



Product Passport through Twinning of Circular Value Chains

Deliverable 5.2

**Annual dissemination,
standardization and marketing
report v1**

WP5: Impact Creation, Solutions Scale-up and Exploitation

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Executive Summary

This document presents the dissemination, standardization and marketing activities conducted by the Ploto partners in the first year of the project. It includes all activities carried out through all online and offline outlets of the project (indicatively, social media channels – Facebook, LinkedIn and Twitter, project website etc.) as well as the participation of the different partners in clustering activities and events. Furthermore it presents the contributions to other projects as well as the presence in different events that were conducted in the first year. This document also provides a list of scientific publications made by the Ploto as well as the materials that were designed and developed to support all the communication and dissemination activities as initially conceptualized and put into the overall strategy of the communication and dissemination activities presented in Deliverable 5.1 Dissemination, Standardization and Marketing Plan. Lastly this deliverable also presents the status – at month 12 – of all achieved KPIs as defined in the D5.1.

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Acronyms and Abbreviations

Acronym	Description
DOA	Description of Action
EEIG	European Economic Interest Grouping
IoT	Internet of Things
EFFRA	European Factories of the Future Research Association
IDO	Industrial Data Ontology

1 Introduction

1.1 Purpose and Scope

This document constitutes the report that results from Task 5.1 – Industrial and Scientific Dissemination Activities which started from Month 1 of the project and receives input from all partners, with the goal to orchestrate all Plooto dissemination activities that target industrial and scientific communities based on the strategy and planned actions defined in Section 2.3.2 of the Description of Action (DOA). Further more this document also reports the results from Task 5.3 Standardisation Industry Commons Initiatives which started also from Month 1 of the project and handles all potential standardization activities according to the strategy and planned action similarly defined in the DOA. Lastly, this document provides a list of all academic Publications made by the Plooto partners during the initial 12 months of the project as well as the status – at month 12 – of all achieved KPIs relevant to dissemination and communication.

1.2 Relation with other deliverables

This deliverable is the first out of the set of three (3) deliverables that will be provided to the EC alongside with D5.3 and D5.4 periodically. Each of the aforementioned deliverables will report on the dissemination, standardization and marketing activities accomplished by the Plooto consortium partners during the respective reporting periods within the project lifecycle. This deliverable and the followup versions are meant to provide the outcomes of the overall strategy of the communication and dissemination activities that is presented in the submitted deliverable “Deliverable 5.1 Dissemination, Standardization and Marketing Plan” in terms of achieved KPIs that are being monitored.

1.3 Structure of the document

This deliverable is divided into nine different chapters:

- **Chapter 2** describes the communication activities conducted up to month 12.
- **Chapter 3** describes the dissemination activities conducted up to month 12.
- **Chapter 4** presents the clustering activities of the project up to month 12.
- **Chapter 5** describes the work relevant to the standardization activities up to month 12.
- **Chapter 6** presents the work relevant to the training and lifelong learning activities and materials to be used in the dissemination and communication actions
- **Chapter 7** aggregates the communication and dissemination KPIs and reports towards the current status
- **Chapters 8** presents the next steps.

2 Communication Activities up to M12

2.1 Project Website

The Plooto project website is already online from the starting months of the project and is operational. It currently looks that the one depicted in the following figure and in the course of the first year of operation it has undergone updates in the look and feel in various pages as well as an update in the News & Events section where the important news that derive from the project are presented. The plooto website is available at plooto-project.eu.

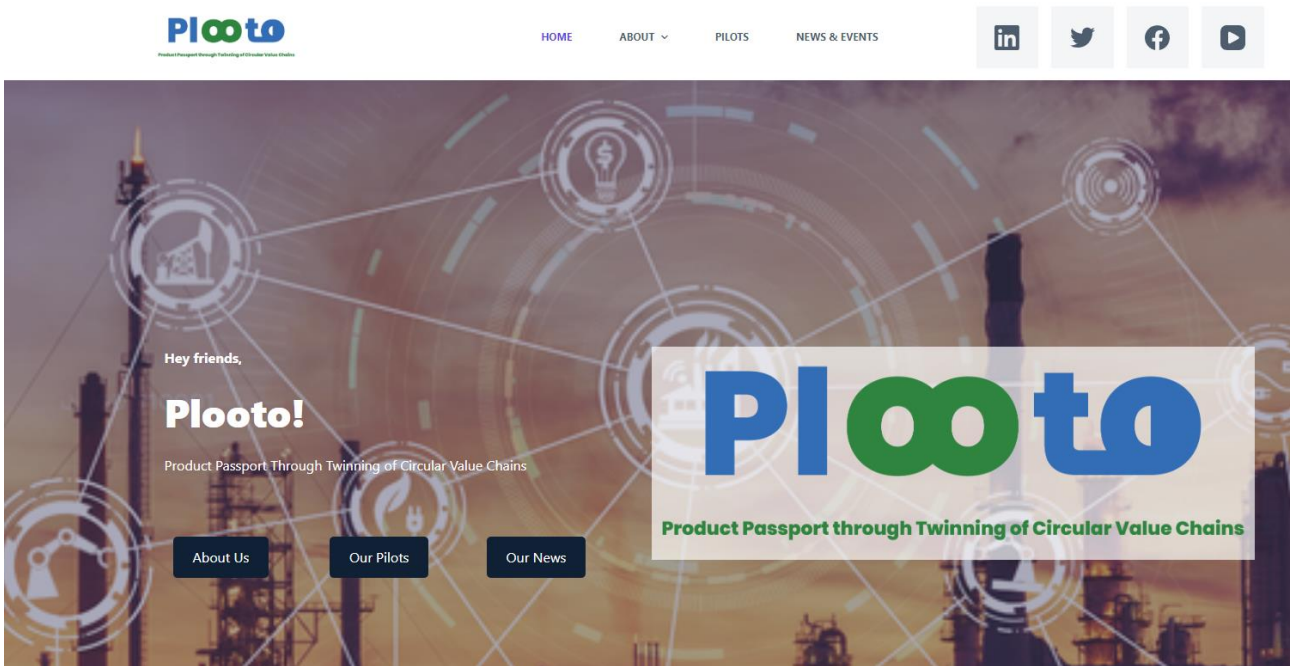


Figure 1: Plooto Website

In the Plooto website, dedicated post have been created highlighting the meetings that took place in the first year of the project lifecycle as well as other communication efforts (e.g. the participation in the P4Planets forum). As the project progresses, different news pieces will be created and posted in the placeholder of the News and Event. Additionally, in the deliverables' pages, all public deliverables will be made available for interested third parties alongside with the publications that have taken place relevant to the Plooto project. The diffusion of the project website can be seen in the following figure.

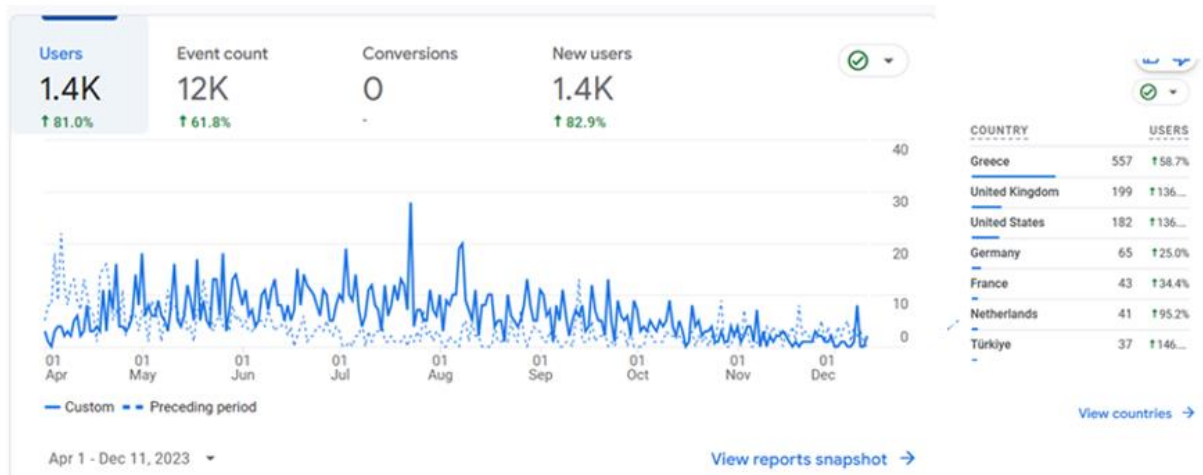


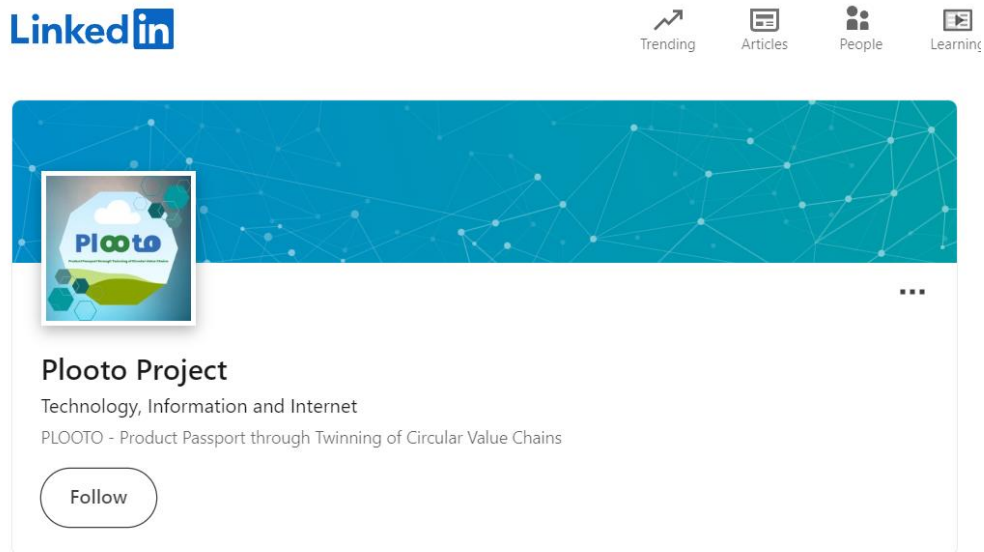
Figure 2: Ploto Website Analytics

2.2 Social Media

This section presents all the social media outlets as well as the activities that have taken place for which a social media post have taken place during the first year of the Ploto project. Ploto relies on different social media channels as means to maximize the dissemination range and impact of the project among the stakeholders' community as well as direct the different posts to different stakeholders, following the Plotos integrated communication and dissemination strategy as presented in Deliverable 5.1 Dissemination, Standardization and Marketing Plan and the respective scientific publication.

2.2.1 LinkedIn

The Ploto LinkedIn page has been operational from the beginning of the project and can be found here: <https://www.linkedin.com/company/ploto-project/>. Its current view is presented in the following figure.



About us

Plooto aims to deliver a Circular and Resilient Information System (CRIS) to support manufacturers in their green, digital and circular transition. CRIS enables waste reduction and end-to-end traceability of Secondary Raw Materials (SRM) through interconnected digital services for real-time decision-making, monitoring and certification of materials and products.

Figure 3: Plooto LinkedIn Page

Following the communication and dissemination plan, all major updates are published in the LinkedIn profile of the project including meeting and presentations of partners. Additionally, and to maintain an ongoing engagement, all partners are requested to periodically provide relevant to the Plooto project content to populate the social media presence (including LinkedIn) with respective and relevant content.

As can be seen in the following figure the overall reach of the Plooto LinkedIn profile includes **160 followers** that have contributed to Plooto having received **600 reactions** and **58 reposts** as well as over **9000 impressions** on its shared content. It merits here to present that all interactions are of organic nature showcasing its wide diffusion.

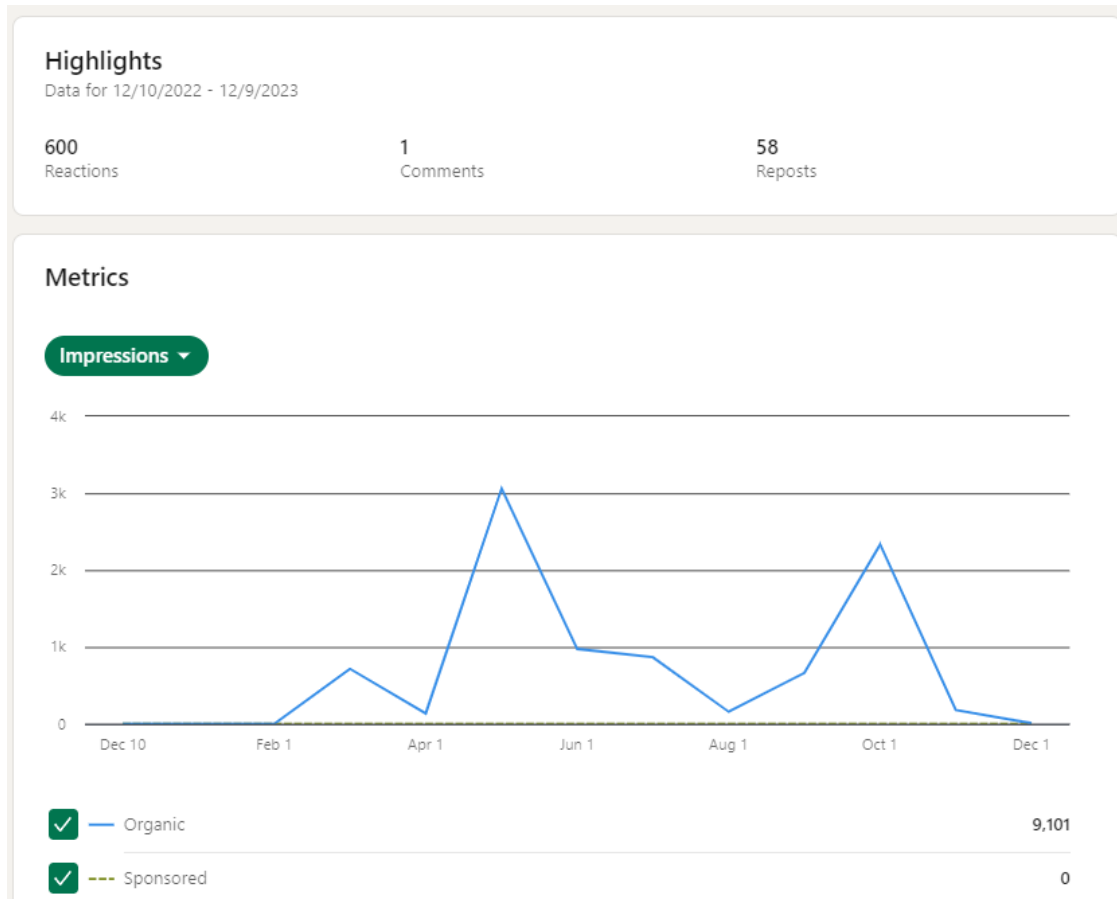


Figure 4: LinkedIn Page Analytics

In particular and regarding the posts that have taken place in the course of the first year of the project these amount to **27 posts** each of which have the following performances as presented in the following table.

Table 1: LinkedIn Posts

A/A	Post title	Post type	Impressions	Clicks	CTR	Reactions	Comments	Reposts	Engagement rate
1	Today, on International ...	Repost	319	7	2.19%	22	0	0	9.09%
2	Day #1 of the General Assembly Meeting of PLOOTO in Chania...	Image	1,654	28	1.69%	53	0	8	5.38%
3	As you enjoy your sun-soaked summer vacations,...	Video	229	1	0.44%	22	0	4	11.79%
4	IDC4EU along with other Plooto Project...	Text	437	4	0.92%	24	0	0	6.41%
5	Last month we concluded the	Image	233	8	3.43%	16	0	2	11.16%

A/A	Post title	Post type	Impressions	Clicks	CTR	Reactions	Comments	Reposts	Engagement rate
	first round ...								
6	Exciting News! We are thrilled...	Image	412	21	5.10%	36	0	1	14.08%
13	The strive towards sustainability and circul..	Text	303	8	2.64%	24	0	2	11.22%
14	Day #2 of the Plooto Project Plenary...	Image	741	51	6.88%	59	0	10	16.19%
15	Foivos Psarommatis from University of Oslo...	Repost	119	0	0%	7	1	0	6.72%
16	A glimpse of the Plenary Meeting for Plooto Proje..	Image	586	21	3.58%	55	0	12	15.02%
17	Time for one last meeting before the..	Image	181	2	1.10%	12	0	0	7.73%
18	Another Technical Meeting. We need to examine how..	Image	198	4	2.02%	17	0	0	10.61%
19	Dissemination and Communication is ...	Image	204	2	0.98%	22	0	1	12.25%
20	Once plans are made, Task leaders see...	Image	283	9	3.18%	21	0	5	12.37%
21	Every month starts with planning...	Image	200	4	2%	16	0	2	11%
22	Worskhop time. We need to ..	Image	509	12	2.36%	27	0	2	8.06%
23	Plooto Project partners meet ..	Image	210	6	2.86%	19	0	1	12.38%
24	A glimpse of the Plenary Meeting for..	Image	311	13	4.18%	61			
25	Today's Clustering event, organised ...	Repost	218	13	5.96%	14	0	0	12.39%
26	Time for the first online meeting ...	Image	425	31	7.29%	26	0	2	13.88%
27	We are proud to announce the Kick Off ...	Image	432	30	6.94%	34	0	1	15.05%

2.2.2 Twitter - X

The X (former Twitter) Ploto presentation has been operational from the first half of the project in order to accumulate enough tweets to have the medium engaged and can be found in the following link : ([@PlotoProject](#)). Its current view is presented in the following figure.



Figure 5: Ploto X/Twitter page

Similarly to all social media, the content that has been served through X follows the execution of the communication and dissemination plan and as can be seen in the following figure the overall reach of the Ploto X profile includes **61 followers** that have contributed to Ploto having received over **1500 impressions** on its shared content similarly all with organic nature.

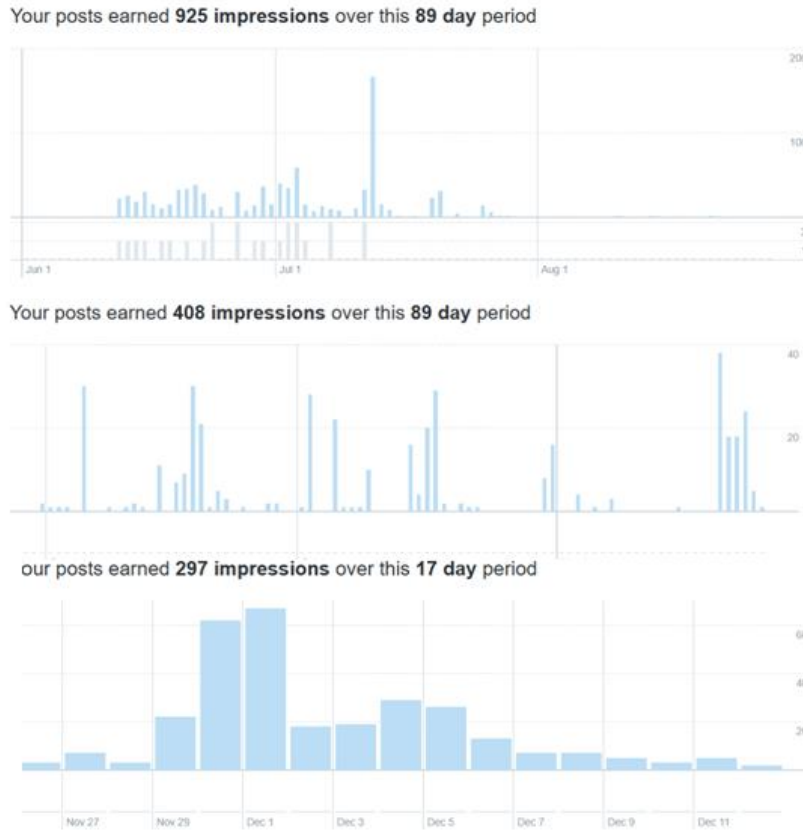


Figure 6: X/Twitter Analytics

In particular and regarding the posts that have taken place in the course of the first year of the project these amount to **29 posts** each of which have the following performances as presented in the following table.

Table 2: X / Twitter Posts KPIs

A/A	Tweet	Impressions	Engagements	Engagement Rate
1	ASPIS SA was very happy..	48	3	6.20%
2	To reduce waste ...	43	5	11.60%
3	Pilot 3 meeting...	61	8	13.10%
4	#CircularManufacturing	43	2	4.70%
5	The group of Permanent..	225	22	9.80%
6	A drone passport	33	2	6.10%
7	PlootoProject aims to extend..	36	3	8.30%
8	Digital Product passport..	36	8	22.20%
9	Sustainability is on the ...	23	3	13.00%
10	In @plootoproject Frontier..	35	8	22.90%
11	Stay tuned for ...	30	3	10.00%
12	Blockchain is a dece...	46	6	13%
13	QLEAP AI platform...	41	6	11.80%
14	#PlootoProject will benefit..	70	8	11.40%
15	How can Event Registr..	38	4	10.50%
16	Visit plooto-project..	26	2	7.70%

A/A	Tweet	Impressions	Engagements	Engagement Rate
17	TUV AUSTRIA Hellas...	42	6	14.30%
18	The Ploto project..	35	5	14.30%
19	Magnets: Commonly used..	87	13	14.90%
20	A new paper publi..	56	5	8.90%
21	How are the circular...	34	4	11.80%
22	Its been a great start for ...	40	4	10.00%
23	After 6 fruitful months..	44	10	22.70%
24	Mr. Kostas Kalampoukas..	70	7	10.00%
25	Which are the main..	39	4	10.30%
26	Today on international..	52	2	3.80%
27	The end of the year...	80	11	13.80%
28	The #Eufunded @plootoproject	17	4	23.50%
29	One of the @Plootoprojects.	96	6	6.20%
Totals		1526	174	

2.2.3 Facebook

Similarly to LinkedIn and Twitter, Facebook social medium has been utilized to diffuse the news of Ploto project and can be found at <https://www.facebook.com/plootoproject>. The current look of the facebook page of Ploto is presented in the following figure.

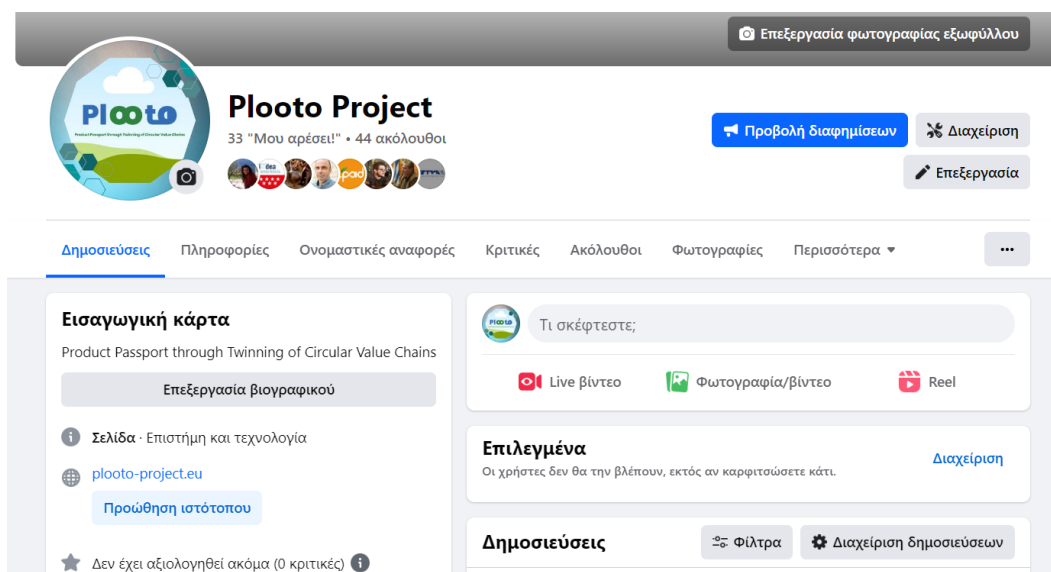


Figure 7: Ploto Facebook page

As can be seen in the following figure the overall reach of the Ploto Facebook page includes **44 followers** that have contributed to Ploto having received **33 likes** as well as over **4000** total number of **interactions** on its shared content. It merits here to present that also in this medium all interactions are of organic nature.

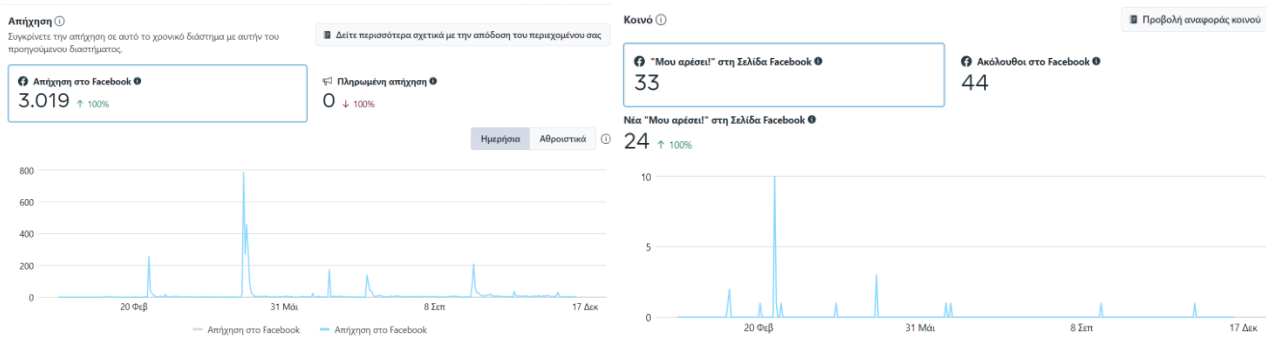


Figure 8: Facebook Analytics

In particular and regarding the posts that have taken place in the course of the reporting period of the project these amount to **17 posts** each of which have the following performances as presented in the following table.

Table 3: Facebook Posts KPIs

A/A	Post	Reach	Views	Likes	Shares	
1	We are proud to announce ...	200	278	22	2	
2	Today's Clustering event...	45	62	6	0	
3	Time for the first...	111	174	11	1	
4	Worskhop time...	61	68	0	8	
5	Ploto Project partners ...	27	30	0	6	
6	The #EUfunded Ploto...	21	31	0	11	
7	Day #2 of the Ploto...	166	207	0	53	
8	A glimpse of the Plenary ...	232	278	0	62	
9	Time for one last...	42	49	0	5	
10	Another Technical Meeting...	50	56	0	3	
11	Dissemination and Comm...	33	36	0	5	
12	Once plans are made...	47	49	0	5	
13	Every month starts ...	37	40	0	2	
14	Two days of Ploto ...	16	22	10		
15	The group of Permanent...	6	6	2	1	
16	Day #1 of the General ...	148	158	9		
17	ELTRUN The E-Business...	513	613			
Totals		1755	2157	60	164	4136

2.2.4 Youtube

The Youtube presence of the Ploto project (<https://www.youtube.com/@plootoproject>) has been created to serve as the communication channels of the developed Ploto content relative to video. Currently there is work conducted to develop the first video for Ploto project which will be made available in the Youtube channel. Additionally the channel currently has 11 Subscribers and its current look can be seen in the following figure.



Figure 9: Plooto YouTube channel

2.3 Newsletter

In the course of the project and relevant to the first year of the project lifecycle two Newsletters were foreseen to take place. As the project is still in its beginning and the website and remaining social media channels are still taking up in terms of users, it was decided to have the initial newsletters through project partners’ own channels who would work as hosts of the newsletter in parallel to the emails collected from the website and remaining outlets. On that account the initial Newsletter was disseminated through the ELTRUN E-Business R.C. newsletter list (from partner AUEB – Athens University of Economics and Business). Thus the first newsletter piece was sent to over 300 subscribers and its content was an introductory content relevant to the Plooto initiation and overall description. The first newsletter is presented in the following figure and is also available under the News&Events section of the website (<https://www.plooto-project.eu/2023/06/11/plooto-first-newsletter/>).

[View this email in your browser](#)



Product Passport through Twinning of Circular Value Chains

Welcome to the Ploto Project.

The constantly increasing demand for scarce resources and critical raw materials (CRMs) requires efficient usage of resources – reuse and recycling of materials- and responsible waste management and prevention. Ploto aims to deliver a Circular and Resilient Information System (CRIS) to support manufacturers in their green, digital and circular transition. CRIS enables waste reduction and end-to-end traceability of Secondary Raw Materials (SRM) through interconnected digital services for real-time decision-making, monitoring and certification of materials and products. The solution will be piloted in three different circular supply chains demonstrating waste reduction, reusability of scrap and production by-products, and operational improvement.

The Ploto Pilots

<p>Circular Waste Processing</p> <p>The Circular Waste Processing pilot aims to reduce the production of orange juice to recover CO₂ and then produce by-products such as animal feed, high quality cellulose for food industry, and a concentrate for cosmetics industry.</p>	<p>CRMP Waste for Drives</p> <p>The CRMP Waste for Drives pilot aims to use CRMP waste from the production of new computer materials to be re-used in the production of drives in the value chain.</p>	<p>WEEE for Magnets</p> <p>The WEEE for Magnets pilot uses WEEE to extract REE Standard REE and REE Oxides, and convert it to the REE which are used in SRM in the production of new magnets, aiming to increase their usage.</p>
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Consortium: The Ploto Project comprises of a diverse consortium of 20 partners from 9 countries. You can find the team [by following this link](#).
Our Objectives: The Ploto Project has a diverse set of objectives to help it change manufacturing. In a nutshell:

- Objective 1: Establish a digital transformation framework for circular value chain
- Objective 2: Develop a Cognitive Digital Twin (CDT) platform to support circularity in industrial processes
- Objective 3: A Circular and Resilient Information System (CRIS) for real-time decision making and SRM monitoring
- Objective 4: Validate the solution in three real cases (pilots) in different industrial domains
- Objective 5: Maximize the impact through dissemination, policy recommendations and standardization activities

Lastly, you can find all our deliverables that showcase the output of our work [in this link](#) which will be progressively populated with new material that will communicate the progress achieved through out the lifecycle of the project.



Ploto has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101092008

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Figure 10: Ploto First Newsletter

The upcoming newsletter of Ploto is scheduled to be sent out in the same manner as the previous with the support of the partners on the 15th of January 2024 in order to take advantage of the new year and not to have reduced diffusion due to different holidays.

2.3.1 Partners' Joint Efforts in Communication

In parallel to all the communication activities held through the official Plooto media outlets (Website, Social Media) the partners of Plooto also utilized their own channels (Website and Social Media) to communicate and disseminate the project scope and ongoing progress. The following table highlights sample activities that took place in the course of the first year of the Plooto project by each partners' own outlets.

Table 4: Partners' Communication and Dissemination actions through own Outlets

A/A	Partner	Description	Target Audience	Channel	Achievements
1	TUV AUSTRIA HELLAS	Dissemination of the project via the partners website, supported by social media presence & social media	Industry business partners, National authorities, Regional authorities, Local authorities, Citizens	Website, Social media, Newsletter	
2	IMDEA	Researchers engage with audience in an exhibition in Caixaforum, Madrid.	Local authorities, Citizens	Exhibition	100 Attendants to the exhibition
3	FRONT	Sharing GA meeting in Chania	Industry business partners, Innovators, Investors, EU Institutions, Research communities	Social media	397 Views, 13 Likes
4	FRONT	Sharing Technical meeting in Athens	Industry business partners, Innovators, Investors, EU Institutions, Citizens, Research communities	Social media	280 impressions, 12 likes.
5	ACCELI	Kickoff meeting for Plooto project conducted in Bologna [M1]	Industry business partners, Innovators	Social media	14 likes
6	ACCELI	Plooto project website promotion [M4]	Industry business partners, Innovators	Social media	13 likes
7	ACCELI	1st Plenary meeting in Barcelona, Spain [M5]	Industry business partners, Innovators	Social media	20 likes
8	ACCELI	1st workshop of Italian use case, which was conducted in Ascoli Piceno, Italy, and hosted by HPC.	Industry business partners, Innovators	Social media	20 likes
9	ACCELI	2nd Plenary meeting conducted in Crete, Greece [M10]	Industry business partners, Innovators	Social media	27 likes
10	CC	Brief description of Plooto project on Cetma Composites website	Industry business partners, Civil society, Citizens	Website	

A/A	Partner	Description	Target Audience	Channel	Achievements
11	TUC	Presentation of Plooto Project in our Group's website	Industry business partners, Innovators, EU Institutions, National authorities, Regional authorities, Local authorities, Citizens, Research communities	Website	N/A
12	TUC	LinkedIn post regarding the GA meeting in Chania	Industry business partners, Innovators, Investors, EU Institutions, National authorities, Regional authorities, Local authorities, Citizens, Research communities, Academia	Social media	31 Reactions and 4 Reposts / 951 Impressions, 81 Engagements and 46 Clicks
13	TUC	LinkedIn post regarding the presentation on IEES conference	Research communities, Academia	Social media	26 Reactions and 2 Reposts / 819 Impressions, 49 Engagements and 21 Clicks
14	TUC	LinkedIn post about the presentation of Process Simulation and Modelling (PSM) Tool in Barcelona GA	Industry business partners, Innovators, Investors, EU Institutions, Research communities, Academia	Social media	40 Reactions and 2 Reposts / 600 Impressions, 62 Engagements and 20 Clicks
15	TUC	LinkedIn post about the work on T2.6 during the Barcelona GA	Industry business partners, Innovators, Research communities, Academia	Social media	17 Reactions and 2 Reposts / 300 Impressions, 31 Engagements and 12 Clicks
16	TUC	LinkedIn post about WPI progress during Barcelona GA	Industry business partners, Innovators, EU Institutions, National authorities, Regional authorities, Local authorities, Research communities, Academia	Social media	58 Reactions and 4 Reposts / 833 Impressions, 80 Engagements and 18 Clicks

A/A	Partner	Description	Target Audience	Channel	Achievements
17	TUC	LinkedIn post regarding the Bologna Kick-Off meeting	Industry business partners, Innovators, Investors, EU Institutions, National authorities, Regional authorities, Local authorities, Citizens, Research communities, Academia	Social media	31 Reactions and 6 Reposts / 702 Impressions, 130 Engagements and 93 Clicks
18	IDC	Communicating the launch of Plooto, its overview and status	Industry business partners, Innovators, Investors, EU Institutions, Citizens, Research communities	Social media, Event (conference, meeting, workshop, internet debate, round table, group discussion, etc.)	
19	CETMA	Plooto activities promotion in CETMA social network	Industry business partners	Social media, Exhibition	Numbers of likes
20	AEGIS	Plooto news & updates	Industry business partners, Citizens	Website, Social media	The views of our Twitter posts range from 69 to 104/per post accumulating to 459 total views..
21	AUEB	Plooto Post	Industry Business partner	Website, Social Media	

2.4 Available Communication Materials

This section presents the set of dissemination and communication materials created for the use by project partners in their Plooto dissemination and communication activities. In the course of the second year the respective documents will undergo an update in order to account for different dissemination and communication target audiences and respective activities.

2.4.1 Document

The design of the documents follow the overall Plooto aesthetic and hold relative placeholders for all needed information. Indicative application of the template is presented in the following figure.



Figure 11: Ploto Document Example

2.4.2 Presentation

For the presentation, it was designed a similar aesthetic layout as was developed that holds different areas as header, title, subtitle, information about the project, among others.

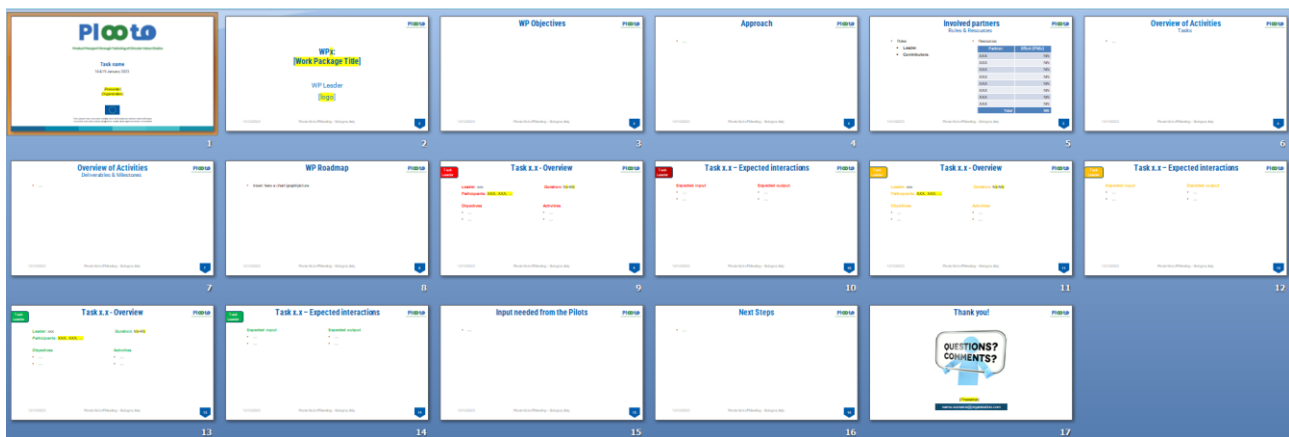


Figure 12: Ploto Presentation Template

2.4.3 Brochure

The design of the Ploto Brochure is done in a three fold template and is of descriptive nature relevant to the overall Ploto project. Its goal is to be given as a handout in different events towards informing about the project as well attract visitors to the different online outlets of the project.

3 important Business Cases

Cirtus Waste Processing

The Cirtus processing waste for juice by-products pilot uses the waste from the production of orange juice to recover EO and then produce by-products such as animal feed, high quality molasses for food industry, and d-Limonene for cosmetic industry.

CFRP Waste for Drones

The CFRP waste for Drones pilot aims to use CFRP waste from the production of new composite materials to be re-used in the production of drones in the value chain.

WEEE for Magnets

The WEEE for Magnets pilot uses WEEE to extract PMs (bonded NdFeB and Sr-ferrite, and sintered Sr-ferrite) which are used (as SRMs) in the production of new magnets, aiming to increase their usage.

20 Partners 9 Countries

Our Vision

To develop a Circular and Resilient Information System (CRIS) that enables waste reduction and end-to-end traceability of SRMs through interconnected digital services for real-time decision-making, monitoring, and certification of materials and products, relying upon a digital transformation strategy pertinent to process industries.

Our Objectives

Objective 1: To establish a digital transformation framework for a circular value chain. **Objective 2:** To develop a Cognitive Digital Twin (CDT) platform to support circularity in industrial processes. **Objective 3:** To develop a Circular and Resilient Information System (CRIS) for real-time decision-making and SRM monitoring. **Objective 4:** To validate the solution in three real cases (pilots) in different industrial domains. **Objective 5:** To maximize the impact through dissemination, policy recommendations and standardization activities so as every industry benefits from Ploto.

In a glimpse

- 20 Partners**
A diverse consortium consisting of large technology providers, innovative SMEs, universities and research centers across Europe.
- 9 Countries**
Partners from Italy, Greece, Norway, Germany, Slovenia, Romania, Cyprus, Spain and the United Kingdom have formed a consortium to deliver the Ploto system.
- 3 Pilots**
Ploto is developed around three different diverse pilots, namely the Cirtus Waste Processing pilot, the CFRP Waste for Drones, and the WEEE for Magnets.

Contact Us

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- info@ploto-project.eu
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- www.facebook.com/plotoproject
- twitter.com/plotoproject

Ploto has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101092008

Figure 13: Ploto Brochure

2.4.4 Roll Up

For use in the different events a Roll Up was designed that presented the main points of Ploto with the objective to capture the attention of the spectators and draw their attention to the main concepts of Ploto as well as invite interested viewers to connect.

Plooto

Product Passport through Twinning of Circular Value Chains

OUR AIM

Plooto aims to deliver a Circular and Resilient Information System (CRIS) to support manufacturers in their green, digital and circular transition. CRIS enables waste reduction and end-to-end traceability of Secondary Raw Materials (SRM) through interconnected digital services for real-time decision making, monitoring and certification of materials and products.

OUR PILOTS



Cirtus Waste Processing
Using the waste from the production of orange juice to recover EO and then produce by-products such as animal feed, high quality molasses for food industry, and d-Limonene for cosmetic industry.



CFRP Waste for Drones
Using CFRP waste from the production of new composite materials to be re-used in the production of drones in the value chain



WEEE for Magnets
Using WEEE to extract PMs (bonded NdFeB and Sr-ferrite, and sintered Sr-ferrite) which are used (as SRMs) in the production of new magnets, aiming to increase their usage

THE CONSORTIUM

FIND MORE ABOUT PLOOTO

- www.plooto-project.eu
- info@plooto-project.eu
- www.linkedin.com/company/plooto-project
- www.facebook.com/plootoproject
- twitter.com/plootoproject

Figure 14: Plooto Rollup

2.4.5 Poster

Additionally, to the Brochure and complementing the Roll Up a poster has been designed for use in the different events where Plooto has/will participate with the objective to be portable and offer a direct glimpse of all Plooto related key information and more importantly directly invite interested viewers to the social media of the project as well as the website (through the QRCode). The look and feel of the Poster is presented in the following figure.

Ploto

Product Passport through Twinning of Circular Value Chains

SHAPING THE FUTURE



Cirtus Waste Processing

Using the waste from the production of orange juice to recover EO and then produce by-products such as animal feed, high quality molasses for food industry, and d-Limonene for cosmetic industry.



CFRP Waste for Drones

Using CFRP waste from the production of new composite materials to be re-used in the production of drones in the value chain



WEEE for Magnets

Using WEEE to extract PMs (bonded NdFeb and Sr-ferrite, and sintered Sr-ferrite) which are used (as SRMs) in the production of new magnets, aiming to increase their usage



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- twitter.com/plotoproject



Ploto has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101092008

Figure 15: Ploto Poster

3 Dissemination Activities up to M12

In the following sections, the Plooto related dissemination activities are presented starting from the achieved academic publications that the partners have successfully submitted and have been accepted and/or presented as well as the different events and activities conducted in relation to conferences / workshops and clustering activities.

3.1 Publications

In the course of the first year the Plooto partners contributed a number of academic publications to the academy as well as society in general. In particular the research output that has been successfully published includes Four (4) Publications in Conference Proceedings, Three (3) Articles in Journals and Two (2) Chapters in Books leading to 9 different academic publications. The following table presents the academic publications conducted during the first year of the Plooto project.

Table 5: List of Academic Publications of Plooto

A/A	Type	URL	Title of Publication	Authors	Academic Outlet	Month/ Year of publication
1	C	Link	Enabling sustainability and resilience in industries through the value chains' circularity and digitalisation	Aryblia M., Sarantinoudis N., Tsinarakis G., Arampatzis G.	International Conference on Environmental Science and Technology (CEST)	9,2023
2	C	Link	Advancing sustainability in industrial supply chains by embracing circular approaches & digital transformation	Aryblia M., Sarantinoudis N., Tsinarakis G., Arampatzis G.	IEES 2023, International Ecological Engineering Society (IEES)	10,2023
3	J	Link	Optimization of Zero Defect Manufacturing Strategies: A Comparative Study on Simplified Modeling Approaches for Enhanced Efficiency and Accuracy	Foivos Psarommatis , Gokan May	Computers & Industrial Engineering, Elsevier	30.II.2023
4	J	Link	A Systematic Analysis for Mapping Product-Oriented and Process-Oriented Zero-Defect Manufacturing (ZDM) in the Industry 4.0 Era	Foivos Psarommatis , Gokan May	Sustainability journal, MDPI	10.08.23
5	BC	Link	A Readiness Level Assessment Framework for Zero Defect Manufacturing (ZDM)	Foivos Psarommatis, Gokan May, Victor Azamfirei, Maria Chiara Magnanini &	Lecture Notes in Mechanical Engineering, Springer	25.08.23

A/A	Type	URL	Title of Publication	Authors	Academic Outlet	Month/ Year of publication
				Daryl Powell		
6	BC	Link	Human Factors in the Design of Advanced Quality Inspection Systems in the Era of Zero-Defect Manufacturing	Victor Azamfirei, Foivos Psarommatis & Yvonne Lagrosen	Lecture Notes in Mechanical Engineering, Springer	25.08.23
7	J	Link	Envisioning maintenance 5.0: Insights from a systematic literature review of Industry 4.0 and a proposed framework	Foivos Psarommatis, Gökan May , Victor Azamfirei	Journal of Manufacturing Systems, Elsevier	26.01.2023
8	C		A Rula-based Assessment Framework based on Machine Vision and Zero-Defect Manufacturing 4.0 Initiative	Foivos Psarommatis, Victor Azamfirei, Fotios K Konstantinidis	3rd IFSA Winter Conference on Automation, Robotics & Communications for Industry 4.0 / 5.0 (ARCI' 2023)	2.2023
9	C	Link	D&C for EU Funded Projects: Towards an Integrated Omnichannel Dissemination and Communication Framework	Koukopoulos, Anastasios & Adam, Vrechopoulos & Georgios, Doukidis & Lounis, Stavros & Timoleon, Farmakis.	11th International Conference on Contemporary Marketing Issues	7.2023

Legend: C = Conference, J = Journal, BC = Book Chapter

3.1.1 Enabling sustainability and resilience in industries through the value chains' circularity and digitalisation

Abstract: Living for the last decades in a linear world has emerged the necessity for resources reduction, reuse, and recycling, leaving behind the “take-make-waste” economic model and jumping over towards a cyclical ecologic system. Especially for the industrial environments, the efficient management of resources, the need for prevention and the circular designing and planning, have shown the path towards alternative approaches, new technologies and services, and cutting-edge solutions. Digitalisation technologies (Digital Twins, big data analysis, etc.), secondary raw materials, circular supply chains, integrated sustainability frameworks and standards, Digital Product Passports, are some of the solutions, services and tools that assemble to facilitate a green and digital transition, considering the circular economy aspects, and targeting to resiliency and sustainability. Under this scope, three industries focus on transforming their supply chains into circular, green and sustainable ones using advanced traceability approaches. The ordinary supply chains of a citrus juice company in Greece, the processes of managing Waste Electrical and Electronic Equipment (WEEE) for magnets and

Carbon Fiber Reinforced Polymer (CFRP) for drones, are assessed using the Sustainability Balanced Scorecard, to empower the business opportunities, to enhance traceability and lead to sustained value chains. **KEYWORDS:** industrial value chains, sustainability, resiliency, circularity, digitalisation **ACKNOWLEDGEMENTS** The research methodology, pilots' activities and results presented in this article are part of the H2020 Plooto project, which has received funding from the European Union's Horizon-2020 research and innovation program under grant agreement No. 101092008. The responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. The European Commission is not responsible for any use that may be made of the information contained therein.

3.1.2 Advancing sustainability in industrial supply chains by embracing circular approaches & digital transformation

Abstract: Sustainable growth has been assuredly connected with the integration of circularity, sustainability, innovation and resiliency into the value chains. Towards this path drives the recently updated European Circular Economy Action Plan (CEAP, 2020), a fundamental component of Europe's agenda for sustainability and resiliency, the European Green Deal (EU Green Deal, 2019). On the other hand, Europe foresees achieving both a green transition and digital transition during the Digital Decade, focusing mainly on high energy-consuming industrial facilities towards a net-zero industries concept. The green transition, as being reinforced by circularity, is called to accompany the digital transition towards climate neutrality, a target that has been underlined as a key requirement in the EU's green agenda (Digital Europe, 2022). The industrial environments, as an intensive energy consumer, aspires to move towards green and digital transition, where the efficient management of resources, the need for prevention and the circular designing and planning, have shown the path towards alternative approaches, new technologies and services, and cutting-edge solutions. Digitalisation technologies, circular supply chains, secondary raw materials, integrated sustainability frameworks and standards, digital twins and cognitive digital twins, the newly introduced DPPs - Digital Product Passports, are some of the solutions and tools that assemble to facilitate a green and digital transition, considering the circular economy aspects, and targeting to resiliency and sustainability. Under this scope, the Horizon Europe Plooto project valorises on available sustainability and governance frameworks and models to design and develop an integrated methodological approach for "closing-the-loop" in industrial value chains, the Sustainability Balanced Scorecard Framework. This framework is demonstrated in three robust use cases, representing the food and manufacturing sectors. The ordinary supply chains of a citrus juice company in Greece, the processes of managing Waste Electrical and Electronic Equipment (WEEE) for magnets and Carbon Fiber Reinforced Polymer (CFRP) for drones, are assessed using the Sustainability Balanced Scorecard, to empower the business opportunities, to enhance traceability and lead to sustained value chains.

3.1.3 Optimization of Zero Defect Manufacturing Strategies: A Comparative Study on Simplified Modeling Approaches for Enhanced Efficiency and Accuracy

Abstract: This paper presents a comparative analysis of three distinct Zero Defect Manufacturing (ZDM) strategies: Detection - Repair (DR), Detection - Prevention (DP), and Prediction - Prevention (PP). We evaluated these strategies based on their effectiveness in optimizing ZDM parameters, considering the specific needs and constraints of various manufacturing setups. Our analysis found that while DR and DP simulation models closely reflected original results, PP models demonstrated lower predictability, underscoring the need for further research and specialized modeling approaches. Nonetheless, the selection of an optimal strategy was determined to be context-dependent, hinging on the characteristics of the manufacturing system. The study also highlights the necessity of validating these strategies across diverse manufacturing setups to assess their performance and suitability. This research augments the existing body of knowledge on ZDM, offering insights to drive future investigations for the development of robust, accurate, and efficient ZDM modeling techniques. The ultimate objective is to move modern manufacturing industries towards a zero-defect environment, thereby enhancing their efficiency, reliability, and overall productivity.

3.1.4 A Systematic Analysis for Mapping Product-Oriented and Process-Oriented Zero-Defect Manufacturing (ZDM) in the Industry 4.0 Era

Abstract: Quality is a key aspect in the era of Industry 4.0. Zero-defect manufacturing (ZDM) as the latest quality assurance approach. It can be implemented in two different approaches: the product-oriented and the process-oriented ZDM. It is important to know how and when to consider adopting one approach over the other. To achieve that there is the need for analyzing the differences of the two ZDM approaches. However, the current literature lacks a detailed analysis and comparison of these two approaches to ZDM implementation. Earlier studies on the topic have adopted one of these approaches over the other without evaluating how it fits with specific cases. The literature of the last decade indicates a movement towards product-oriented approaches, but it has not shown proof why product oriented was used over process oriented. Guided by these gaps, this research work creates a model for quantifying the effects of the implementation of both the product-oriented and process-oriented ZDM approaches. The proposed model considers all the critical parameters that affect the problem and serves as an assisting tool to engineers during the design or re-configure manufacturing systems, for choosing the most efficient ZDM approach for their specific cases. The robustness of the model was analyzed using the design of experiments method. The results from both the designed experiments and an industrial use case illustrate that in most cases, product-oriented ZDM performs better than the process-oriented approach. Nevertheless, in our analysis, we also highlight strong interactions between some factors that make the selection between product-oriented and process-oriented ZDM difficult and complex.

3.1.5 A Readiness Level Assessment Framework for Zero Defect Manufacturing (ZDM)

Abstract: In this study, a comprehensive framework for assessing the readiness of production systems for Zero Defect Manufacturing (ZDM) has been developed and presented. The framework includes four pillars of ZDM readiness, namely Personnel, Procedures, Infrastructure, and Company Culture, to help companies understand their level of readiness and plan for successful implementation of ZDM. We argue that a manufacturing company will be better equipped to embrace ZDM if it performs well in these four areas. We propose a tool that uses yes/no questionnaires to assess a manufacturing system's readiness for ZDM. The results of the questionnaire will objectively show the true level of cultural readiness for ZDM adoption, and the level of investment required for implementation will depend on the level of readiness. This tool can help companies gain a clear understanding of their readiness and create a plan for implementing ZDM. Overall, our framework and tool can help manufacturers improve the quality of their products and be ready for ZDM adoption.

3.1.6 Human Factors in the Design of Advanced Quality Inspection Systems in the Era of Zero-Defect Manufacturing

Abstract: Manufacturing companies around the world are under constant pressure to perform effectively and sustainably. Incidental processes, such as Quality Inspection (QI), are needed to achieve Zero-Defects Manufacturing (ZDM). This study aimed to identify the Human Factors and Ergonomics (HF&E) in the design of advanced automation, QI systems, and ZDM through selected papers and empirical observations. Our presented model is built around the six main dimensions, i.e., top management, manager (project owner), designers, engineers (internal and suppliers), and operators. The commitment of top management, the openness of the manager, the design-friendly nature of the technological system, and the constant updating of knowledge by engineers are important for the success of ZDM. Researchers need to be familiar with cognitive and organisational human factors to align theory with specific cases. Operators face physical and cognitive challenges, and their environment and health must be considered for their successful contribution to the design of advanced QI systems.

3.1.6.1 *Envisioning maintenance 5.0: Insights from a systematic literature review of Industry 4.0 and a proposed framework*

Abstract: To provide direction and advice for future research on Industry 4.0 maintenance, we conducted a comprehensive analysis of 344 eligible journal papers published between 2013 and 2022. Our systematic literature review identifies key trends in advanced maintenance techniques and the consolidation of traditional maintenance concepts, which are driven by the increasing adoption of Industry 4.0 technologies and the need to optimize manufacturing systems' performance and reliability. In light of our findings, we highlight the importance of addressing sustainability factors, human aspects, and the implementation of environmental KPIs in future research. Building upon these insights, we introduce the Maintenance 5.0

framework, which emphasizes the integration of human-centered and AI-driven strategies for achieving efficient and sustainable maintenance in Zero-Defect Manufacturing (ZDM) systems. We propose a novel framework that links traditional and advanced maintenance policies for small and medium-sized enterprises (SMEs) to facilitate the adoption of Industry 4.0 technologies in the maintenance field. This work underscores the need for future research to bridge the gap between these policies, enabling a seamless transition for SMEs towards Industry 4.0 maintenance practices, while fostering sustainable and socially responsible operations.

3.1.7 A Rula-based Assessment Framework based on Machine Vision and Zero-Defect Manufacturing 4.0 Initiative

Abstract: The Zero-Defect Manufacturing (ZDM) paradigm will drastically change the manufacturing system and its sociotechnological interactions. Following the idea that 'quality is free', this is, the cost of appraisals is lower compared to defects, bigger effort will be placed in detect, predict, prevent, and repair. Such activities would require an adequate level of automation. Human operators are the ultimate flexible resource in the manufacturing system, thus should be appreciated and protected. Human Factors and Ergonomics (HF/E) have been studied for decades but not been part of Industry 4.0. To secure a true sustainable growth towards ZDM and Industry 5.0, humans should be the centre of such socio-technological revolution. Utilising state-of-the-art technologies, such as Machine Vision and Artificial Intelligence, and knowledge gained from the ergonomic science field, human-centred ZDM can be secured. In this paper, a RULA-based Machine Vision framework is proposed for the real-time assessment of human ergonomics in shop floor.

3.1.8 D&C for EU Funded Projects: Towards an Integrated Omnichannel Dissemination and Communication Framework

Abstract: In an ever-changing environment, technological progress is at the frontline. Through European-funded projects, research is conducted in various fields, aiming to tackle Europe's biggest challenges in various sectors. In the course of materializing these new advancements, exploitable outcomes are designed and developed that, in turn, need to be optimally introduced to the market. In order for that to happen, the first thing needed is to make the developments widely known so that they start the journey of diffusion toward adoption, for which Dissemination and Communication is key. However, Dissemination and Communication actions are quite often underperforming. This research proposes a new approach to Dissemination and Communication actions by introducing an Integrated Omnichannel Dissemination and Communication (IODC) Framework relying upon Integrated Communications, capitalizing on an Omnichannel approach to optimally address all potentially interested stakeholders (through the Quintuple helix) that can help European Funded projects' partners effectively structure their Dissemination and Communication strategy and actions.

3.2 Events (conferences, workshops, etc)

Additionally to the presentation of the Plooto project in the academic conferences as presented in the previous chapters, Plooto project partners also participated in the EcoMondo 2023 Conference as well as at the P4Planet forum.

3.2.1 EcoMondo 2023

In the course of the EcoMondo 2023 Conference, MAG presented the Plooto project during a dedicated workshop hosted by Maggioli titled "Green Horizon: Towards a Sustainable Future". In addition, the partner had a dedicated booth where the Plooto Rollup was presented and brochures were handed over to interested visitors and attendants. The particular event gathered the attention of Industry business partners of Plooto and relative projects, EU Institutions, Policy makers and authorities, national and regional as well as the broad public.



Figure 16: EcoMondo 2023

3.2.2 P4Planet Forum 2023

ELTRUN The E-Business Center participated in the Processes4Planet Projects Forum open to ASPIRE members and representing the Plooto project among the 29 projects in the field on the 20th of September 2023 in Brussels. The objective of the forum was to advertise and make known the current Processes4Planet projects and enable the creation or enhancement of synergies between projects in order to maximize the impact created through the P4Planet Partnership. In the course of the P4Planet Forum the project had a dedicated spot at the Poster session where the Roll Up banner was placed and brochures were given to interested

participants. The particular event gathered the attention of Industry business partners of Ploto and relative projects, EU Institutions and Policy makers. Additional information for the event can be found at <https://www.aspire2050.eu/news/new/processes4planet-projects-forum-2023>



Figure 17: ASPIRE – P4Planet Forum 2023

4 Clustering Activities

In the course of the first year of the Plotoo project a number of activities to promote the project and cross pollinate the results took place. In the following paragraphs the efforts of Plotoo dissemination and link/partnership formation with AI4Gov, DataSpace4.0, EBDVF2023, DigInTraCE projects are presented.

4.1.1 Plotoo at the HaDEA Clustering event

Plotoo alongside with CS_RISE and DigInTraCE participated in a clustering event with the Horizon Results Booster (HRB) presentation organized during the 13th of March 2023 by the European Health and Digital Executive Agency (HaDEA) where the Plotoo project was presented alongside with its scope and potential Dissemination and Exploitation avenues that will be pursued in the course of the project.

4.1.2 Processes4Planet Projects' Brochure

During the first year of the Plotoo project, the project was invited to participate in the Processes4Planet Projects' Brochure. All requested material were provided respectively and currently the Plotoo is featured on the "Innovation and Sustainability in the European Process Industries Processes4Planet Partnership Projects 2021 and 2022" brochure" (available at https://www.aspire2050.eu/sites/default/files/users/user85/p4planet_projects_brochure_2021-2022.pdf p.52) The entry is presented in the following figure:



Figure 18: Plotoo at the Processes4Planet Projects' Brochure

4.1.3 AI4Gov

During the first year of the Plooto project, JSI presented the Plooto concept and approach to Digital Product Passports to the AI4Gov team in the prospect of having the Plooto DPP utilized in the AI4Gov project as means of a cross pollination activity of the Plooto project's outcome. The conversations are ongoing.

4.1.4 DataSpace 4.0

IDC partner participated in a Joint meeting with DataSpace 4.0. towards the examination of a collaboration outlook with the respective project. In particular, due to the strong link between DPP and Dataspaces, IDC presented Plooto project and its use-cases in a meeting with DataSpace4.0 project (DataSpaces for manufacturing) to discuss the concept of business modelling and digital maturity.

4.1.5 EBDVF2023

Additionally to the link with DataSpace 4.0, IDC partner, during the course of EBDVF2023 and through several 1 to 1 meetings, presented Plooto to relevant stakeholders of the data community in BDVA who are active in the field of Green deal dataspace, manufacturing dataspace, data analytics, etc.

4.1.6 DigInTraCE

Lastly another outreach activity took place through MAGs participation in the External Advisory Board meeting of the project DigInTraCE held on November 27th 2023 where Mr. Kostas Kalamboukas presented Plooto to the sister project.

5 Standardisation Activities

The standardisation activities of PLOOTO will be around the Digital Product Passport and the digital twins implementation. The first step in the standardization of PLOOTO activities is to identify what are the needs of the PLOOTO pilots for standardization. Therefore, a questionnaire has been developed and disseminated to the pilot partners. The questionnaire can be found below. It is a preliminary questionnaire in order to extract the needs of the pilots and also to understand the different standards already using.

Table 6: Preliminary questionnaire for the standardization needs for Digital twins (DT)

Question	Answer
1. Do you have DTs implemented in your company ?	
2. Are you planning to implement them DTs?	
3. What standards are you using in your organization that are close to the DT concept?	
4. What are the standardization needs of your organization for these topics in order to adopt and implement the DT?	
5. What is the current status in your company concerning the implementation of DT solutions?	
6. Is standardization a barrier for the adoption and implementation of DT?	
7. What would trigger your company to implement a standardized DT solution?	

Table 7: Preliminary questionnaire for the standardization needs for Digital product passport (DPP)

Question	Answer
1. Do you have DPP implemented in your company ?	
2. Are you planning to implement them DPP?	
3. What standards are you using in your organization that are close to the DPP concept?	

4. What are the standardization needs of your organization for these topics in order to adopt and implement the DPP?	
5. What is the current status in your company concerning the implementation of DPP solutions?	
6. Is standardization a barrier for the adoption and implementation of DPP?	
7. What would trigger your company to implement a standardized DPP DT solution?	

Once the Plooto pilots will answer the questionnaire and the standardization needs are clarified the following procedure will be followed for the standardization process.

1. Check Official Websites: Look for official websites of standardization bodies, industry associations, or organizations involved in the relevant field. These websites often provide reports, publications, and updates related to standardization initiatives.
2. Industry Publications: Explore industry-specific publications, journals, or magazines that cover standardization and industry commons topics. These sources may highlight key reports or initiatives.
3. Government Agencies: Check with relevant government agencies that oversee or promote standardization efforts in your region or industry.
4. Professional Networks: Engage with professional networks, forums, or conferences related to the industry in question. Attendees or members may share information about the latest reports or initiatives.
5. Online Databases: Utilize online databases, repositories, or libraries that host reports and publications. These could include academic databases, industry databases, or government repositories.
6. Contact Relevant Organizations: If you have specific organizations or bodies in mind, consider reaching out to them directly to inquire about the report or initiative you're interested in.
7. Search for similar standards and also for active standardization activities.

6 Plooto Educational Modules and Lifelong Learning Activities

6.1 OE4BW call

In order to provide Plooto educational modules, JSI has started utilizing the existing global mentoring program Open Education for a Better World (OE4BW.org).

Open Education for a Better World (OE4BW) is an international online mentoring program supporting the development and implementation of freely accessible modules and resources for online education on topics with social impact according to the UN Sustainable Development Goals (SDGs). The program was initiated by Tanja Urbančič from University of Nova Gorica and Mitja Jermol, UNESCO Chair on open technologies for open educational resources and open learning at Jožef Stefan Institute.

In 6 years, the program engaged 447 participants from 6 continents and 40 countries, while 330 new OERs have been developed in the scope of the program.

Proposals for the projects of OER development are collected with a global call. Accepted proposals are selected based on (1) their compatibility with SDGs, (2) social impact, (3) maturity of the idea, (4) capacity and commitment of the applicant to make the idea come true. In the continuation, selected applicants are supported on-line for six months by experts in OER design volunteering as mentors. Mentors are invited with a follow-up global call. During the project development, the progress is being regularly followed and advice is given if needed. Developers and mentors communicate online on a weekly (or bi-weekly) basis. There are also two interim checkpoints planned to provide information about the progress to the organizers of the program. At the end of the program, the participants are obliged to prepare a presentation for the final event. They are invited and supported to come to the closing event to attend a workshop on OER design, exchange ideas, meet other OER developers and establish potential future cooperation.

The program is open to all applicants regardless their professional background, education, origin or any other limiting factor. The scope and the final form of the developed OER are not prescribed, nor is the platform to be used. This is to encourage participants to find the best solution for their target audience and their specific situation. The only request is the developed educational material to be publicly accessible and to be specified as such by using an appropriate open licence. There is no participation fee.

In September 2023 we published calls for developers and mentors for 2023/24 to develop new and original OERs, update existing OERs, create auxiliary material to existing OERs or translate existing OERs.

The call was looking for (but was not limited to) projects to be involved in one of the specific thematic Hubs:

- Displaced persons – to provide or develop open materials for the displaced persons – seeking materials for elementary and secondary school curricula, vocational education, and social-emotional learning/teaching support; professional development for teachers, all levels of education;
- Sustainability – topics on climate, environment and natural science related to the Green Deal,¹ climate change and sustainable development with an emphasis on circular economy.
- Education – addressing quality of education, pedagogical issues, teacher professional development.
- Health and well-being – addressing topics related to physical and mental health – healthy eating habits, going organic, alternative medicines, stress management, web addiction and sustainable lifestyle.
- Artificial intelligence- addressing ICT topics and skills related to computing.
- Renewable energy: How to replace fossil fuels; How to perform a Just Transition in communities in regions producing fossil fuels (mainly coal).
- Regional hub – Africa.
- Hub Youth – for developers from 12–24 years.

The second topic (Sustainability – topics on climate, environment and natural science related to the Green Deal, climate change and sustainable development with an emphasis on circular economy) is Plooto related and is also branded as a Plooto open educational resources addressing green deal topics.

The call ended by the November 25th 2023 and OE4BW received 86 applications for developers (68 of them were accepted) and applications 98 for mentors. The accepted applications by topics are:

- 5 on topic Sustainability (should fit into Plooto context)
- 4 on topic Renewable energy (should fit into Plooto context)
- 25 on topic Education
- 9 on topic Artificial Intelligence
- 12 on topic Health and well-being
- 8 for Hub Youth

¹The European Green Deal, approved in 2020, is a set of policy initiatives by the European Commission with the overarching aim of making the European Union (EU) climate neutral in 2050. The plan is to review each existing law on its climate merits, and also introduce new legislation on the circular economy, building renovation, biodiversity, farming and innovation. The European Green Deal aims to boost the efficient use of resources by moving to a clean, circular economy and stop climate change, revert biodiversity loss and cut pollution.

- 5 on topic Displaced persons

Now we are performing additional review of the topics Sustainability and Renewable energy in order to identify applications that fit to the Plooto context.

6.2 Curriculum development

For the Plooto project we developed a curriculum that is designed to introduce participants to the concept of the circular economy, its importance, key principles, and applications in various industries.

The curriculum is a framework to collect various OER (existent and newly created) by applicants around the world.

The course we are designing will enable participants to develop a deep understanding of the challenges of linear economies and the opportunities and benefits of embracing circularity. The curriculum will provide participants with practical knowledge and tools to drive a circular economy transition within their organizations or communities.

6.2.1 Circular Economy: Shifting Towards a Sustainable Future

This curriculum should be designed to introduce participants to the concept of the circular economy, its importance, key principles, and applications in various industries. The course will enable participants to develop a deep understanding of the challenges of linear economies and the opportunities and benefits of embracing circularity. The curriculum will provide participants with practical knowledge and tools to drive a circular economy transition within their organizations or communities.

- **Introduction to the Circular Economy:** Understanding the Linear Economy: Challenges and Limitations. Circular Economy: Definition, Concepts, and Principles. The History and Evolution of the Circular Economy. The Importance of a Circular Economy for Sustainability and Resilience
- **Key Principles and Strategies of Circular Economy:** The 3Rs of the Circular Economy: Reduce, Reuse, and Recycle. Design for Circularity: Product Design and Material Selection. Circular Business Models: Product-as-a-Service, Sharing Economy, and Others. Industrial Symbiosis and Ecosystem Collaboration
- **Circular Economy in Practice: Sector-Specific Applications:** Circularity in Manufacturing and Production. The Circular Economy in the Built Environment. Circular Economy Applications in Agriculture and Food Systems. Circular Strategies in the Fashion and Textile Industry. Circular Economy in the Electronics and E-waste Management. Circular Economy in Packaging and Waste Management
- **Policies, Regulations, and Standards:** Global and Regional Circular Economy Policy Landscape. Role of Government in Supporting Circular Economy Transition. Voluntary

and Regulatory Standards for Circular Economy Implementation. International Collaboration and Partnerships for Circular Economy

- **Measuring and Assessing Circular Economy Performance:** Circular Economy Metrics and Indicators. Circular Economy Assessment Frameworks and Tools. Monitoring and Reporting Circular Economy Performance. Circular Economy Case Studies and Best Practices
- **Driving the Circular Economy Transition:** Organizational Strategies for Circular Economy Implementation. Innovation and Technology in Circular Economy. Stakeholder Engagement and Communication in Circular Economy. Developing a Circular Economy Roadmap and Action Plan

6.2.2 Transformation Framework for Circular Value Chains: Traceability Strategies, Reference Processes, and Governance Models

This curriculum should aim to provide learners with an understanding of a transformation framework based on traceability strategies for materials/products per business case. The course will explore reference processes for sustainable resource management (SRM) from waste deposit to new products, as well as governance models for circular value chains.

- **Introduction to Circular Economy and Sustainable Resource Management (SRM) :** Overview of Circular Economy . Principles of SRM. Benefits and Challenges of Implementing SRM . Key Stakeholders and Their Roles
- **Traceability Strategies for Materials and Products:** Importance of Traceability in Circular Economy . Traceability Strategies and Techniques. Material Flow Analysis and Lifecycle Assessment . Digital Technologies for Traceability (e.g., IoT, Blockchain)
- **Reference Processes for SRM from Waste Deposit to New Products:** Waste Collection and Sorting. Waste Processing and Treatment. Material Recovery and Recycling. Design for Disassembly, Reuse, and Remanufacturing. Case Studies on Successful SRM Implementations
- **Governance Models for Circular Value Chains:** Introduction to Governance Models. Public-Private Partnerships (PPP). Collaborative Models and Industry Alliances . Regulatory and Policy Frameworks. Monitoring and Evaluation of Circular Value Chains
- **Business Case Development and Implementation:** Identifying Opportunities for SRM. Developing a Business Case for SRM. Financial and Non-Financial Performance Indicators. Risk Assessment and Mitigation Strategies. Implementation and Scaling-up Strategies

6.2.3 Cognitive Digital Twins (CDTs): ICT Tools for Modeling Product, Production Processes, and Supply Chains

This curriculum will aims to provide learners with an understanding of ICT tools for modeling products, production processes, and supply chains using an aggregation of individual

component Digital Twins with cognition capabilities (Cognitive Digital Twins – CDTs). The course will explore the principles, technologies, and applications of CDTs in various industries.

- **Introduction to Digital Twins and Cognitive Digital Twins (CDTs):** Overview of Digital Twins. Introduction to Cognitive Digital Twins (CDTs). Benefits and Challenges of Implementing CDTs. Key Components and Technologies of CDTs
- **ICT Tools for Modeling Products:** Computer-Aided Design (CAD) and Engineering (CAE). Product Lifecycle Management (PLM) Systems. Real-time Data Collection and Analysis. Integration of CDTs in Product Modeling
- **ICT Tools for Modeling Production Processes:** Manufacturing Execution Systems (MES) and Manufacturing Operations Management (MOM) . Process Simulation and Optimization. Real-time Process Monitoring and Control . Predictive Maintenance and Process Improvement. Integration of CDTs in Production Process Modeling
- **ICT Tools for Modeling Supply Chains:** Supply Chain Management (SCM) Systems. Real-time Visibility and Tracking. Advanced Analytics and Optimization. Risk Assessment and Mitigation Strategies. Integration of CDTs in Supply Chain Modeling
- **Cognition Capabilities and Artificial Intelligence in CDTs:** 1 Machine Learning and Deep Learning. 2 Natural Language Processing and Understanding. 3 Computer Vision and Image Recognition. 4 Expert Systems and Knowledge Representation. 5 Reinforcement Learning and Adaptive Control
- **Applications and Case Studies of CDTs in Various Industries:** 1 Automotive Industry. 2 Aerospace and Defense. 3 Healthcare and Pharmaceutical. 4 Consumer Goods and Retail. 5 Energy and Utilities

6.2.4 Data-Driven Resource Management: Material Certification and Product Passports in Waste Dataspace

This curriculum will provide learners with an understanding of how data can feed resource management (RM) recovery and waste dataspace, enabling the provision of material certification and product passports. The course will explore data collection, management, and analysis techniques and their application in creating material certification and product passports for efficient waste management and resource recovery.

- **Introduction to Resource Management (RM) Recovery and Waste Dataspace:** Overview of Resource Management and Recovery. Importance of Waste Dataspace in Circular Economy. Benefits and Challenges of Implementing Waste Dataspace. Key Stakeholders and Their Roles
- **Data Collection and Management in Waste Dataspace:** Data Sources for Waste Management and Resource Recovery. Data Quality, Validation, and Standardization. Data Integration and Interoperability. Data Storage, Security, and Privacy. Data Governance and Compliance

- **Data Analytics for RM Recovery and Waste Dataspac**: Understanding Waste Generation and Composition. Identifying Patterns and Trends in Waste Data. Forecasting Future Waste Generation and Resource Recovery Opportunities. Prescriptive Analytics: Developing Waste Management and Recovery Strategies. Advanced Analytics Tools and Techniques
- **Material Certification in Waste Dataspac**: Introduction to Material Certification. Material Certification Standards and Guidelines. Material Testing and Validation. Data-Driven Material Certification Process. Role of Material Certification in Circular Economy
- **Product Passports in Waste Dataspac**: Introduction to Product Passports. Key Components and Information in a Product Passport. Digital Technologies for Product Passport Creation and Management (IoT, Blockchain,...). Data-Driven Product Passport Development Process. Role of Product Passports in Circular Economy
- **Case Studies and Industry Applications**: Waste Management and Recycling Industry. Electronics and E-waste. Construction and Demolition Waste. Automotive and End-of-Life Vehicles. Packaging and Plastic Waste

6.2.5 Circular Sustainability Balanced Scorecard: Assessing the Impact of Decision-Making at Cognitive Digital Twin (CDT) Level

This curriculum will provide learners with an understanding of a circular sustainability balanced scorecard (framework+toolkit) to assess the impact of decision-making based on various key performance indicators (KPIs). The course will explore the principles, design, and implementation of a circular sustainability balanced scorecard and its application in assessing CDT-based decision-making processes.

- **Introduction to Circular Sustainability**: Overview of Circular Sustainability. The Role of CDTs in Circular Sustainability . Benefits and Challenges of Implementing CDTs in Circular Economy
- **Understanding Balanced Scorecard and Its Evolution** :Introduction to Balanced Scorecard. Evolution of Balanced Scorecard: From Traditional to Sustainability-Oriented. Key Components of a Balanced Scorecard. Benefits and Challenges of Implementing a Balanced Scorecard
- **Designing a Circular Sustainability Balanced Scorecard**: Key Performance Indicators (KPIs) for Circular Sustainability. Perspectives of a Circular Sustainability Balanced Scorecard. Setting Objectives, Measures, Targets, and Initiatives . Linking KPIs to Decision-Making at the CDT Level
- **Implementing a Circular Sustainability Balanced Scorecard** : Integration with Existing Management Systems. Data Collection, Management, and Analysis for Scorecard Implementation. Continuous Improvement and Performance Management . Challenges and Best Practices in Scorecard Implementation
- **Circular Sustainability Balanced Scorecard Toolkit**: Software and Tools for Balanced Scorecard Implementation. Customizing Scorecard Tools for Circular Sustainability.

Integration with CDT Systems and Data. Monitoring and Reporting on KPIs Using Scorecard Tools

- **Assessing the Impact of Decision-Making at CDT Level:** Decision-Making Processes in CDT-based Systems. Analyzing the Impact of Decisions on Circular Sustainability KPIs. Identifying Opportunities for Improvement and Innovation. Scenario Analysis and Sensitivity Testing for Decision-Making
- **Case Studies and Industry Applications:** Manufacturing and Production. Supply Chain Management. Smart Cities and Infrastructure. Energy and Utilities. Transportation and Mobility

6.2.6 New and Emerging Technologies for the Circular Economy: Accelerating the Transition

This curriculum will provide participants with an in-depth understanding of the latest and emerging technologies that support the circular economy. Participants will explore how these technologies can be applied to various industries to foster circularity, enhance sustainability, and boost economic growth. The course will equip participants with the necessary knowledge and skills to identify, evaluate, and implement innovative solutions that contribute to a successful circular economy transition.

- **Introduction to the Circular Economy and Technology:** Circular Economy: Concepts, Principles, and Benefits. The Role of Technology in Accelerating the Circular Economy. Challenges and Opportunities in Implementing Circular Technologies
- **Digital Technologies for the Circular Economy:** Internet of Things (IoT) and its Applications in Circular Economy. Big Data Analytics and Artificial Intelligence for Circular Decision-Making. Blockchain for Transparency and Traceability in Circular Supply Chain. Virtual Reality and Augmented Reality for Circular Design and Training
- **Advanced Materials and Circular Design:** Biodegradable and Bio-based Materials for Circular Products. Nanotechnology and Advanced Materials for Circular Solutions. 3D Printing and Additive Manufacturing for Resource Efficiency. Cradle-to-Cradle Design and Material Health Assessment
- **Energy and Resource Recovery Technologies:** Renewable Energy Technologies for Circular Economy. Energy Storage and Conversion Technologies for Circular Systems. Waste-to-Energy Technologies and Resource Recovery. Water Recovery and Reuse Technologies in Circular Systems
- **Emerging Technologies and Innovations in Key Sectors:** Circular Technologies in Agriculture and Food Systems. Emerging Technologies in the Built Environment and Urban Planning. Innovations in Circular Manufacturing and Industrial Processes. New Technologies in Waste Management and Recycling
- **Implementation and Adoption of Circular Technologies:** Assessing the Feasibility and Impact of Circular Technologies. Overcoming Barriers to Circular Technology Adoption.

Financing and Investing in Circular Technologies. Collaborative Innovation and Ecosystem Building

6.2.7 Circular and Resilient Information Systems for Green, Digital, and Circular Manufacturing

This curriculum will provide participants with a comprehensive understanding of the design, implementation, and management of circular and resilient information systems in the context of green, digital, and circular manufacturing. Participants will explore the role of information systems in enabling resource-efficient and sustainable production processes, enhancing supply chain transparency, and supporting circular business models. The course will equip participants with the necessary skills to develop and implement innovative information systems solutions that drive sustainability and resilience in manufacturing.

- **Introduction to Green, Digital, and Circular Manufacturing:** Overview of Sustainable Manufacturing and Circular Economy. The Role of Digital Technologies in Green and Circular Manufacturing. Challenges and Opportunities in Circular Manufacturing
- **Designing Circular and Resilient Information Systems:** Principles and Frameworks for Circular Information Systems. Integrating Circular Economy Objectives into Information System Design. Resilience and Robustness in Information Systems. Data Governance and Security in Circular Information Systems
- **Digital Technologies and Tools for Circular Information Systems:** IoT, Sensors, and Real-time Data Collection for Circular Manufacturing. Big Data Analytics and AI for Decision Support in Circular Manufacturing. Blockchain for Transparency and Traceability in Circular Supply Chains. Cloud Computing and Edge Computing for Scalable and Resilient Information Systems
- **Circular Information Systems for Green Manufacturing Processes:** Energy and Resource Management Systems for Manufacturing. Industrial Symbiosis and Material Flow Management Systems. Waste Minimization and Recycling Information Systems. Life Cycle Assessment and Environmental Impact Analysis Tools
- **Circular Information Systems for Digital and Circular Business Models:** Information Systems for Product-as-a-Service and Sharing Economy Models. Digital Platforms for Material and Resource Exchange. Reverse Logistics and Product Take-Back Management Systems. Supply Chain Collaboration and Multi-Stakeholder Information Systems
- **Implementation and Adoption of Circular Information Systems:** Assessing the Feasibility and Impact of Circular Information Systems. Change Management and Organizational Transformation for Circular Information Systems. Developing a Circular Information System Implementation Roadmap. Monitoring, Evaluation, and Continuous Improvement of Circular Information Systems

6.2.8 Digital Product Passport

This curriculum will provide participants with a comprehensive understanding of the design, implementation, and management of Digital Product Passports in the context of circular manufacturing.

- **Introduction to Digital Product Passports (DPP):** Understanding Digital Product Passports. Definition and importance in the context of sustainability. Relationship with the Circular Economy Action Plan (CEAP) and Ecodesign for Sustainable Products Regulation. Key Goals of DPP Implementation. Supporting sustainable product production. Enabling circular business models. Empowering consumers to make informed decisions.
- **Targeted Markets and Industries:** Key Markets for Initial DPP Implementation. Textiles, construction, industrial and electric vehicle batteries. Additional sectors identified in the Circular Economy Action Plan. Regulatory Landscape (Overview of proposed Ecodesign for Sustainable Products Regulation, Alignment with Circular Economy Action Plan objectives).
- **Data Requirements for Digital Product Passports:** General Requirements (Connection to a unique product identifier, Compliance with ISO/IEC 15459:2015 standards, Machine-readable, structured, and searchable information). Specific Requirements for Different Industries.
- **Implementation Process:** Products Subject to DPP Requirements (Understanding which products are targeted, Identifying the criteria for inclusion). Practicalities of Implementation (Utilizing traceability software, Choosing and applying unique product identifiers e.g., barcodes, QR codes, RFID tags)
- **Infrastructure for DPP Data Transfer:** Industry-wide Data Standardization (Role of open standards in DPP implementation, Ensuring interoperability and machine-readability). Blockchain and Decentralized Systems (Overview of decentralized systems, Protecting proprietary information through encryption)
- **Ensuring Data Security:** Storage and Encryption Methods (Centralized vs. decentralized data storage, Encryption methods e.g., RSA, end-to-end, zero-knowledge proofs)
- **Potential Challenges and Opportunities:** Bureaucratic Concerns (Addressing potential challenges in DPP implementation, Balancing regulation and innovation). Leveraging DPP for Business Growth (Gaining a competitive edge through sustainability claims, Exploring circular business models and new revenue streams)
- **Case Studies and Best Practices:** Battery Passport Case Study, Successful DPP Implementation in Textiles, Construction, and Other Industries
- **Future Trends and Industry Outlook:** Evolution of DPP Requirements (Future product categories and regulations, Industry collaboration and standardization efforts). Sustainability Leadership in the Digital Era (Positioning businesses as sustainability leaders, Navigating future changes in traceability and sustainability regulations)

6.3 Collecting OER materials related to the Green Deal, climate change and sustainable development with an emphasis on circular economy.

The next phase after developing the curriculum is to collect and create as much as possible existing OER materials about circular economy, sustainable development and Green Deal topics.

As already mentioned, the curriculum is a framework and our next step will be to “fill the gaps” by collecting various OER (existent and newly created) by applicants around the world and insert them to the curriculum framework.

In the first phase we have identified five lectures from our Greek partners presented on event “Twin Digital and Green Transition to a Resilient Economy” that were presented during the hybrid workshop in June 2022 at the Technical University of Crete.

We have collected the recordings of the lectures, and consent forms of the authors for publishing the lectures under creative commons licence on a VideoLectures.net portal. VideoLectures.net is an award-winning free and open access educational video lectures repository. The lectures are given by distinguished scholars and scientists at the most important and prominent events like conferences, summer schools, workshops and science promotional events from many fields of science.

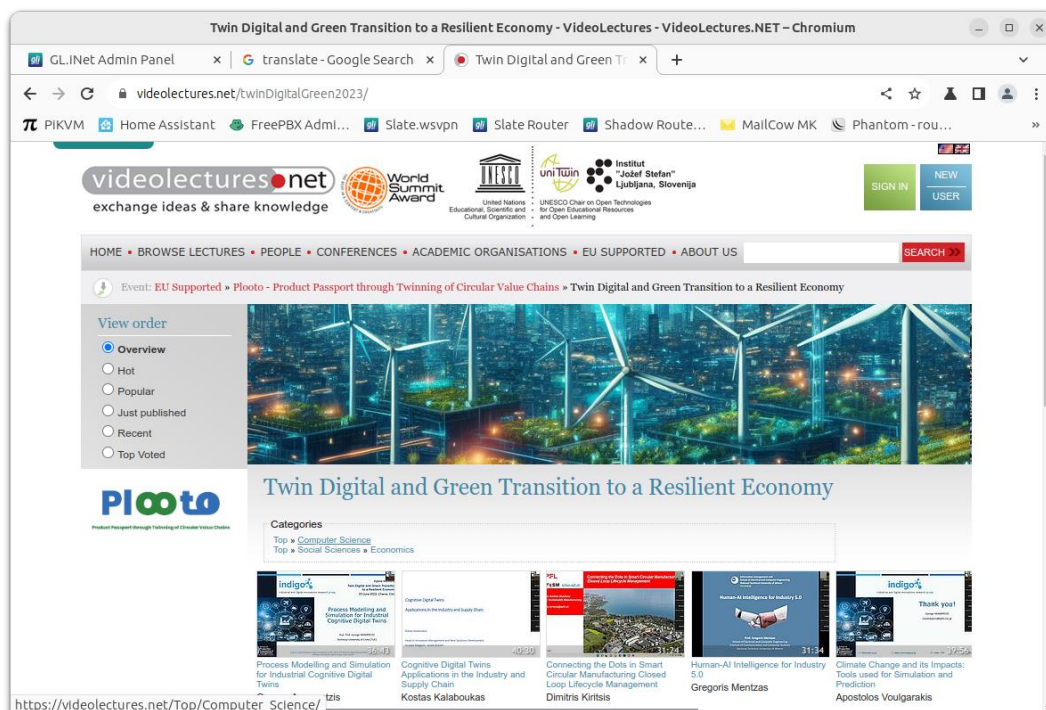


Figure 19: Lectures published on Videolectures.NET portal.

The lectures are now available on <https://videolectures.net/twinDigitalGreen2023/>

List of lectures:

1. **Cognitive Digital Twins** by Dimitris KYRITSIS, Ecole Polytechnique Fédérale de Lausanne (EPFL) & University of Oslo.
2. **Human-AI Intelligence for Industry 5.0: Augmented Data Analytics and Data Spaces** by Gregoris MENTZAS, National Technical University of Athens (NTUA)
3. **Process Modelling and Simulation for Industrial Cognitive Digital Twins** by George ARAMPATZIS, Technical University of Crete (TUC).
4. **Climate change and its impacts: tools used for simulation and prediction** by Apostolos VOULGARAKIS, Technical University of Crete (TUC).
5. **Cognitive Digital Twins: Applications in the Industry and Supply Chain** by Kostas KALAMPOUKAS, Gruppo Maggioli, Greek Branch.

The investigation of relevant content will extend to additional repositories housing OER content, specifically those integrated into the X5Gon compilation of accessible repositories. X5Gon employs advanced artificial intelligence tools to discern content across various modes, languages, and domains, enhancing the identification process in a comprehensive and versatile manner.²

² <https://www.x5gon.org/>

7 Dissemination and Communication aggregate KPIs

During the first year of the Plooto project as described in the previous chapters a number of Dissemination and Communication actions took place. Each action on each outlet is presented in the respective chapter however in the present chapter an aggregation of all KPIs is presented for better comprehension.

Table 8: Aggregate presentation of Plooto KPIs for D&C

Community	Marketing strategy	Horizontal Activities	KPIs	Achieved as of M12	
Public: Web site, social media	Public awareness	Web site	No of unique visitors: > 5.000	1400	
		Twitter account	a) No. of followers: > 700; b) No. of reactions > 1.000; c) > 2000 tweets	a) 61 Followers b) 174 Engagements / 1500 Impressions c) 29 Tweets	Through Partners' Social Media own Plooto related Posts Impressions / Views: 4882 Likes: 119 Reposts: 20 Clicks: 210
		Facebook account	a) no. of followers: > 200; b) > 100 posts; c) no. of reactions > 5.000;	a) 44 Followers b) 17 Posts c) 33 Likes / 4000 Impressions	
		LinkedIn account	a) No. of followers: > 250; b) No. of reactions > 1.000; c) > 100 posts	a) 160 Followers b) 600 Reactions / 58 Reposts c) 27 Posts	
		Open learning	IRCAI: 4 open learning courses through Open Education for a better world OE4BW.org (See Task 5.4)		
ICT	<ul style="list-style-type: none"> • Create awareness • Do project offerings scalable 	Website/Intranet Newsletters (1 per six months) Training material &	2 Workshops organized per Software vendor (inside their existing networks of collaborative partners)	Participation in EcoMondo 2023, EBDVF2023 Liason with AI4Gov, DataSpace 4.0, DigInTraCE	

Community	Marketing strategy	Horizontal Activities	KPIs	Achieved as of M12
	and easy to integrate • Validate requirements and business models	specific demos (~ 1-2 for each of the Plooto results, per stakeholder category: ICT, Manufacturing) Social Media	> 10 workshops/stands in ICT-related events focusing on Industrial automation and supply chain (CEBIT, other) > 4 hackathons to experiment with Plooto tools Establish liaisons with other core EU Digital Platform projects (eFactory, ZMDP, KYKLOS40)	
Process Industries Industrial Consultants			> 10 workshops/stands in industry4.0 events (World Manufacturing Forum, IMS, CEBIT, etc.) > 3 dedicated workshops organized by the ICT industrial players (1 for each of MAG, Entersoft, IDC), utilizing their existing customer base and commercial marketing channels > 1 workshop for each of the pilot supply chains with selected supply chain collaboratives TUV: Promoting Plooto in 15 training sessions (organized by TUV) with relevant course	
Associations/ Clusters			• Targeted visits and demos to clusters to incorporate them into the Plooto community • Approaching	

Community	Marketing strategy	Horizontal Activities	KPIs	Achieved as of M12
			Clusters/Associations through Horizon projects (clustering and networking events)	
Academic / Research	Diffuse scientifically and technological results	Web site/Intranet Newsletters (1 per six months) Training material & specific demos (~ 1-2 for each of the Plooto results, per stakeholder category: ICT, Manufacturing) Social Media	20 papers/poster sessions at International conferences and stands > 10 papers in Scientific Journals (open access)	3 Journal Papers 4 Conference Papers 2 Book Chapters
Horizon2020/ HorizonEurope projects	Dissemination and look for synergies with Plooto)		Participation in all relevant EU Horizon cluster meetings and workshops > 10 Demos and talks in cluster events organized with	1 Newsletter Sent 1 Newsletter developed/Planned for Mid January 2024 Participation at HaDEA Clustering event Participation at P4Planet forum
National and EU initiatives	Promote Plooto as a decentralized platform for circular waste supply chains		<ul style="list-style-type: none"> > 1 local workshop co-organized with the national authorities (for the countries represented by the Plooto consortium). > 5 workshops in relevant EU initiatives 	

8 Next Steps

During the second year of the Plooto project the actions presented in this deliverable will continue and strengthen following the direction of the overall strategy for communication and dissemination of the Plooto project. Indicative actions are as follows

- Creation of the YouTube video for the Plooto Project
- Continuation of collaborative posts on all outlets
- Redesign / Design of new communication and dissemination material (online and offline)
- Continuation of cross-pollination actions relevant to the progress of the project
- Participation in additional events
- Continuation of academic publications of the new knowledge that will be created in the course of the project.

9 Conclusions

This deliverable presented the conducted Dissemination, Standardization and marketing activities of the Plooto project during the first year of the project lifecycle. It showcased the activities carried out through all online and offline outlets of the project (indicatively, the social media channels – facebook, LinkedIn and Twitter, the website etc.) as well as the participation of the different partners in clustering activities and events, as well as presented the action taken towards establishing relationships with other projects. Furthermore, it highlighted the progress beyond state of art as exhibited by the academic publications of the Plooto project that were conducted during the first year. Plooto thus continues its course as designed in the communication and dissemination strategy presented in Deliverable 5.1 Dissemination, Standardization and Marketing Plan.