training programs.
- Leverage High Agreement on **Exercises** and **Practical Application -** Use these well-accepted methods as a foundation for evaluation strategies and incorporate elements of these approaches into other methods to enhance their effectiveness and acceptance.
- Establish structured **feedback mechanisms** that are easy to implement and demonstrate clear benefits to both trainers and participants.
- Address uncertainties and clarify the role of **Exams** in the assessment framework.
- Reevaluate the relevance and application of **other** options based on specific entity needs and feedback.

Question 14 – Other details (training survey):

The goal of Question 14 is to gather any additional insights or preferences from respondents regarding DPP training,

Analysis of Any Other Details Provided in the Survey: Only Entity 9 responded to this question, providing the note "E-learning solutions." This indicates a preference or emphasis on the use of e-learning platforms for delivering DPP training.

Implications:

The mention of "E-learning solutions" suggests that there is interest in or recognition of the benefits of digital and remote learning methodologies. E-learning can offer cost effectiveness, flexibility, accessibility, and scalability, making it a valuable tool for training diverse groups of participants across different geographic locations. Online learning has been designated as the most preferred method for the DPP training delivery. (Question Nr. 12)

Recommendations:

- **Integrate E-learning Platforms:** Consider incorporating e-learning solutions into the DPP training curriculum to enhance accessibility and convenience.
- **Develop Comprehensive Online Modules:** Create detailed and interactive online training modules that cover all key aspects of DPP.
- **Leverage Multimedia Tools:** Utilize multimedia tools such as videos, interactive simulations, to make the training engaging and effective.
- **Ensure Continuous Support:** Provide continuous support and resources online, including discussion forums, FAQs, and access to trainers for any queries.

By embracing e-learning solutions, training programs can reach a wider audience and provide flexible learning options, ultimately enhancing the overall effectiveness and reach of DPP training initiatives.

Conclusion:

The feedback received in response to Q16, though limited, provides valuable insight into level of familiarity with the topic of DPP. It may indicate that the topic of DPP is so new to the respondents that it is difficult for them to generate any ideas or provide suggestions.

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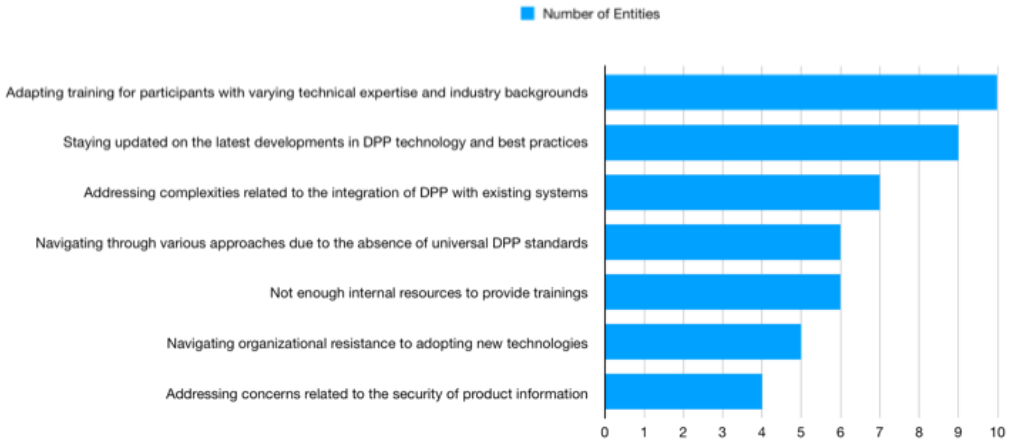
Question 15 – Expected Challenges (training survey):

Question 15: Which challenges, if any, have you encountered or anticipated in providing training for DPP?

The goal of Question 15 is to identify and understand the challenges that organizations have encountered or anticipate in providing training for Digital Product Passports (DPP).

FIGURE 8 - LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 15.

In this figure the options are sorted by the number of entities that expressed some form of agreement with given option.



Question 15 highlights several key challenges encountered or anticipated by entities in providing training for Digital Product Passports (DPP).

The most prominent challenge, reported by 10 entities (71.43%), is **adapting training for participants** with varying technical expertise and industry backgrounds. This underscores the need for flexible and tailored training programs.

Another significant challenge, noted by 9 entities (64.29%), is **staying updated on the latest developments in DPP technology and best practices**. This reflects the dynamic nature of DPP technology and the need for continuous learning and adaptation.

Half of the respondents (7 entities) identified the **complexity of integrating DPP with existing systems** as a notable barrier. This highlights the technical difficulties and potential disruptions involved in merging new and existing processes.

Navigating organizational resistance to adopting new technologies is a challenge faced by 5 entities (35.71%). This resistance can stem from a lack of understanding or fear of change, emphasizing the importance of change management strategies in DPP training programs.

Additionally, 6 entities (42.86%) reported **difficulties due to the absence of universal DPP standards**. This indicates a need for more standardized guidelines to streamline DPP training and implementation processes. Similarly, 6

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entities (42.86%) indicated that they lack sufficient internal resources to provide DPP training, suggesting a resource allocation issue that could hinder effective training delivery.

Lastly, concerns related to the **security of product information** were highlighted by 4 entities (28.57%), pointing to the importance of incorporating robust security protocols and practices within DPP training programs.

The findings from Question 15 suggest that a multifaceted approach is required to address the varied challenges in DPP training. Tailoring training programs, staying abreast of technological advancements, managing organizational resistance, standardizing guidelines, allocating sufficient resources, and ensuring data security are all crucial components for improving the effectiveness of DPP training initiatives and facilitating smoother adoption and implementation of Digital Product Passports.

Question 16 – Additional suggestions (training survey):

Question 16: Any additional comments or suggestions you would like to share regarding DPP training?

(Question 16 was a free text question, no entities provided answers for this question.)

Final Conclusion (Training survey)

The VET Survey report provides a detailed analysis of the current landscape and needs for Digital Product Passport (DPP) training across various educational and training organizations in Europe. The survey's findings reveal significant insights into the geographical distribution, organizational types, respondent roles, and their perspectives on DPP training.

Geographic Distribution and Organizational Types: The survey included a diverse range of entities from seven European countries, with Denmark and Portugal having the highest number of participating organizations. The majority of these entities are VET schools. Other types of organizations, such as technology centers, consulting firms, research technology organizations, and universities, are also represented, reflecting the broad interest in DPP across different sectors.

Respondent Roles and Perspectives: The roles of respondents, including department managers, owners, team managers, training managers, teachers, and researchers, significantly influence their perspectives on DPP training. Managers and directors focus on strategic and operational implications, while teachers and trainers emphasize practical impacts on teaching and student outcomes. Researchers evaluate DPP from an evidence-based perspective, highlighting the need for training programs to address the concerns of various stakeholders effectively.

Experience with DPP Training: The majority of respondents reported **no experience in delivering DPP training**, indicating a **significant gap** in current training provisions. Technology centers and research organizations have some engagement in DPP training, suggesting their potential role as models or partners for other sectors. VET

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schools and universities show a gap in DPP training experience, presenting an opportunity for capacity building and development.

DPP Training Topics: There is prevailing consensus on the importance of core DPP training topics such as data entry and documentation, case studies and best practices, environmental impact, DPP system navigation and implementation, data security, supply chain integration, regulatory compliance.

However, significant uncertainty exists regarding advanced topics like blockchain technology and troubleshooting. This highlights the need for clearer communication and more focused training in these areas. Practical examples through case studies and best practices are highly valued, indicating the necessity of incorporating real-world applications into training programs.

Training Resource Adequacy: A significant number of entities lack the necessary resources for effective DPP training, particularly in curriculum development, practical tools, and trainers' expertise. This underscores the need for initiatives to develop comprehensive curricula, high-quality training materials, and enhanced trainer capabilities.

Training Methodologies: The preferred training methodologies include a combination of traditional, online, and experiential learning approaches. Online courses and classroom lectures are highly favored, along with case studies, work-based learning, hands-on workshops. A blended learning approach is recommended to cater to diverse learning preferences and enhance training effectiveness.

Evaluation Methods: Exercises, practical application and continuous feedback are the most favored methods for evaluating DPP training effectiveness. However, there is moderate to low agreement on the use of exams, indicating an inclination to rather more practical approach in obtaining knowledge than one-time evaluation.

Other Details and E-learning: The limited feedback on e-learning solutions highlights the interest in digital and remote learning methodologies. Integrating e-learning platforms into the DPP training curriculum can enhance accessibility and convenience, making training programs more effective and scalable.

Expected implementation challenges: Tailoring training programs, staying abreast of technological advancements, managing organizational resistance, standardizing guidelines, allocating sufficient resources, and ensuring data security are all crucial components for improving the effectiveness of DPP training initiatives and facilitating smoother adoption and implementation of Digital Product Passports.

The VET Survey report highlights the crucial areas for improvement in DPP training, including the need for better resources, clearer communication on advanced topics, and a blended learning approach. By addressing these gaps and leveraging the strengths identified, training centers can significantly enhance their capacity to deliver effective DPP training programs. This will support the broader adoption and implementation of Digital Product Passports, contributing to improved product traceability and sustainability in various sectors. Collaborative efforts and targeted support are essential to bridge the current gaps and promote widespread adoption of DPP training.

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Final Recommendations for Enhancing DPP Training Programs (Training survey)

Based on the findings of the VET Survey report, the following recommendations are proposed to enhance the effectiveness and reach of Digital Product Passport (DPP) training programs:

1. **Develop Standardized Curricula:**
   - Create a flexible yet standardized, structured curricula that includes core topics such as data entry and documentation, regulatory compliance, and environmental impact assessment.
   - Include advanced topics like blockchain technology (where practical) and troubleshooting with clear explanations and practical applications to reduce uncertainty.
2. **Enhance Training Resources:**
   - Provide high-quality training materials, including comprehensive content, case studies, best practices, and practical tools.
   - Develop simulation environments and test scenarios to offer hands-on learning experiences.
3. **Improve Trainers' Expertise:**
   - Invest in training and professional development for trainers to ensure they have the necessary knowledge and skills to deliver effective DPP training.
   - Encourage trainers to stay updated with the latest developments in DPP and related technologies.
4. **Adopt Blended Learning Approaches:**
   - Combine traditional classroom lectures with online courses, case studies, work-based learning, hands-on workshops, and simulation applications.
   - Utilize multimedia tools such as videos, interactive simulations, and virtual labs to enhance engagement and learning outcomes.
5. **Leverage Practical Examples:**
   - Incorporate real-world case studies and best practices into the training programs to illustrate the practical applications of DPP.
   - Highlight successful DPP implementation examples to demonstrate the benefits and challenges.
6. **Establish Clear Evaluation Methods:**
   - Use a combination of Exercises, Practical Application, to assess the effectiveness of DPP training.
   - Develop structured frameworks for continuous feedback and exams (or tests only where practical, since exams were less popular) to ensure ongoing improvement and relevance of the training programs.
7. **Foster Collaborative Efforts:**
   - Encourage collaboration between different types of organizations, such as VET schools, universities, technology centers, and consulting firms, to share resources and expertise.
   - Partner with research organizations and industry experts to develop and disseminate best practices and innovative training methods.
8. **Expand E-learning Solutions:**
   - Integrate e-learning platforms into the DPP training curriculum to enhance accessibility and convenience for geographically dispersed learners.
   - Develop comprehensive online training modules that cover all key aspects of DPP and provide continuous support through discussion forums, FAQs, and access to trainers.

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9. **Address Resource Gaps:**
    - Identify and address specific resource gaps within different types of organizations to ensure they have the necessary tools and materials for effective DPP training.
    - Provide targeted support to entities that lack adequate resources, such as curriculum development assistance, access to training materials, and funding for simulation environments.
10. **Promote Awareness and Understanding:**
    - Conduct introductory sessions or provide informational materials about DPP to ensure all participants have a clear understanding of its concepts and importance.
    - Clarify advanced topics and their relevance to different sectors to reduce uncertainty and enhance engagement.

By implementing these recommendations, training centers and organizations can significantly improve their DPP training programs, thereby supporting the broader adoption and implementation of Digital Product Passports. This will contribute to enhanced product traceability, sustainability, and overall efficiency in various industries.

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Industry Survey Report Analysis

Questions 1 to 5 - Sample characterization (industry survey):

The following section includes analysis of questions 1 to 5. These questions are related to sample characterization; therefore, they are analyzed together in one chapter.

The questions:

1. Name of Company/Organization" - Confidential
2. Your e-mail (optional) - Confidential
3. Country
4. Organization type
5. What is your role within the business?

1. Analysis of Company/Organization Names (Question 1):

- **Entity 1**: A manufacturing company from Portugal, with a project manager as the respondent, has no plans to implement DPP.
- **Entity 2**: A manufacturing company from Denmark, with a management respondent, plans to explore DPPs in the next 24 months.
- **Entity 3**: An engineering service provider from Turkey, with a management respondent, also plans to explore DPPs in the next 24 months.
- **Entity 4**: A research/development company from Portugal, with a management respondent, is following DPP developments due to interest from industrial partners.
- **Entity 5**: A digital technology provider from the United Kingdom, with a management respondent, has implemented DPPs for all products/services.
- **Entity 6**: A research/development company from Spain, with the head of the research group respondent, is studying the requirements for DPP.
- **Entity 7**: An IT company from the United Kingdom, with a technical team respondent, plans to explore DPPs in the next 24 months.
- **Entity 8**: A research/development company from the UK, with a research respondent, has heard about DPP but has not delved into it.
- **Entity 9**: A manufacturing company from Spain, with an R&D respondent, believes DPPs are not relevant.
- **Entity 10**: A manufacturing company from Germany, with a management respondent, also thinks DPPs are not relevant.

2. Participating entities by country (Question 3)

1. **United Kingdom:** 3 entities
2. **Portugal:** 2 entities
3. **Spain:** 2 entities
4. **Denmark:** 1 entity

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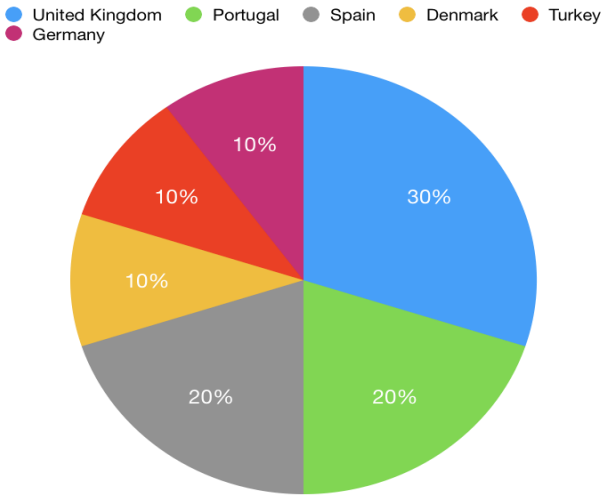
5. **Turkey:** 1 entity
6. **Germany:** 1 entity

FIGURE 9 - PARTICIPATING ENTITIES BY COUNTRY (QUESTION 3)



3. Organization Type (Question 4)

- **Manufacturing:** 4 entities
- **Research/Development:** 3 entities
- **Service Provider:** 1 entity
- **Digital Technology Provider:** 1 entity
- **IT:** 1 entity

FIGURE 10 - ORGANIZATION TYPE (QUESTION 4)

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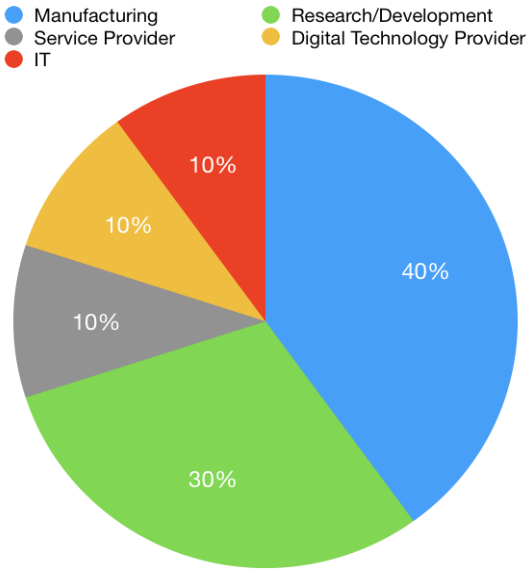

TABLE 3 - POSITIONS HELD BY THE RESPONDENTS (QUESTION 5)

Role	Number of Resp.	Locations	Organizations	Count of Organizations
Management	5	Manufacturing, Engineer Service Provider, Research/Development, Digital Technology Provider	Manufacturing, Engineer Service Provider, Research/Development, Digital Technology Provider	Manufacturing (3), Engineer Service Provider (1), Research/Development (1), Digital Technology Provider (1)
Project Manager	1	Manufacturing	Manufacturing	Manufacturing (1)
Head of Research Group	1	Research/Development	Research/Development	Research/Development (1)
Technical	1	IT	IT	IT (1)
Research	1	Research/Development	Research/Development	Research/Development (1)
R&D	1	Manufacturing	Manufacturing	Manufacturing (1)

Conclusion

The sample of participating entities is characterized by a varied landscape of interest and engagement with DPP across different organization types and countries, highlighting different stages of awareness and implementation strategies. The participating entities were from 6 different countries. The United Kingdom had the highest representation with 3 entities, followed by Portugal and Spain with 2 entities each. Denmark, Turkey, and Germany each had 1 entity participating. However, concentrations of the respondents in individual countries reflect more

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the number of personal connections of survey organizers than organically generated interest, as it was very difficult to obtain participants for this survey.

The roles of the respondents are diverse, encompassing various positions within their respective organizations. Management positions were the most common, with 5 respondents from different sectors including Manufacturing, Engineer Service Provider, Research/Development, and Digital Technology Provider.

Again, although this might indicate an interest in DPP from individuals in leadership and decision-making roles, i tis not organic interest, i tis heavily influenced by who was contacted by the PIECE project team. Additionally, specific roles such as Project Manager, Head of Research Group, Technical, Research, and R&D were also represented, showing that the survey reached individuals involved in both strategic and operational aspects of their organizations.

Question 6 and 7 - Tracking documentation and current involvement in DPP (industry survey):

We have analyzed questions nr. 6 and 7 together because the topics are related.

Questions:

6. Does your organization currently use any form of digital documentation for tracking battery products throughout their lifecycle?

7. Is your company already involved with the Digital Product Passport (DPP)?

Based on the responses from the entities regarding their engagement in DPP development, we can categorize their levels of engagement and identify key patterns in their current involvement.

1. Active Implementation and Development:
    - **Entity 5 (United Kingdom, Digital Technology Provider):** Actively developing digital solutions and has implemented DPPs for all products/services. This shows a high level of engagement in both the development and practical application of DPPs.
    - **Entity 7 (United Kingdom, IT):** Uses custom software and plans to explore DPPs within the next 24 months, indicating proactive steps towards integrating DPPs.
2. Planned Exploration and Interest:
    - **Entity 2 (Denmark, Manufacturing):** Uses custom software and plans to explore DPPs in the next 24 months. This reflects an intention to engage more deeply with DPPs in the near future.
    - **Entity 3 (Turkey, Engineer Service Provider):** Currently using Excel/Spreadsheets and plans to explore DPPs in the next 24 months, suggesting a transition phase towards more advanced digital documentation.
    - **Entity 4 (Portugal, Research/Development):** Following DPP developments due to curiosity from industrial partners in the manufacturing sector, indicating indirect engagement through industry

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connections. - **Entity 6 (Spain, Research/Development):** Uses paper-based methods and is studying the requirements for DPPs, showing initial steps towards understanding and possibly implementing DPPs.

3. Minimal or No Current Engagement:
    - **Entity 1 (Portugal, Manufacturing):** No answer provided regarding current use or plans for DPPs, suggesting a lack of engagement or priority in this area.
    - **Entity 8 (UK, Research/Development):** Uses Excel/Spreadsheets and has heard about DPPs but has not delved into them, indicating low engagement.
    - **Entity 9 (Spain, Manufacturing):** Uses paper-based methods and finds DPPs irrelevant to current work, showing no engagement or interest in DPP development.
    - **Entity 10 (Germany, Manufacturing):** Unaware of DPPs and considers them irrelevant, reflecting a lack of engagement and recognition of their potential relevance.
4. No Answer or Uncertain Engagement:
    - **Entity 1 (Portugal, Manufacturing):** No information provided on the current use of digital documentation for DPPs, leaving their level of engagement unclear.

Conclusion

The engagement in DPP development among the entities varies significantly. Some entities, particularly those in the technology and IT sectors, are actively involved in developing or implementing digital solutions and developing DPPs. In contrast, others, especially in traditional manufacturing, are either planning future exploration currently rely on more traditional methods such as spreadsheets and paper-based documentation or currently see no relevance in DPPs.

The variation in engagement levels highlights the need for targeted outreach and education to demonstrate the benefits and applications of DPPs across different sectors. For effective DPP adoption, customized strategies that address the specific needs and readiness levels of various entities are essential.

Question 8 - Barriers to DPP implementation (industry survey):

Question Nr. 8: Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP.

The goal of Question 8 is to assess agreement on the barriers to implementing Digital Product Passports (DPP)

FIGURE 11 - TABLE: LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 8.

In this figure the options are sorted by the level of agreement with given option.

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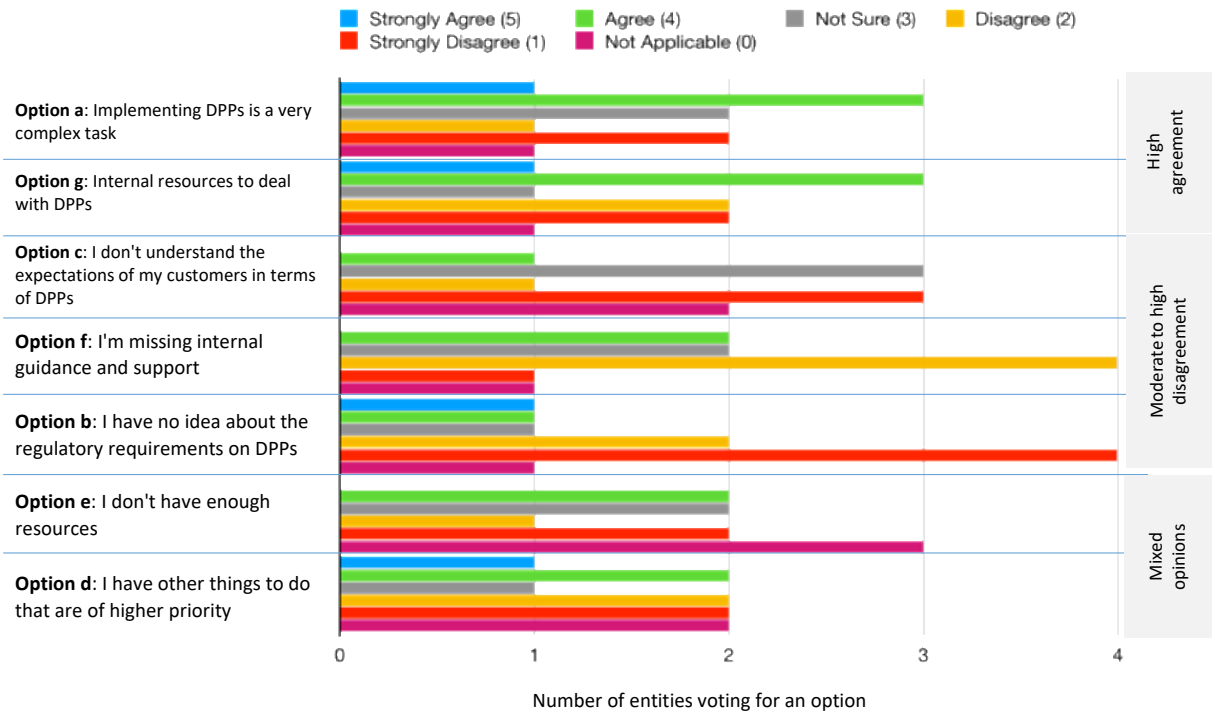

Conclusion:

High to moderate disagreement

From the chart it is visible that most of the companies 60% feels that they have an idea about the **regulatory requirements** for DPPs, because they expressed high level of disagreement with the statement in option b. However, in question 10 which investigates the DPP Topis the respondents expressed the need for training on regulatory requirements. So, this indicates despite not having sufficient knowledge, the respondents are expressed believe that the regulation will not be a barrier to implementation.

Furthermore, 50% disagree or strongly disagree that they lack **internal guidance and support**, suggesting that many entities, particularly in manufacturing and service sectors, feel they have adequate support structures.

Mixed opinions

Complexity of the task and **resource constraints**

The entities show the highest level of agreement on the **complexity of the task** and **resource constraints** in implementing Digital Product Passports (DPPs). Specifically, 40% of entities agree or strongly agree that implementing DPPs is complex, highlighting significant recognition of this barrier, especially among manufacturing and research entities and also the nature of the business. Or manufacturing companies in reality the DPP implementation can be more complex task depending on the complexity of the product they are producing.

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Similarly, 40% agree or strongly agree that they lack **internal resources**, reflecting the need for better resource allocation. On the other hand, 40% of entities expressed some form of disagreement. This may reflect different situations in the entities in terms of work overload and resources availability.

Prioritization (**more important things to do**) and **understanding customer expectations**.

Opinions on **prioritization** of the DPPs are divided, with 30% agreeing or strongly agreeing that other priorities are more important, while 40% disagree or strongly disagree, suggesting varied prioritization among entities. Mixed opinion on prioritization may vary from entity to entity possibly based on the internal resources availability and workload of the employees responsible for DPP implementation.

Additionally, 40% of entities are unsure or disagree about **understanding customer expectations**, indicating mixed clarity on this issue. This suggests a communication gap, particularly in research and manufacturing entities, while technology providers and service entities feel more confident in understanding customer needs, as generally they are more dependent on constant monitoring of customer's expectation.

In summary

the main barriers to DPP adoption include the complexity of implementation, resource constraints, and mixed clarity on customer expectations. While there is a general awareness of regulatory requirements and adequate internal support in many entities, the prioritization of DPPs and understanding of customer needs vary significantly. Addressing these barriers through targeted training, better communication, and strategic resource allocation will be essential for improving DPP adoption across all sectors.

Addressing these barriers can be done through targeted training resources, better communication above all with the management (to gain support and priority), and sufficient resource allocation will be crucial for improving DPP adoption and engagement across all sectors.

Question 9 DPP Training needs (industry survey):

Question Nr. 9: In terms of training and education, is there anything you foresee to need in terms of DPPs?

The goal of Question 9 is to identify the specific training and educational needs that entities foresee regarding Digital Product Passports (DPPs)

FIGURE 12 - LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 9.

In this figure the options are sorted by the level of agreement with given option.

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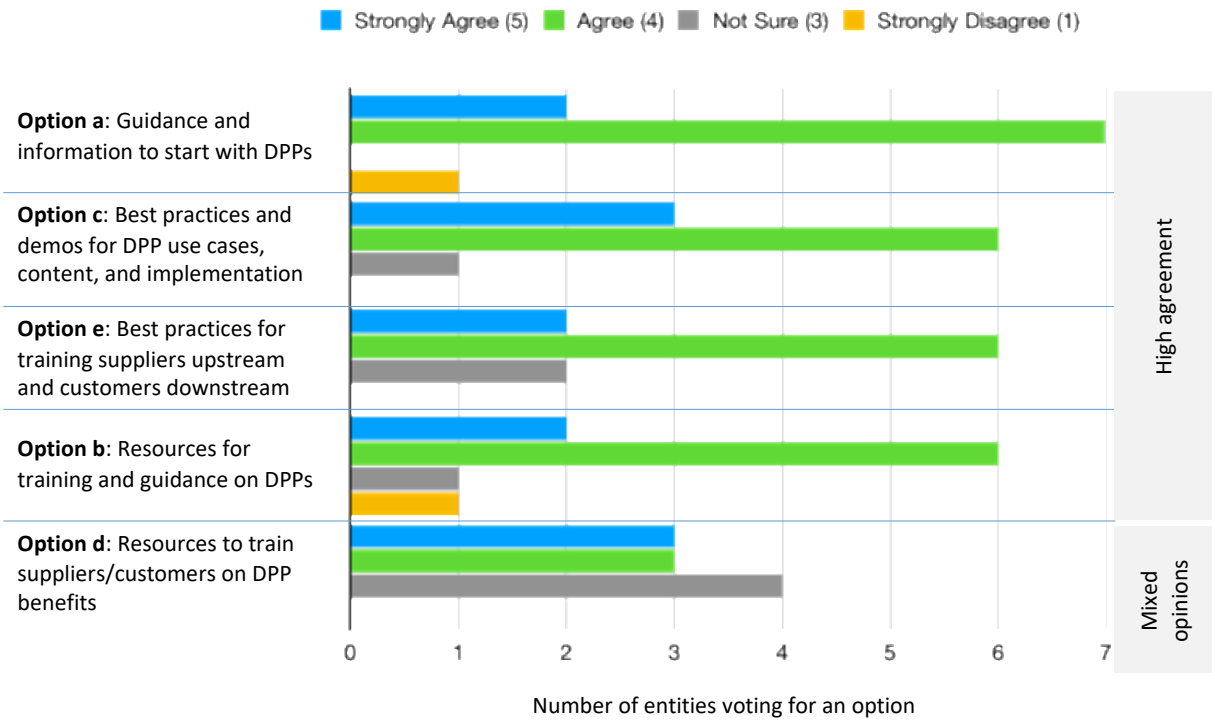

Conclusion

High Agreement

The entities show the highest level of agreement on the **need for guidance**, **best practices** (both use case and demos, content and implementation as well as training suppliers), and **resources for Digital Product Passports (DPPs) training**. Specifically, 90% of entities agree or strongly agree that guidance and information are crucial for starting with DPPs, highlighting a significant demand for initial guidance.

Similarly, 90% of entities agree or strongly agree on the importance of **best practices and demos for DPP use cases**, indicating that practical examples and demonstrations are key to successful implementation. Additionally, 80% of entities agree or strongly agree on the need for best practices for **training suppliers upstream and customers downstream**, underscoring the importance of standardized training methods.

Mixed opinions

are evident in the area of **resources to train suppliers and customers on DPP benefits**. Opinions are divided, with 60% of entities agreeing or strongly agreeing on the need for these resources, while 40% are unsure. This uncertainty suggests that more clarity and good arguments are needed on the benefits and methods of training external stakeholders on DPP benefits. This uncertainty may stem from the hesitancy to train business partners.

These insights underscore the critical need for initial guidance, comprehensive training resources, and practical examples to overcome barriers to DPP implementation. Addressing the areas of uncertainty, particularly in training external stakeholders, will be essential for effective DPP adoption.

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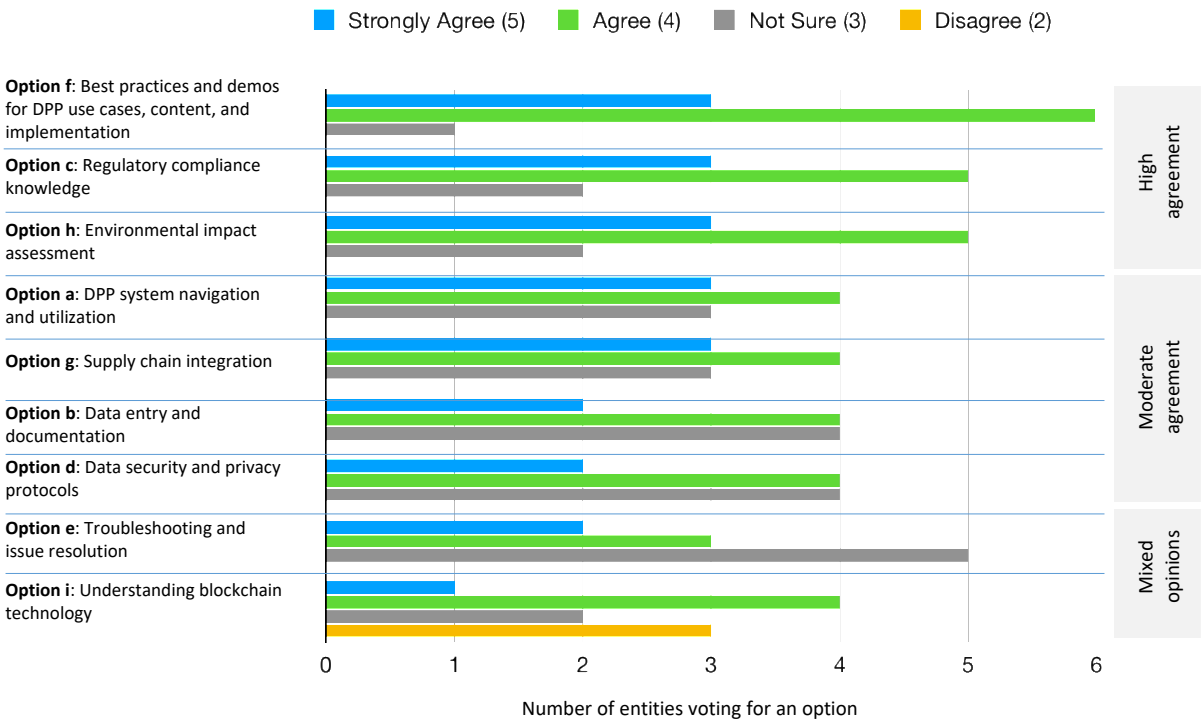
Question 10 – DPP training topics (industry survey):

Question 10: What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?

The goal of Question 10 is to identify the specific training topics that entities consider crucial for effectively adopting Digital Product Passports (DPPs).

FIGURE 13 - LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 10.

In this figure the options are sorted by the level of agreement with given option.



Conclusion

Important topics for DPP training are:

High Agreement

The entities show the highest level of agreement on the need for **best practices**, **regulatory compliance knowledge, and environmental impact assessment** for Digital Product Passports (DPPs) training.

Specifically, 90% of entities agree or strongly agree that **best practices** and **demos for DPP use cases**, **content**, and **implementation are crucial**, highlighting a significant demand for practical, **example-based training**.

Similarly, 80% of entities agree or strongly agree on the need for **regulatory compliance knowledge**, indicating a clear demand for in-depth training on compliance standards and legal requirements related to DPPs. Additionally, 80% of entities agree or strongly agree on the importance of training in **environmental impact assessment,** underscoring it as a key area for educational focus.

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Moderate agreement

is observed for **DPP system navigation** and **utilization and supply chain integration**. For instance, 70% of entities agree or strongly agree on the importance of training in **navigating and utilizing the DPP system,** though 30% are unsure, suggesting a need for introductory training sessions to improve confidence in system usage. Similarly, 70% agree or strongly agree on the need for training on **integrating DPPs into the supply chain**, but 30% uncertainty suggests that additional clarity and information are needed.

data entry and documentation, **data security and privacy protocols**. For data entry and documentation, 60% of entities agree or strongly agree, but 40% are unsure, indicating a mixed understanding of requirements. Similarly, for **data security and privacy protocols,** 60% agreement and 40% uncertainty highlight a need for targeted training programs to address concerns.

Mixed opinions

are evident in more advanced areas such as **blockchain technology** and **troubleshooting and issue resolution** Troubleshooting and issue resolution show the greatest need for detailed training, with only 50% agreement and 50% uncertainty, indicating entities are unclear about this area. Understanding blockchain technology has the most divided opinions, with only 50% agreement and 30% disagreement, suggesting a need for targeted, possibly optional, training modules.

Universally Preferred Topics:

- Best practices and demos for DPP use cases (Option f)
- DPP system navigation and utilization (Option a)
- Environmental impact assessment (Option h)

In order to successfully address these training topics through targeted programs, these insights underscore, as identified in previous questions, the **critical need for:**

- Initial guidance
- Comprehensive training resources
- Practical examples to overcome barriers to DPP implementation

In the identified areas of DPP training topics and focus on more clarity in the areas of mixed opinions or uncertainty.

Question 11 – Preferred training format (industry survey):

Question 11. Do you have any preferred training format for DPP?

The goal of Question 11 is to determine the preferred training formats for Digital Product Passports (DPP) among different entities.

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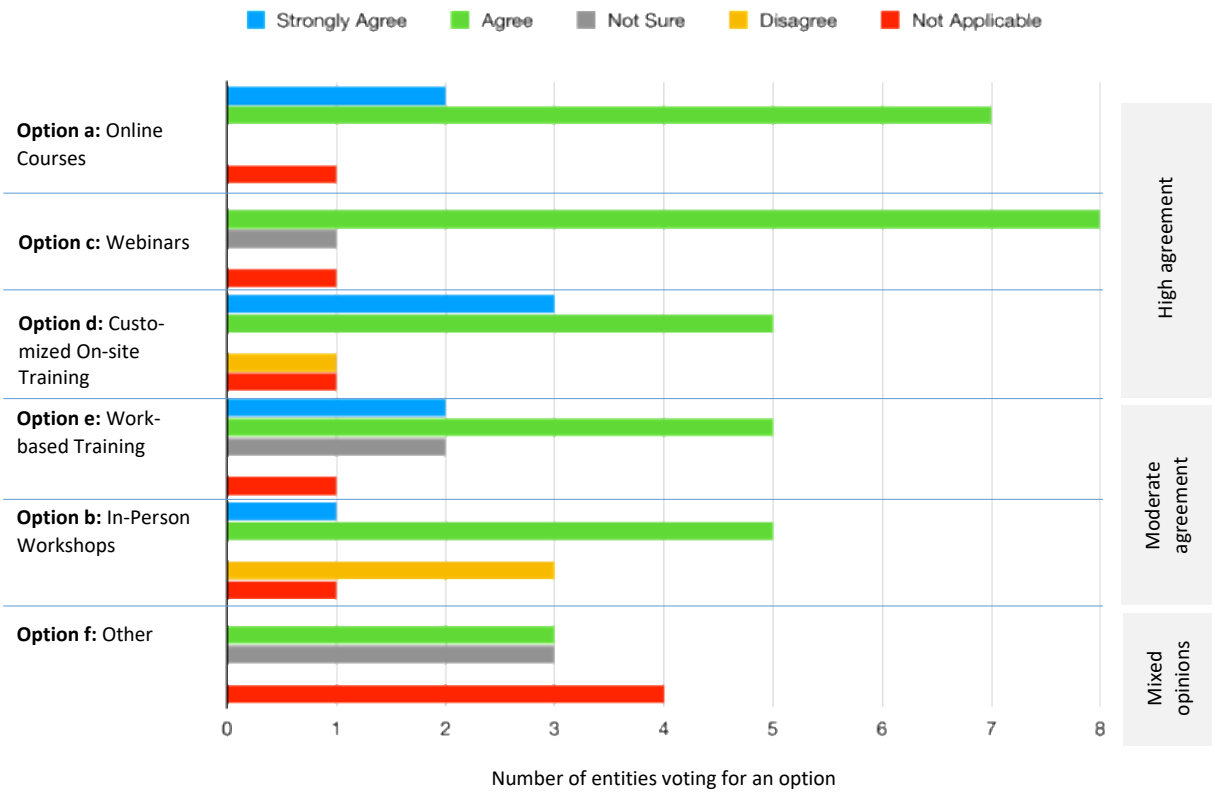
FIGURE 14 - LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 11

In this figure the options are sorted by the level of agreement with given option.



Conclusion

The entities show a clear preference for certain training formats, with the highest agreement for online courses, webinars, and customized on-site training. These formats should be prioritized in developing DPP training programs.

- **Customized On-site Training:** This format is highly valued for its tailored, hands-on approach that addresses specific needs. One disagreement from a research company indicates that different types of entities may have different preferences.
- **Work-based Training and In-Person Workshops:** While moderately preferred, these formats require further clarity and adjustments to meet the diverse preferences of entities.
- **Webinars and Online Courses:** These formats are favored for their flexibility and accessibility, allowing participants to engage remotely.

Addressing the areas of lower consensus, particularly in "Other" training formats, will involve identifying specific needs and preferences that are currently unclear or less relevant to many entities.

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Patterns by Entity Type:

Due to small and unequal sample of the respondents in the survey it is difficult to draw any industry related pattern, however we may observe the indication of some preferences.

1. **Manufacturing and Research Entities:**
    - Seem to favor customized on-site training and work-based training, highlighting a preference for practical, hands-on learning methods as well as online methods.
2. **Service and IT Entities:**
    - Show a preference for online courses and webinars, suggesting a need for flexible, remote learning options.
3. **Mixed Responses:**
    - In-person workshops and "Other" formats show mixed responses, with significant portions of entities either agreeing, disagreeing, or unsure, indicating variability in training format preferences.

Overall, the analysis reveals a strong preference for online and customized on-site training formats, with a noticeable inclination towards practical, hands-on methods among manufacturing and research entities. Service and IT entities show a higher preference for flexible, remote learning options like online courses and webinars.

Question 12 – Future expectations (industry survey):

Question 12. In terms of the future of DPPs, what do expect?

The goal of Question 12 is to gather insights into industry expectations for the future of Digital Product Passports (DPPs). This information will help in aligning future DPP initiatives with industry needs and expectations.

FIGURE 15 - LEVEL OF AGREEMENT WITH INDIVIDUAL OPTIONS IN QUESTION 12.

In this figure the options are sorted by the level of agreement with given option.

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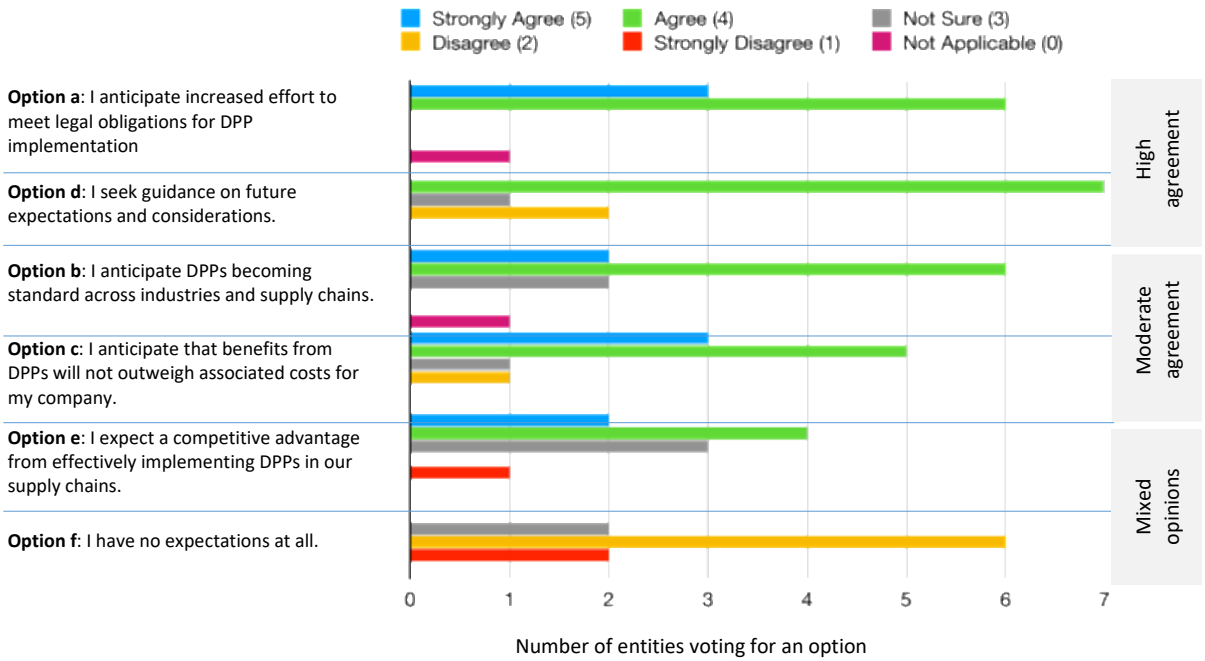

Note: In this figure the options are sorted by the level of agreement with given option.

Conclusion

Highest level of agreement

The entities show the highest level of agreement on the need to meet **legal obligations** and seek **guidance for future DPP implementations**.

Specifically, 90% of entities anticipate increased efforts to comply with legal requirements, and 70% seek guidance on future expectations, highlighting the importance of regulatory clarity and industry support.

Moderate agreement

is observed in the industry has expectations of **DPPs becoming standard across industries** and concerns about the **cost-benefit balance**. An 80% agreement on DPPs becoming a standard practice indicates awareness for the need of widespread adoption, while the same level of agreement on cost concerns reflects financial apprehensions.

Mixed opinions

are evident in the **anticipated competitive advantage** and **lack of expectations**. While 60% agree that DPPs will provide a competitive edge, (at the same time some respondents do not expect the benefits to cover associated implementation costs). 30% are uncertain, **indicating the need for more demonstrable benefits**. The majority disagreement on having no expectations suggests that most entities are engaged with the concept of DPPs, though some uncertainty remains.

Addressing these expectations through targeted communication and clear demonstrations of DPP benefits will be crucial for successful adoption and engagement across all sectors. Ensuring regulatory clarity, providing guidance,

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demonstrating cost-effectiveness, and showcasing competitive advantages are key to meeting the industry's needs and driving forward the implementation of Digital Product Passports.

Question 13 – Additional comments (industry survey):

13. Any additional comments or suggestions you would like to share regarding DPP training in the battery sector?

Question 13 sought additional comments or suggestions from respondents about DPP (Digital Product Passport) training specifically within the battery sector. Out of all entities surveyed, only Entity 9 provided a response.

Comment from Entity 9

- **Comment**: "I believe DPP should be implemented at the earliest possible time."
- **Entity Type**: IT company
- **Location**: United Kingdom

Analysis

The comment provided by Entity 9 highlights a proactive stance towards the implementation of DPPs. This perspective is particularly significant coming from an IT company that has already implemented DPPs for other sectors. The IT company's advocacy for early implementation underscores the perceived benefits and potential business opportunities associated with DPPs.

Insights

1. **Business Opportunities for IT Companies**:
    - For IT companies, the early implementation of DPPs represents an expansion of their core business services. By advocating for early adoption, IT companies like Entity 9 can leverage their expertise to support other industries in integrating DPPs, thereby creating new revenue streams and strengthening their market position.
2. **Contrast with Manufacturing Companies**:
    - While IT companies see DPP implementation as an opportunity, manufacturing companies have expressed concerns about the cost-benefit balance of DPP adoption (as seen in Question 12). This contrast highlights the differing perspectives based on industry roles and the direct impact of DPPs on their operations.
    - Manufacturing companies are likely to face significant upfront costs for DPP implementation, which may not immediately translate into tangible benefits. This disparity underscores the need for tailored strategies and support to address the specific challenges faced by different sectors.

Conclusion

The additional comment from Entity 9 emphasizes the importance of early DPP implementation, particularly from the perspective of IT companies that stand to gain from this transition. This proactive stance contrasts with the

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cautious approach of manufacturing companies, which are more concerned about the immediate costs and practical challenges of DPP adoption.

To address these differing perspectives, it is crucial to:

- **Highlight the Long-term Benefits**: Clearly communicate the long-term advantages of DPPs, including enhanced regulatory compliance, improved supply chain transparency, and potential cost savings through streamlined operations.
- **Provide Sector-specific Support**: Develop targeted training and support programs that address the unique needs and concerns of different sectors. For IT companies, this might involve advanced training on DPP implementation and integration. For manufacturing companies, focus on cost management strategies and practical case studies demonstrating successful DPP adoption.
- **Facilitate Collaboration**: Encourage collaboration between IT and manufacturing sectors to share best practices and leverage each other's strengths. This could involve joint training sessions, workshops, and pilot projects to showcase the benefits of DPPs in real-world applications.

By addressing these areas, the battery sector can better navigate the complexities of DPP implementation, ensuring a smoother transition and greater overall benefits across industries.

Final Conclusions (industry survey):

General Engagement and Implementation

- **Diverse Engagement Levels**: Engagement with Digital Product Passports (DPPs) varies widely across sectors and countries. IT and digital technology providers show more proactive engagement, whereas manufacturing companies display skepticism or indifference.
- **Organizational Representation**: The survey included a mix of manufacturing (4 entities), research/development (3), service provider (1), digital technology provider (1), and IT (1) entities, with representation from the UK, Portugal, Spain, Denmark, Turkey, and Germany.

Digital Documentation and DPP Involvement

- **Digital Documentation Usage**: Organizations employ both traditional and digital documentation methods. IT and digital technology sectors are more advanced in digital solutions, while manufacturing and some research entities still rely on paper-based methods.
- **Exploration Trends**: There is a growing trend towards exploring and adopting DPPs, particularly in IT and digital technology sectors. Conversely, some manufacturing entities question the relevance of DPPs.

Barriers to Implementation

The main barriers to DPP adoption include the complexity of implementation, resource constraints, and mixed clarity on customer expectations. While there is a general awareness of regulatory requirements and adequate

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internal support in many entities, the prioritization of DPPs and understanding of customer needs vary significantly. Addressing these barriers through targeted training, better communication, and strategic resource allocation will be essential for improving DPP adoption across all sectors.

Several barriers to DPP implementation have been identified:

- **High Consensus Barriers**: Complexity of implementation and insufficient internal resources are widely recognized as significant challenges.
- **Disagreement:** respondents disagreed with the following areas to represent barriers in DPP implementation: missing internal guidance and support and regulatory requirements.
- There is mixed understanding among entities, whether customer expectations and prioritization of DPPs represent barriers.

Training and Educational Needs

- **High Consensus Training Topics**: Best practices and demos, regulatory compliance, and environmental impact assessment are critical training areas.
- **Moderate Consensus Training Topics**: System navigation, supply chain integration, require focused training.
- **Mixed Opinions Topics:** Are advanced topics such as data security and privacy protocols, Blockchain technology, or areas that are probably considered as nice to have like trouble shooting and issue resolution or may be burdensome like data entry and documentation.
- **Preferred Training Formats**: Online courses, customized on-site training, and webinars are highly preferred, reflecting a desire for flexible and accessible training solutions. Work-based training and in-person workshops have moderate support.

Future Expectations

Respondents have clear expectations for the future of DPPs:

- **High Consensus**: There is a strong expectation of increased efforts to meet legal obligations and for DPPs to become standard across industries. Most respondents disagree with having no expectations, indicating a general anticipation of significant changes.
- **Moderate Consensus**: Many seek guidance on future expectations, although some disagreement exists.
- **Low Consensus**: Expectations of competitive advantage from DPPs show mixed views, indicating the need for further refinement and clarification.

Recommendations

1. **Focus on Flexible and Accessible Training**:
   - Prioritize online courses, customized on-site training, and webinars to meet the high demand for these formats.
2. **Address Key Barriers**:

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- Develop targeted training to address the complexity of DPP implementation and the lack of internal resources. Provide clear regulatory guidance and best practices.

3. **Enhance Practical Training**:
   - Emphasize practical examples and demos to improve understanding and implementation. Ensure training covers regulatory compliance and environmental impact assessment.
4. **Clarify Customer Expectations and Resource Allocation**:
   - Offer training on understanding customer expectations and managing resources effectively.
5. **Provide Future Guidance and Support**:
   - Offer clear, forward-looking guidance to address the need for future expectations. Target uncertainties around competitive advantages through specific training and communication.

Distinctions Based on Entity Types

- **Manufacturing Companies**: Show scepticism about DPP relevance and have significant concerns about complexity and internal resources. They prefer flexible training formats and demand compliance and best practices training.
- **Research/Development Companies**: Actively follow DPP developments and need internal resources and support. They demand best practices, regulatory compliance, and environmental impact assessment training.
- **Service Providers**: Plan to explore DPPs and have less concern about implementation complexity. They prefer online courses and customized on-site training.
- **Digital Technology Providers**: Confident in regulatory knowledge and resources, they have a high demand for best practices and data security training.
- **IT Companies**: Confident in regulatory requirements and internal resources, they show a strong preference for online courses, customized on-site training, and webinars.

Additional Comments

Only one respondent (an IT company from the UK) provided additional comments, emphasizing the urgency of DPP implementation. This suggests that IT companies see new business opportunities in DPP implementation, while manufacturing companies are more concerned about the costs versus benefits.

Overall Conclusion

The report highlights the diverse engagement levels, barriers, and training needs associated with DPP implementation across different sectors. By addressing these specific needs through tailored training programs, clear regulatory guidance, and practical examples, organizations can navigate the complexities of DPP adoption, enhance sector-wide engagement, and effectively leverage the benefits of DPPs.

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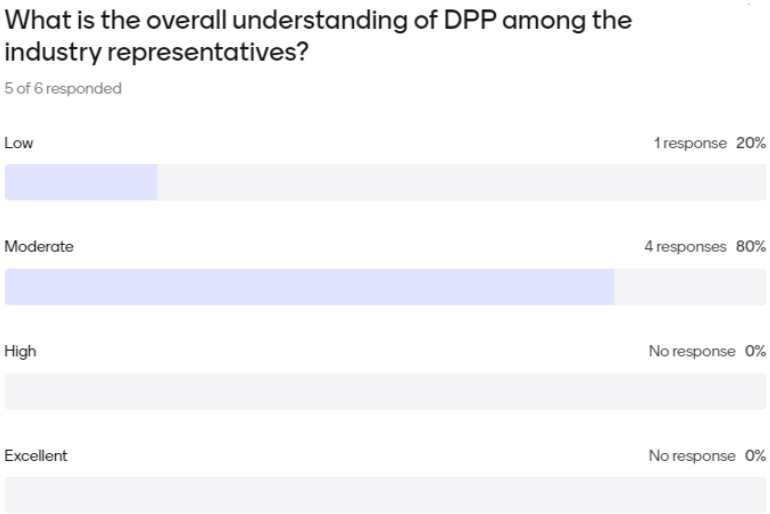
Round Table Results

An online roundtable was organized with the purpose of validation of the survey results (presented in the previous chapter with the expert panel views and opinions allowing for a more effective analysis of the DPP in the battery sector. The panel consisted of 5 participants who were external representatives from both the education and industry sectors.

The round table focused on analysing the results of the survey and engaging the panel for feedback questions through the use of the Mentimeter. Mentimeter is an application that helps instantly gather input from a group directly presenting the participants with polls multiple-choice and open-ended questions, quizzes, and scales that audience members can interact with live.

During the round table discussion, the survey results gave an overview on the current state of the Digital Product Passport (DPP) in the battery sector. The results showed various perspectives from industry professionals and vocational educational training (VET) centers. This discussion of the results helped in understanding the current landscape, challenges, and opportunities associated with DPP implementation.

Concerning the overall understanding of DPP among industry, the experts consider that industry still have a low to moderate knowledge, that some have the basic understanding, but is not widespread, revealing that there is a lot of work to be done in order to deal with challenges that most of the industry are facing. The challenges pointed out, were the lack of structure data, knowledge, commercial bias, the initial investment costs, the need to engage all value of chain, to perceived how data is going to be shared. It was also point out that DPP concept is not sufficient clear and only a few consider DPP a competitive advantage and an important asset in the future.



Based on this round table discussion, the key take-aways are the following:

<u>Awareness and Understanding:</u>

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- Need for increase in awareness and understanding of DPP among industry stakeholders who are currently unaware or unsure about its benefits.
- Role of VET centres can play in bridging the knowledge gap.

Implementation Challenges:

- Need for strategies to be employed to mitigate the high costs associated with DPP implementation.
- Develop and promote standardized guidelines for DPP across the industry.

Technical Expertise:

- Enhance technical expertise in the workforce regarding DPP technologies and processes.
- Industry partnerships with VET centres need to be strengthened to ensure relevant training and education.

Perceived Benefits:

- Importance of real-world examples from the industry where DPP has significantly improved operational efficiency or compliance.
- Better communication of the long-term benefits of DPP to stakeholders

Future Directions:

- Providing stakeholder-specific training is essential for the successful adoption and implementation of DPP in the battery sector. Collaborative efforts between industry, VET centres, and regulatory bodies will be key to achieving these training goals.
- Defining next steps for the industry and VET centres in advancing the adoption of DPP
- Foster a collaborative ecosystem to support continuous improvement and innovation in DPP practices.
- The training should be addressed to managers
- As main training topics experts referred to Data ownership, Data Sharing and Security Protocols, Passport Labels creation, Regulatory landscape
- A Modular approach would be the most adequate allowing the training be structure into different level of proficiency.

The above take-aways from this round table could be used in the definition of the curricula, training materials, and DPP maturity assessment methodology.

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Final Conclusion

The VET and industry survey results provided invaluable insights into the battery sector, helping to understand the broader context necessary for a successful Digital Product Passport DPP transition. **This chapter presents the conclusions drawn from the VET and industry surveys as well as the online roundtable discussion**, along with recommendations for developing training curricula, materials, and delivery methods to ensure a smooth transition.

The VET Survey report offers a comprehensive analysis of the current landscape and needs for DPP training across various educational and training organizations in Europe. The findings reveal significant insights into the current status of VET providers regarding DPP training, including available courses, training topics, resource adequacy, and suggestions on training methodologies and assessment practices.

Experience with DPP Training: The majority of respondents reported **no experience in delivering DPP training**, indicating a **significant gap** in current training provisions. Technology centers and research organizations have some engagement in DPP training, suggesting their potential role as models or partners for other sectors. VET schools and universities show a gap in DPP training experience, presenting an opportunity for capacity building and development.

DPP Training Topics: There is prevailing consensus on the importance of core DPP training topics such as data entry and documentation, case studies and best practices, environmental impact, DPP system navigation and implementation, data security, supply chain integration, regulatory compliance.

However, significant uncertainty exists regarding advanced topics like blockchain technology and troubleshooting. This highlights the need for clearer communication and more focused training in these areas. Practical examples through case studies and best practices are highly valued, indicating the necessity of incorporating real-world applications into training programs.

Training Resource Adequacy: A significant number of entities lack the necessary resources for effective DPP training, particularly in curriculum development, practical tools, and trainers' expertise. This underscores the need for initiatives to develop comprehensive curricula, high-quality training materials, and enhanced trainer capabilities.

Training Methodologies: The preferred training methodologies include a combination of traditional, online, and experiential learning approaches. Online courses and classroom lectures are highly favoured, along with case studies, work-based learning, hands-on workshops. A blended learning approach is recommended to cater to diverse learning preferences and enhance training effectiveness.

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Evaluation Methods: Exercises, practical application and continuous feedback are the most favored methods for evaluating DPP training effectiveness. However, there is moderate to low agreement on the use of exams, indicating an inclination to rather more practical approach in obtaining knowledge than one-time evaluation.

Other Details and E-learning: The limited feedback on e-learning solutions highlights the interest in digital and remote learning methodologies. Integrating e-learning platforms into the DPP training curriculum can enhance accessibility and convenience, making training programs more effective and scalable.

Expected implementation challenges: Tailoring training programs, staying abreast of technological advancements, managing organizational resistance, standardizing guidelines, allocating sufficient resources, and ensuring data security are all crucial components for improving the effectiveness of DPP training initiatives and facilitating smoother adoption and implementation of Digital Product Passports.

The VET Survey results highlight the crucial areas for improvement in DPP training, including the need for better resources, clearer communication on advanced topics, and a blended learning approach. By addressing these gaps and leveraging the strengths identified, training centers can significantly enhance their capacity to deliver effective DPP training programs. This will support the broader adoption and implementation of Digital Product Passports, contributing to improved product traceability and sustainability in various sectors. Collaborative efforts and targeted support are essential to bridge the current gaps and promote widespread adoption of DPP training.

The industry survey results offer invaluable insights into the current state of the battery industry concerning the transition to Digital Product Passports (DPPs). The following section presents the conclusions drawn from these industry findings.

Diverse Engagement Levels: Engagement with Digital Product Passports (DPPs) varies widely across sectors and countries. IT and digital technology providers show more proactive engagement, whereas manufacturing companies display scepticism or indifference.

Exploration Trends: There is a growing trend towards exploring and adopting DPPs, particularly in IT and digital technology sectors. Conversely, some manufacturing entities question the relevance of DPPs.

Barriers to Implementation: The main barriers to DPP adoption include the complexity of implementation, resource constraints, and mixed clarity on customer expectations. While there is a general awareness of regulatory requirements and adequate internal support in many entities, the prioritization of DPPs and understanding of customer needs vary significantly. Addressing these barriers through targeted training, better communication, and strategic resource allocation will be essential for improving DPP adoption across all sectors.

Training and Educational Needs: The survey identified key training topics for Digital Product Passport (DPP) implementation, categorizing them based on the level of agreement among respondents. High-priority topics include best practices and demos, regulatory compliance, and environmental impact assessment, which are deemed critical. There is moderate agreement on the need for training in system navigation and supply chain integration. Opinions vary more widely on advanced topics such as data security and privacy protocols,

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Blockchain technology, troubleshooting, issue resolution, and potentially burdensome areas like data entry and documentation. The preferred training formats are online courses, customized on-site training, and webinars, indicating a strong preference for flexible and accessible training solutions. Work-based training and in-person workshops also received moderate support.

Future Expectations: Respondents expressed clear expectations for the future of Digital Product Passports (DPPs). A significant majority anticipate increased efforts to meet legal obligations and for DPPs to become standard across industries, reflecting strong agreement on these points. There is moderate agreement on the desire for clearer guidance on future expectations, although some differences in opinion exist. However, expectations regarding the competitive advantages of DPPs show mixed views, indicating a need for further refinement and clarification.

The results highlight the diverse engagement levels, barriers, and training needs associated with DPP implementation across different sectors. By addressing these specific needs through tailored training programs, clear regulatory guidance, and practical examples, organizations can navigate the complexities of DPP adoption, enhance sector-wide engagement, and effectively leverage the benefits of DPPs.

The online roundtable discussion highlighted a significant knowledge gap in the sector regarding the concept of Digital Product Passports (DPPs). There is a notable lack of awareness and understanding about the benefits DPPs can offer to companies, as well as a deficiency in technical knowledge on how to implement them. Experts recommended showcasing real case scenarios to demonstrate the advantages of DPPs, particularly within the battery sector, to increase awareness and understanding. Furthermore, the training should target managers.

Based on the results of the surveys and online roundtable, the following comprehensive recommendations are proposed to enhance the effectiveness and facilitate the transition of DPP through training programs:

- Promote awareness and understanding of Digital Product Passports (DPPs) by conducting introductory sessions and providing informational materials. This will help ensure that all participants have a clear grasp of DPP concepts and their importance. Additionally, clarify advanced topics and their relevance to various sectors to reduce uncertainty and enhance engagement. Initially, focus on managers as the target audience for awareness promotion.
- Develop a flexible and standardized curriculum that includes core topics such as data entry, documentation, regulatory compliance, and environmental impact assessment, as well as advanced topics like blockchain technology and troubleshooting with clear explanations and practical applications.
- Enhance training resources by providing high-quality materials, including comprehensive content, case studies, best practices, and practical tools. Develop simulation environments and test scenarios to offer hands-on learning experiences.
- Adopt blended learning approaches that combine traditional classroom lectures with online courses, case studies, work-based learning, hands-on workshops, and simulation applications. Utilize multimedia tools such as videos, interactive simulations, and virtual labs to enhance engagement and learning outcomes.
- Leverage practical examples by incorporating real-world case studies and best practices into the training programs to illustrate practical applications of DPP. Highlight successful DPP implementation examples to demonstrate benefits and challenges.

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ANNEXES

I – Survey Results

2 – Round table inputs

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I – Survey Results

Questions 1-9 (Training center survey)

Entity	1. Name of the Training Center	2. Country	3. Your e-mail (optional)	4. To which type of organisation do you belong?	5. Please select your main position in the center	6. Has your organization ever delivered any training on Digital product passport (DPP)?	7. If yes, what is the product or industry focus of the most relevant training(s) you provided on DPP?	8. If yes, what is the name of the most relevant training(s) you provided at DPP?	9. If yes, how often does your organization deliver DPP training?
Entity 1	Confidential	Denmark	Confidential	VET school	Department manager	No			
Entity 2	Confidential	Portugal	Confidential	Technology Centre	Owner/Legal representative/ Director	Yes	Safety passport	Safety	Daily
Entity 3	Confidential	Danmark	Confidential	VET school	Department manager	No			
Entity 4	Confidential	Denmark	Confidential	VET school	Department manager	No			
Entity 5	Confidential	North Macedonia	Confidential	Welding consulting	Owner/Legal representative/ Director	No			
Entity 6	Confidential	Spain	Confidential	Research Technology Organisation	Team manager	Yes, through Research Projects as part of dissemination of the project results	Overview of the DPP using a Mobile Phone/Battery use case	Adoption of the Digital Product Passport (DPP) to drive circularity	
Entity 7	Confidential	Romania	Confidential	Independent Training Provider	Department manager	No			
Entity 8	Confidential	Denmark	Confidential	Educational department	Training manager	No			
Entity 9	Confidential	Portugal	Confidential	VET school	Team manager	No			

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Entity 10	Confidential	Portugal	Confidential	VET school	Department manager	No			
Entity 11	Confidential	Italia	Confidential	University	Teacher/trainer	No			

Entity	**1. Name of the Training Center**	**2. Country**	**3. Your e-mail (optional)**	**4. To which type of organisation do you belong?**	**5. Please select your main position in the center**	**6. Has your organization ever delivered any training on Digital product passport (DPP)?**	**7. If yes**, what is the product or industry focus of the most relevant training(s) you provided on DPP?	8. If yes, what is the name of the most relevant training(s) you provided at DPP?	**9. If yes,** how often does your organization deliver DPP training?
Entity 12	Confidential	Finland	Confidential	VET school	Teacher/trainer	A small part, about battery passport	Battery passport	It was a part of another course related to batteries.	
Entity 13	Confidential	Portugal	Confidential	University	Researcher	No			
Entity 14	Confidential	Portugal	Confidential	VET school	Teacher/trainer	No			

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Question 10 (Training center survey)

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10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [DPP system navigation and utilization]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Data entry and documentation]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Regulatory compliance knowledge]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Data security and privacy protocols]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Troubleshooting and issue resolution]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Supply chain integration]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Environmental impact assessment]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Understanding blockchain technology]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Case studies and best practices e.g. in terms of DPP content and implementation]
Not sure	Strongly agree	Agree	Strongly agree	Agree	Agree	Agree	Agree	Agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Not sure	Strongly agree	Not sure	Not sure	Agree
Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree

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Question 10 (Training center survey)

10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [DPP system navigation and utilization]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Data entry and documentation]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Regulatory compliance knowledge]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Data security and privacy protocols]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Troubleshooting and issue resolution]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Supply chain integration]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Environmental impact assessment]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Understanding blockchain technology]	10. To what extent do you agree with the importance of the following training topic(s) for effective adoption of Digital Product Passport (DPP)? (Please scroll to the left to see all options for use on a mobile device) [Case studies and best practices e.g. in terms of DPP content and implementation]
Not sure	Strongly agree	Agree	Strongly agree	Agree	Agree	Agree	Agree	Agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Not sure	Strongly agree	Not sure	Not sure	Agree
Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
Strongly agree	Agree	Strongly agree	Agree	Not applicable	Agree	Strongly agree	Not sure	Strongly agree
Agree	Agree	Not sure	Agree	Agree	Agree	Strongly agree	Disagree	Agree
Not sure	Not sure	Not sure	Not sure	Not sure	Not sure	Not sure	Not sure	Not sure
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	Strongly agree	Agree	Not sure	Agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	Strongly agree	Agree	Strongly agree

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Agree	Strongly agree	Strongly agree	Agree	Not sure	Strongly agree	Strongly agree	Agree	Strongly agree
Strongly agree	Strongly agree	Not sure	Not sure	Not sure	Not sure	Strongly agree	Not sure	Strongly agree
Agree	Strongly agree	Strongly agree	Strongly agree	Agree	Strongly agree	Strongly agree	Not sure	Agree
Not sure	Not sure	Not sure	Not sure	Not sure	Not sure	Not sure	Not sure	Not sure

Question 11 (Training center survey)

11. Do you have adequate resources for DPP training in your center? Select all adequate resources
Curriculum, Assessment methods, Trainers' expertise, Simulation environment for demo, Test environment for demo, Demonstrate DPPs in a life environment
Curriculum, Content as training materials, Case studies- as training materials, best practices as training materials, Assessment methods, Trainers' expertise
dffd
Other
No
Case studies- as training materials, Test environment for demo
Other
No
Curriculum, Content as training materials
Curriculum, Trainers' expertise
Curriculum, Simulation environment for demo
Content as training materials

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Curriculum, Content as training materials, Test environment for demo
Curriculum, Content as training materials, Case studies- as training materials, best practices as training materials, Assessment methods, Trainers' expertise, Test environment for demo

Question 12 (Training center survey)

12. What training methodologies do you find effective for teaching DPP concepts and implementation strategies?
Classroom lectures, Hands-on workshops, Online courses, Case studies, Simulation applications, Work-based learning
Classroom lectures, Online courses, Case studies
Classroom lectures, Online courses, Case studies, Work-based learning
Case studies
Classroom lectures, Hands-on workshops, Online courses, Case studies, Simulation applications, Work-based learning
Online courses, Case studies, Work-based learning
Online courses, Work-based learning
No idea
Classroom lectures, Hands-on workshops, Online courses, Work-based learning
Classroom lectures, Hands-on workshops, Online courses, Case studies, Simulation applications, Work-based learning
Classroom lectures, Simulation applications
Classroom lectures, Hands-on workshops, Online courses, Case studies
Hands-on workshops, Online courses, Simulation applications, Work-based learning
Classroom lectures, Hands-on workshops, Online courses, Case studies, Work-based learning

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Question 13 (Training center survey)

13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Exams]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Practical application]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Exercises]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Continuous feedback]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Mechanisms]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Other]
Agree	Strongly agree	Agree	Agree	Strongly agree	Not applicable
Strongly agree	Not sure	Strongly agree	Not sure	Not applicable	Not applicable
Not sure	Strongly agree	Strongly agree	Strongly agree	Not sure	Strongly agree
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
Agree	Strongly agree	Agree	Strongly agree	Not applicable	Not applicable
Not sure	Agree	Agree	Agree	Not sure	Not applicable
Not sure	Not sure	Not sure	Not sure	Not sure	Not sure
Strongly agree	Strongly agree	Agree	Agree	Not sure	Not sure

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13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Exams]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Practical application]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Exercises]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Continuous feedback]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Mechanisms]	13. To what extent do you agree with the methods of evaluation proposed for assessing the effectiveness of DPP training? (Please scroll to the left to see all options for use on a mobile device) [Other]
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	Agree
Agree	Strongly agree	Strongly agree	Agree	Not applicable	Not applicable
Not sure	Agree	Strongly agree	Strongly agree	Not sure	Not applicable
Not sure	Agree	Agree	Strongly agree	Not sure	Not sure
Not sure	Not sure	Not sure	Not sure	Not sure	Not sure

Question 14 (Training center survey)

14. If other, please provide details

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E-learning solutions
-

Questions 1-7 (Industry survey)

Entity	1. Name of Company/Organization	2. Your e-mail (optional)	3. Country	4. Organization type	5. What is your role within the business?	6. Does your organization currently use any form of digital documentation for tracking battery products throughout their lifecycle?	7. Is your company already involved with the Digital Product Passport (DPP)?
Entity 1	Confidential	Confidential	Portugal	Manufacturing	project manager		

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Entity 2	Confidential	Confidential	Denmark	Manufacturing	Management	Custom Software	We plan to explore DPPs in the next 24 month.
Entity 3	Confidential	Confidential	Turkey	Engineer Service Provider	Management	Excel/Spreadsheets	We plan to explore DPPs in the next 24 month.
Entity 4	Confidential	Confidential	PORTUGAL	Research/Development	Management	NA	we are following DPP developments as our Industrial partners (from Manufacturing sectors) are curious about it.
Entity 5	Confidential	Confidential	United Kingdom	Digital technology provider	Management	We are developing digital solutions for tracking	Yes, we implemented DPPs for all our products/ services.
Entity 6	Confidential	Confidential	Spain	Research/Development	Head of research group	Paper-based	we are working on studying the requirements for DPP
Entity 7	Confidential	Confidential	United Kingdom	IT	Technical	Custom Software	We plan to explore DPPs in the next 24 month.
Entity 8	Confidential	Confidential	UK	Research/Development	Research	Excel/Spreadsheets	Heard about it but did not dive into it.

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Entity	1. Name of Company/Organization	2. Your e-mail (optional)	3. Country	4. Organization type	5. What is your role within the business?	6. Does your organization currently use any form of digital documentation for tracking battery products throughout their lifecycle?	7. Is your company already involved with the Digital Product Passport (DPP)?
Entity 9	Confidential	Confidential	Spain	Manufacturing	R&D	Paper-based	No, I think it's not relevant for my work.
Entity 10	Confidential	Confidential	Germany	Manufacturing	Management	I unfortunately do not know the answer to this question.	No, I think it's not relevant for my work.

Question 8 (Industry survey)

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8. Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP 1 - Strongly disagree, 5 Strongly agree, 6 - Not applicable for me (Please scroll to the left to see all options for use on a mobile device) [Implementing DPPs is a very complex task.]	8. Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP 1 - Strongly disagree, 5 Strongly agree, 6 - Not applicable for me (Please scroll to the left to see all options for use on a mobile device) [I have no idea about the regulatory requirements on DPPs.]	8. Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP 1 - Strongly disagree, 5 Strongly agree, 6 - Not applicable for me (Please scroll to the left to see all options for use on a mobile device) [I don't understand the expectations of my customers in terms of DPPs.]	8. Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP 1 - Strongly disagree, 5 Strongly agree, 6 - Not applicable for me (Please scroll to the left to see all options for use on a mobile device) [I have other things to do that are of higher priority.]	8. Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP 1 - Strongly disagree, 5 Strongly agree, 6 - Not applicable for me (Please scroll to the left to see all options for use on a mobile device) [I don't have enough]	8. Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP 1 - Strongly disagree, 5 Strongly agree, 6 - Not applicable for me (Please scroll to the left to see all options for use on a mobile device) [I'm missing internal guidance and support.]	8. Indicate the level of agreement /disagreement about the statement below concerning the barriers in preventing or limiting the implementing DPP 1 - Strongly disagree, 5 Strongly agree, 6 - Not applicable for me (Please scroll to the left to see all options for use on a mobile device) [internal resources to deal with DPPs.]
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Agree	Disagree	Not sure	Agree	Not sure	Disagree	Disagree
Disagree	Strongly disagree	Strongly disagree	Disagree	Not applicable	Disagree	Strongly agree
Agree	Strongly agree	Not sure	Disagree	Agree	Agree	Agree
Strongly disagree	Strongly disagree	Disagree	Strongly disagree	Strongly disagree	Disagree	Disagree
Strongly agree	Disagree	Not sure	Not sure	Agree	Agree	Agree
Strongly disagree	Strongly disagree	Strongly disagree	Strongly disagree	Strongly disagree	Strongly disagree	Strongly disagree
Not sure	Not sure	Agree	Strongly agree	Not sure	Not sure	Not sure

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Agree	Agree	Not applicable	Agree	Disagree	Disagree	Agree
Not sure	Strongly disagree	Strongly disagree	Not applicable	Not applicable	Not sure	Strongly disagree

Question 9 (Industry survey)

9. In terms of training and education, is there anything you foresee to need in terms of DPPs? Indicate the level of agreement /disagreement about the statement below	**9. In terms of training and education, is there anything you foresee to need in terms of DPPs?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all	**9. In terms of training and education, is there anything you foresee to need in terms of DPPs?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options	**9. In terms of training and education, is there anything you foresee to need in terms of DPPs?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options	**9. In terms of training and education, is there anything you foresee to need in terms of DPPs?** Indicate the level of agreement /disagreement about

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(Please scroll to the left to see all options for use on a mobile device) [Guidance and information to start with DPPs]	options for use on a mobile device) [Resources for training and guidance on DPPs]	for use on a mobile device) [Best practices and demos for DPP use cases, content and implementation]	for use on a mobile device) [Resources to train suppliers/customers on DPP benefits]	the statement below (Please scroll to the left to see all options for use on a mobile device) [Best practices for training suppliers upstream and customers downstream]
Agree	Agree	Agree	Agree	Agree
Strongly Agree	Strongly Agree	Strongly Agree	Not sure	Agree
Strongly disagree	Strongly disagree	Not sure	Not sure	Not sure
Agree	Agree	Agree	Strongly Agree	Agree
Agree	Agree	Agree	Agree	Agree
Agree	Agree	Agree	Strongly Agree	Agree
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Agree	Agree	Agree	Not sure	Not sure
Agree	Agree	Agree	Agree	Agree
Agree	Not sure	Strongly Agree	Not sure	Strongly Agree

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Question 10 (Industry survey)

10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [DPP system navigation and utilization]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Data entry and documentation]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Regulatory compliance knowledge]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Data security and privacy protocols]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Troubleshooting and issue resolution]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Best practices and demos for DPP use cases, content and implementation]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Supply chain integration]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Environmental impact assessment]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Understanding blockchain technology]

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Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree
Agree	Not sure	Strongly agree	Not sure	Not sure	Agree	Agree	Agree	Disagree
Not sure	Not sure	Agree	Agree	Not sure	Agree	Not sure	Agree	Agree
Strongly agree	Not sure	Strongly agree	Not sure	Not sure	Strongly agree	Strongly agree	Strongly agree	Not sure
Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree
Not sure	Agree	Not sure	Not sure	Not sure	Agree	Strongly agree	Strongly agree	Agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree
Not sure	Not sure	Agree	Not sure	Not sure	Not sure	Not sure	Not sure	Disagree
10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [DPP system navigation and utilization]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Data entry and documentation]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device)	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Data security and privacy protocols]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Troubleshooting and issue resolution]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Best practices and demos for DPP use cases,	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Supply chain integration]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Environmental impact assessment]	**10. What specific training topic(s) do you think would be crucial for your team to adopt DPP effectively?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device)

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		[Regulatory compliance knowledge]			content and implementation]			[Understanding blockchain technology]
Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Not sure
Strongly agree	Strongly agree	Not sure	Strongly agree	Strongly agree	Strongly agree	Not sure	Not sure	Disagree

Question 11 (Industry survey)

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11. Do you have any preferred training format for DPP? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Online Courses]	**11. Do you have any preferred training format for DPP?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [In-Person Workshops]	**11. Do you have any preferred training format for DPP?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Webinars]	**11. Do you have any preferred training format for DPP?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Customized On-site Training]	**11. Do you have any preferred training format for DPP?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Work-based training]	**11. Do you have any preferred training format for DPP?** Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [Other]
Agree	Agree	Agree	Agree	Agree	Agree
Agree	Agree	Agree	Agree	Agree	Not sure
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Agree	Agree	Agree	Strongly agree	Strongly agree	Not applicable
Agree	Agree	Agree	Agree	Agree	Agree
Strongly agree	Disagree	Agree	Agree	Agree	Not applicable
Agree	Strongly agree	Agree	Strongly agree	Strongly agree	Agree
Agree	Disagree	Agree	Disagree	Not sure	Not sure
Agree	Agree	Agree	Strongly agree	Agree	Not sure
Strongly agree	Disagree	Not sure	Agree	Not sure	Not applicable

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Question 12 (Industry survey)

12. In terms of the future of DPPs, what do expect? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [I have no expectations at all.]	12. In terms of the future of DPPs, what do expect? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [I seek guidance on future expectations and considerations.]	12. In terms of the future of DPPs, what do expect? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [I anticipate DPPs becoming standard across industries and supply chains.]	12. In terms of the future of DPPs, what do expect? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [I anticipate increased effort to meet legal obligations for DPP implementation.]	12. In terms of the future of DPPs, what do expect? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [I anticipate that benefits from DPPs will not outweigh associated costs for my company.]	12. In terms of the future of DPPs, what do expect? Indicate the level of agreement /disagreement about the statement below (Please scroll to the left to see all options for use on a mobile device) [I expect a competitive advantage from effectively implementing DPPs in our supply chains.]
Not sure	Agree	Agree	Agree	Agree	Agree
Disagree	Agree	Agree	Strongly agree	Strongly agree	Strongly disagree
Disagree	Disagree	Not sure	Agree	Agree	Agree
Disagree	Agree	Strongly agree	Strongly agree	Strongly agree	Not sure
Disagree	Not sure	Agree	Agree	Strongly disagree	Strongly agree
Disagree	Agree	Agree	Agree	Agree	Agree
Strongly disagree	Agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree

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Disagree	Agree	Not sure	Agree	Not sure	Not sure
Not sure	Agree	Agree	Agree	Agree	Agree
Strongly disagree	Disagree	Agree	Not applicable	Agree	Not sure

Question 13 (Industry survey)

13. Any additional comments or suggestions you would like to share regarding DPP training in the battery sector?
I believe DPP should be implemented at the earliest possible time

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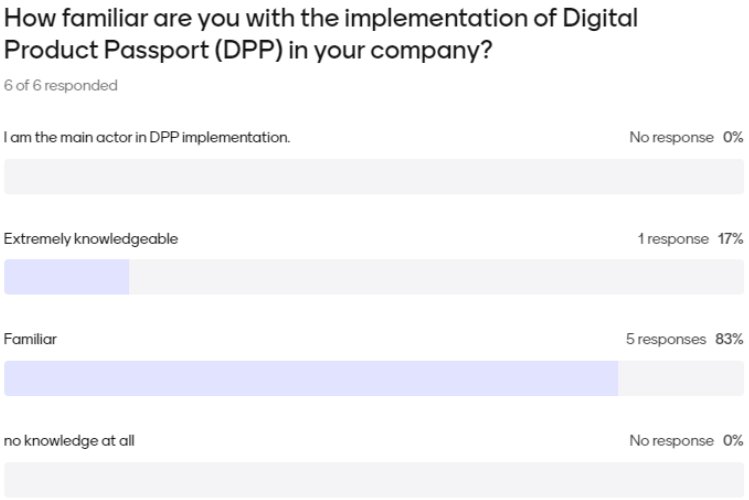
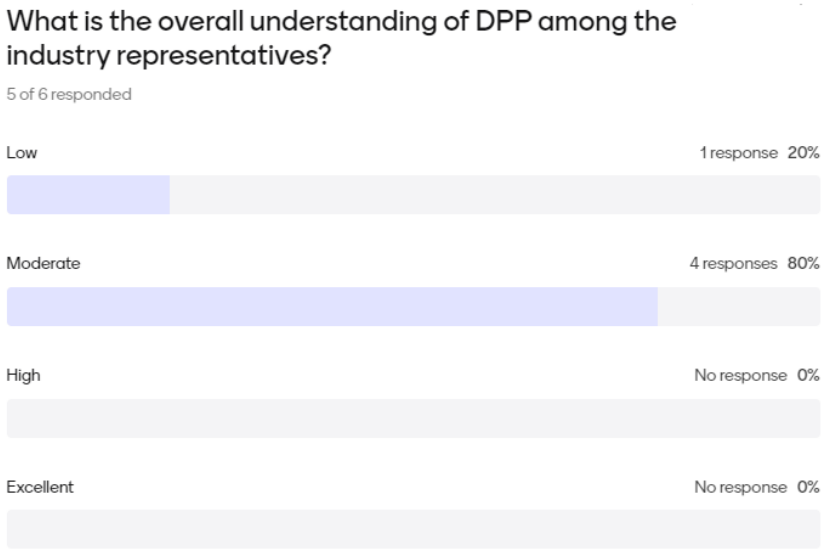
2 – Round table mentimeter results





Low: Limited or none understanding of DPP
Moderate: Some have a basic understanding of DPP, but it's not widespread.
High: A significant number have solid understanding of DPP
Excellent: The majority have a comprehensive understanding

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What are the potential challenges that industry representatives may face during DPP implementation?

10 responses

What is the importance of the following topics for adoption of DPP?

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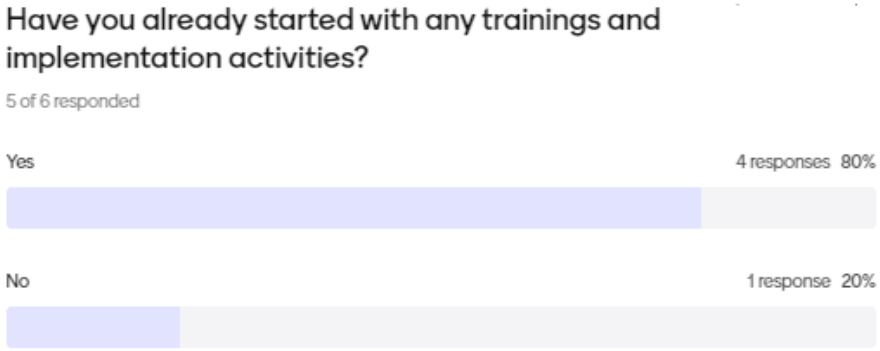

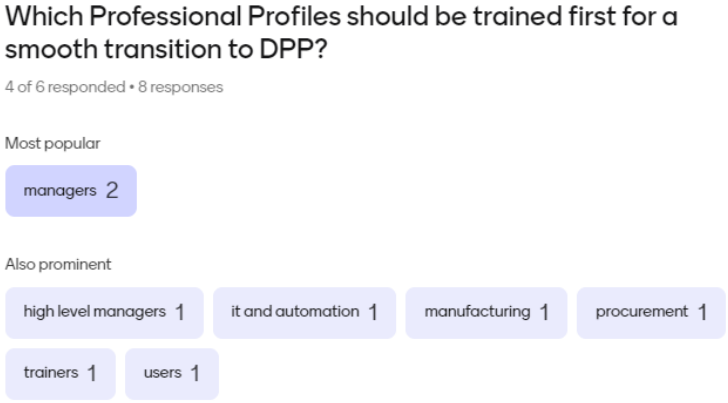

Blue collar does not need to be trained in that stage as they work is not impacted on DPP implementation. this DPP is automatized already so the bottom level is not necessary to be equipped with DPP knowledge.

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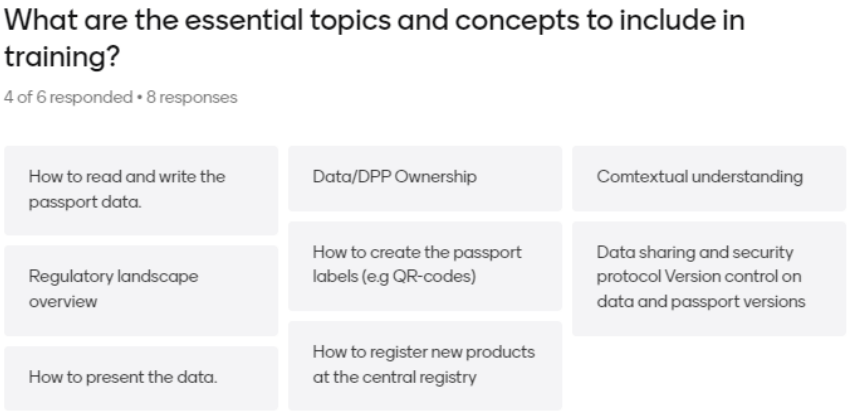

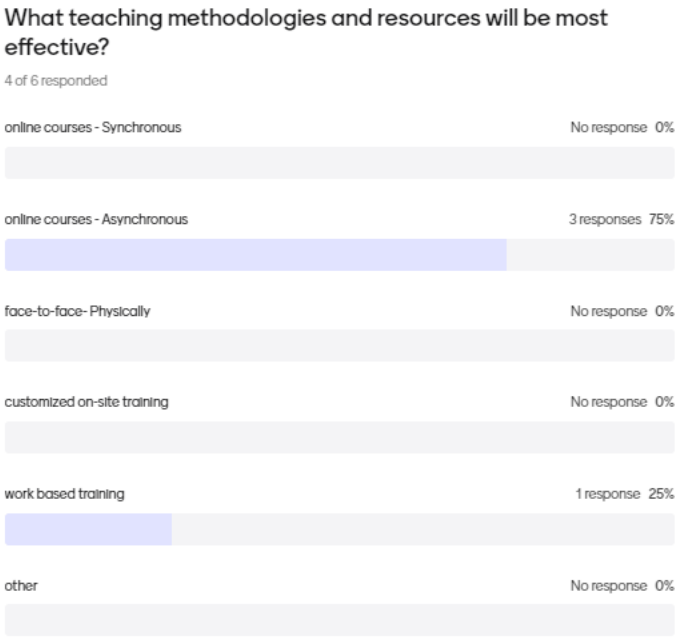

Teaching methods must be aligned with learning outcomes: all of them could be useful. One expert mentioned that asynchronous online courses aren't so effective as it has a huge percentage of dropouts due to lack of motivation.

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