D7.2 – Mid-term Report on Dissemination and Communication Activities and Performance

Project Information

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Project Full Title	Customizable AI-based in-line process monitoring platform for achieving zero-defect manufacturing in the PV industry
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Project Coordinator	Victor Izquierdo Roca (IREC)
Project Website	https://www.platform-zero-project.eu

Deliverable Information

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Deliverable title	Mid-term report on Dissemination and Communication activities and performance											
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Deliverable Leader					✓							
Contributing Partners	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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Contributors	All project partners contributed to review and to provide inputs for this deliverable, in particular for the identification of D&C activities conducted over the past period of the project (chapter 12) and foreseen activities for upcoming months (chapter 13)											
Reviewers	Victor Izquierdo, Johan Steven Ortiz (IREC)											
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SEN	Sensitive – Limited under the conditions of the Grant Agreement	

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Document Log

Version	Date	Description of Change
V1.0	31/05/2024	First draft shared with project partners for review and inputs
V1.1	24/06/2024	First full draft for review by the coordinator
V1.2	28/06/2024	Full deliverable finalised

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1 Deliverable description

Update of the DEC plan (D7.1) and description and tracking of the DEC activities performed during the first 18 months of the project.

2 Executive Summary

The European project Platform-ZERO, started in January 2023, aims to improve the overall production quality of photovoltaic devices, and at the same time to lower fabrication costs, through zero defect manufacturing. This will be achieved by applying in-line process monitoring, control and artificial intelligence strategies, and implemented in four different pilot plants in four different countries.

The purpose of this report is to present an update of the Platform-ZERO Dissemination and Communication strategy and roadmap which identifies, organises and defines the management and promotion of the Platform-ZERO project objectives and results.

The key underpinning concept of the Platform-ZERO dissemination & communication (D&C) strategy is to target key external stakeholders based upon a three-stage process going from awareness to understanding and ultimately to a point where stakeholders are applying and exploiting the Platform-ZERO project key outcomes. In the first 12 months of the project the main focus of the dissemination actions was on stage 1 of the D&C strategy (i.e., D&C for awareness). At the time of writing this mid-term report on D&C activities, project partners have continued with stage 1, but as concrete results emerge and milestones are achieved, the D&C strategy has moved to stage 2 (i.e., D&C for understanding). In the final 12 months of the project the focus will mainly be on those stakeholders who have the ability to implement the Platform-ZERO innovations within the EU PV manufacturing industry, and the dissemination strategy will thus move to stage 3 (i.e., D&C for action) which will make use of the practical material for exploitation/implementation.

This mid-term report gives an overview of D&C activities that have been performed over the past period (i.e. from M1 to M18), as well as a preview of some major foreseen D&C activities to be conducted over the next period of the project, already under preparation. Progress and performance of D&C activities are presented against the D&C KPIs and associated targets which were set in the initial plan (D7.1).

3 Introduction

3.1 Aims and objectives

This report provides a mid-term update on the Platform-ZERO Dissemination and Communication (D&C) plan which is implemented to widely promote and raise awareness on the Platform-ZERO project objectives, and then to disseminate the project results. Compared to the initial plan delivered at the beginning of the project (D7.1), it includes a summary of already achieved D&C activities over the first 18 months of the project.

3.2 Relations to other activities in the project

The D&C strategic planning and execution is conducted under Task 7.1 and is informed by the work conducted in all other work packages and tasks of the project. The D&C timeline is articulated around the main key deliverables and milestones of the project, which materialise important outcomes which are worth to disseminate and communicate.

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3.3 Report structure

Section 4 of the report reminds about the key objectives and underpinning concept of the Platform-ZERO D&C strategy. **Section 5** reminds about the dissemination timeline, which is mapped along specific release dates of key deliverables. **Section 6** reminds about the key stakeholders target audiences and their main interests and expectations related to Platform-ZERO. **Section 7** presents the D&C channels which will be used to disseminate Platform-ZERO results, as well as the related KPIs and associated objectives, and the progress against these indicators at the time of writing this mid-term report. **Section 8** presents D&C multipliers which will be used to maximize the impact of D&C activities. **Section 9** reminds the validation process which has to be followed by all project partners before a D&C item goes external. **Section 10** reminds how the detailed planning and recording of D&C activities is achieved (i.e., monitoring of D&C activities and of the achievement of the KPIs). **Section 11** presents the D&C toolkit, and its most recent updates since its initial creation (e.g. the project promotional videos), made available to project partners to support the implementation of their D&C activities. **Section 12** presents D&C activities conducted by project partners over the first 18 months of the project. **Section 13** introduces some of the D&C activities already foreseen / under preparation for the coming months.

3.4 Contribution of partners

R2M is the main author of this mid-term report on D&C plan and performance. All Platform-ZERO project partners have reviewed the report and are contributing to the implementation of D&C activities according to the D&C plan.

4 Objectives

The key underpinning concept of the Platform-ZERO D&C strategy is reminded in Table 1 below. The idea is to target key external stakeholders based on a three-stage process starting from raising awareness, followed by increasing understanding and, ultimately, reaching a point where stakeholders are applying and exploiting the Platform-ZERO project key outcomes.

Table 1. Platform-ZERO three-stage D&C process from awareness to action

Stage 1. M1-M12 D&C for awareness	Stage 2. M13-M36 D&C for awareness and understanding	Stage 3. M37-M48 D&C for awareness, understanding, and action
Completed and continuing	***Started, ongoing***	***Not started yet***
In the first instance, the purpose of the Platform-ZERO D&C plan is to raise awareness and communicate broadly about Platform-ZERO aims and objectives targeting the general public and relevant external organizations and stakeholders of the Platform-ZERO project outputs.	A subset of the "Stage 1" target audience for whom D&C for awareness activities is targeted, will potentially be able to directly benefit from the project in significant ways. For this group, an important function of the D&C plan is to provide a deeper understanding of Platform-ZERO project's work and innovations.	Yet another "Stage 2" subset of the Platform-ZERO stakeholders will be potentially interested to adopt and implement the project's outputs such as the Platform-ZERO developed in-line process monitoring platform. This group will be equipped with the required skills, knowledge and understanding of the Platform-ZERO project in order to achieve a real change and to foster a greater uptake of zero-defect PV manufacturing.

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5 D&C timeline

In the first 12 months of the project the main focus of the dissemination actions was on stage 1 of the D&C strategy (i.e., D&C for awareness). During the next 24 months of the project, project partners are continuing with stage 1, but as concrete results emerge and milestones are achieved, the D&C strategy has moved to stage 2 (i.e., D&C for understanding). In the final 12 months of the project the focus will mainly be on those stakeholders who have the ability to implement the Platform-ZERO innovations, and the D&C strategy will thus move to stage 3 (i.e., D&C for action).
The proposed D&C timeline runs throughout the entire project. As such it is aligned with the delivery dates of the project's deliverables (see Table 2) and key dissemination events will be aligned as much as possible with the most important outcomes.

As it can be seen in the work plan, during **Stage 1**, we have been able to disseminate and communicate mainly about:

- The process monitoring flow and industrial requirements;
- The design of advanced sensor stations, their configuration and integration;
- A preliminary identification of the project's expected exploitable results.

During **Stage 2**, we will be able to disseminate and communicate mainly about:

- The big data infrastructure and database setup;
- The design and testing of semi-automatized modular sensors prototypes;
- The design of integrated advanced sensor stations;
- The list of components for modular sensor integration;
- The sample fabrication;
- The AI-system architecture;
- The data management, ingestion and extraction algorithms;
- The data communication and control interfaces;
- A description of the project's demonstrators;
- An update on the characterisation of the project's expected exploitable results;
- A description on the project's contribution to standardisation and regulation.

Eventually, during **Stage 3**, we will be able to disseminate and communicate mainly about:

- The final algorithms for control, self-calibration and data conditioning;
- The operation and working procedure of the demonstrators according to each manufacturing process;
- The AI-system implementation and performance;
- The AI-based control unit;
- The performance and impact of process monitoring platform demonstrators at the different manufacturing line;
- An outlook on the scientific and commercial perspective beyond the end of the project.

Table 2. Platform-ZERO deliverables timeline

N°	Deliverable title	Due date	Dissemination focus
D8.1	Project management handbook	M03	Stage 1 Communicating and promoting awareness to wider public
D8.2	Gender Equality plan	M03	
D7.1	Dissemination and Communication strategy, roadmap and KPIs	M05	

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D1.1	Report on process monitoring flow and industrial requirements	M06	
D1.2	Design of advanced sensor stations configuration and integration	M06	
D7.5	Knowledge Management and IPR Strategy	M06	
D8.3	Data and knowledge management plan	M06	
D1.3	Update of risk mitigation strategies	M09	
D8.4	1st phase internal report	M09	
D7.6	Preliminary Innovation Report and ER characterization	M12	
D4.1	Description of the big data infrastructure	M18	Stage 2 Promoting greater understanding and knowledge
D7.2	Mid-term report on Dissemination and Communication activities and performance	M18	
D8.5	Mid-2nd phase internal report	M18	
D3.1	Database setup	M20	
D2.1	Report on the design and testing under simulated industrial conditions of semi-automatized modular sensors prototypes	M22	
D2.3	Report on the design of integrated advanced sensor stations	M24	
D7.8	Contextualization and Market Analysis and preliminary business models	M24	
D2.4	List of components for modular sensor integration	M28	
D1.4	Report on sample fabrication	M30	
D3.2	Report on AI-system architecture	M30	
D4.2	Description of data management, ingestion and extraction algorithms	M30	
D4.3	Description of the data communication and control interfaces	M30	
D8.6	2nd phase internal report	M30	
D5.1	Full description of the Platform-ZERO demonstrators	M34	
D7.7	Final Innovation Report and KERs characterization	M36	
D7.10	Standardization and Regulation recommendations and contributions	M36	
D2.2	Report on final algorithms for control, self-calibration and data conditioning	M39	Stage 3 Promoting uptake of results by relevant stakeholders
D5.2	Report describing the operation and working procedure of the demonstrators according to each manufacturing process	M39	
D8.7	3rd phase internal report	M40	
D3.3	Report on AI-system implementation and performance	M42	
D4.4	Description of the AI-based control unit	M42	
D6.1	Report on performance and impact of process monitoring platform demonstrators at the different manufacturing line	M48	
D7.3	Final report on Dissemination and Communication activities and performance	M48	
D7.4	Final multi-stakeholder event	M48	

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In Platform-ZERO, a large amount of the deliverables has a sensitive dissemination level; however, when it is deemed possible and useful for external dissemination and communication, the lead beneficiaries in charge of these deliverables may prepare a non-confidential executive summary: this executive summary will be then published on the Platform-ZERO website as a blog post and through social media.

6 Stakeholder groups and target objectives

D&C activities are aimed to encourage all identified stakeholder groups to exploit Platform-ZERO results in their daily work in the photovoltaic (PV) production industry. Exploitation aims to ensure uptake of project results among key target groups now and in the future.

Already four Key Exploitable Results (KERs) were identified at the time of writing the initial D&C strategy, as highlighted in Table 3. The list of KERs is currently being further characterised and consolidated: the corresponding work will be reported in deliverables D7.6 and D7.7.

Table 3. Platform-ZERO Key Exploitable Results (KERs) and related Expected Results (ERs)

KER 1 "*Defect-free photovoltaic manufacturing methodologies*": Innovative AI-driven methodologies based solely on non-destructive inspection that will reduce manufacturing defects in the PV industry, especially in the production of high complexity third generation PV devices. This will allow to boost PV production yield and product quality, lower production costs and decrease waste of high-value materials and energy increasing the sustainability of PV devices. →**Related ERs**: process monitoring flow for StS, RtR and LF PV production; database under operational conditions for AI calibration and improvement; methodologies for estimating manufacturing defect reduction in PV; protocols to evaluate the impact of defect reduction on PV production; process optimization strategies for CIGS, Perovskite and smart coating production. (D6.1)
KER 2 "*Advanced sensor stations*": Customizable sensor stations that using a common architecture will integrate different sensor arrays for combined morphological, physicochemical and/or optoelectronic in-line area inspection. The Adv-SS will be compatible with the generation of massive amounts of data and be adaptable for process monitoring and advanced characterization of different complex solid state technologies besides PV like batteries, displays, electronics, etc. →**Related ERs**: integrated probe head designs combining different signal acquisition techniques; signal multiplexing strategies; XY and XYZ scanning protocols for fast large are mapping, mechanical integration strategies for easy adaptation of sensing stations to manufacturing lines; sensor calibration standards; safety protocols for safe sensor operation. (D2.1, D2.2, D2.3)
KER 3 "*Artificial Intelligence decision-making*": Decision-making protocols based on AI for early prediction of defect formation at the earliest possible production stages that will suggest possible corrective actions for process re-optimization. Besides their application to PV, this will be applicable to other of complex solid-state technologies like batteries, displays, electronics, etc. →**Related ERs**: protocols for AI training; spectroscopic, imaging and optoelectronic data conditioning; protocols for big data feed into AI algorithms; self-learning AI algorithms tailored for target variable prediction based on spectroscopic, imaging and optoelectronic data; AI algorithms for sensor self-calibration; database structure for AI; data management algorithms; software for interaction with AI; protocols for AI performance validation. (D3.1, D3.2)
KER 4 "*Holistic manufacturing control platform*": Holistic manufacturing control platform that will be highly flexible and customizable thanks to a modular design based on advanced sensor stations interconnected and controlled through a AI-driven control unit for in-line process monitoring. Besides PV, the platform will be application to in-line monitoring and control of complex solid state devices manufacturing processes like those employed in other technologies such as batteries, displays, electronics, etc. →**Related ERs**: list of critical industrial requirements for process monitoring implementation; big data infrastructure for process monitoring; control unit architecture for process monitoring platform; DB architecture for data storage and extraction; GUI software for platform control; big data visualization protocols; communication network for platform elements interconnection. (D5.1, D5.2)

Table 4 reminds the main messages to be conveyed to main stakeholder groups in relation with each KER.

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Table 4. DEC main messages in relation with each KER and per stakeholder group

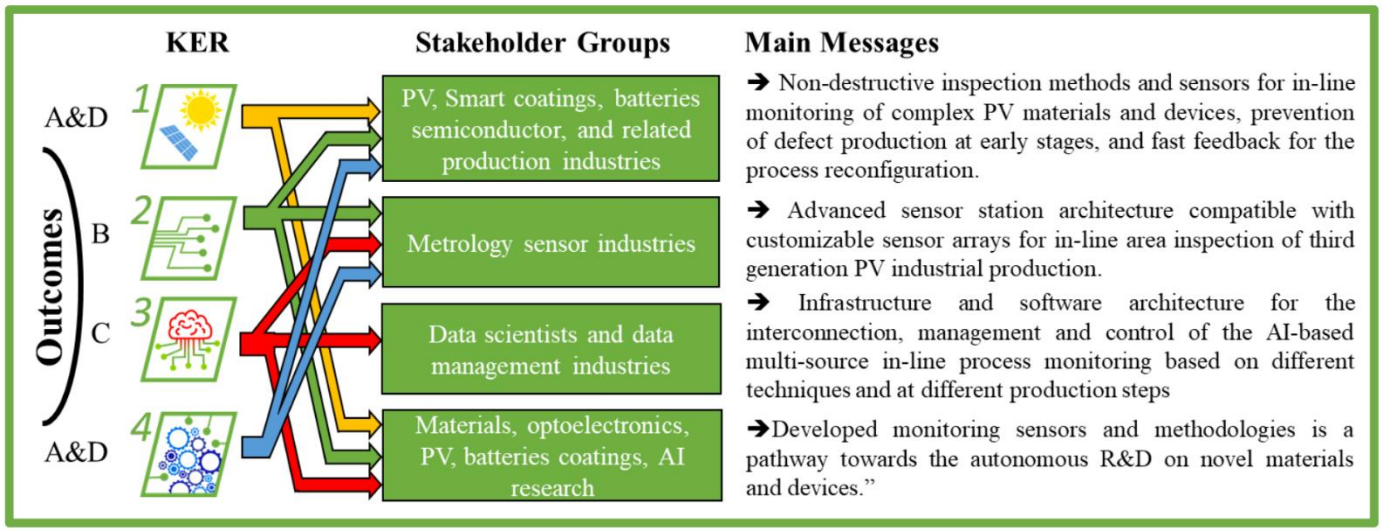

Table 5 below complements the above picture and presents from a wider project perspective the main expectations of each stakeholder group that are being targeted and impacted by Platform-ZERO.

Table 5. Platform-ZERO stakeholders' groups

Target groups	Strategic D&C objectives and expectations
PV manufacturing industry	• Integrate their vision and challenges in the context of WP1, WP5 and WP6 to make sure that Platform-ZERO solutions will fit their business • Provide them evidence that by adopting Platform-ZERO innovations, their market share and profitability will increase (WP7), while simultaneously reducing the costs of their products
Metrology sensor industries	• Integrate their vision and challenges in the context of WP2 to make sure Platform-ZERO solutions will fit their business
Data scientists and data management industries	• Integrate their vision and challenges in the context of WP3 and WP4 to make sure Platform-ZERO solutions will fit their business
Materials, optoelectronics, batteries, coatings, and AI industries	• Integrate their vision and challenges in the context of WP5 and WP6 to make sure Platform-ZERO solutions will fit their business
General public (e.g. citizens) and end-users	• Raise awareness about the project overall goal (all WPs) and explain how it will contribute to tackle key societal challenges
Investors	• Provide them evidence that it would be possible to earn returns on their investment (WP7) by supporting Platform-ZERO solutions
Scientific community, research institutions and researchers	• Benchmark our Platform-ZERO approach with potential prior related-research, to make sure we are aligned with the state of the art in the field. • Provide them evidence that Platform-ZERO innovations can improve the productivity of PV products
Relevant other research and innovation (R&I) projects (In particular those funded under the EFFRA partnership)	• Incorporate their results and lessons learnt in the context of relevant Platform-ZERO technical WPs • Align findings and join forces to address common R&I challenges (All technical WPs) • Organise joint dissemination and communication activities (WP7) when relevant to reach a wider impact
Standardisation organisations and working groups	• Gather details on ongoing standardisation activities that can influence Platform-ZERO R&I activities • Present key outcomes from Platform-ZERO that are relevant to influence existing standards and/or create new standards.
European commission, policy makers	• Get support for widespread dissemination of Platform-ZERO (e.g. through European Commission official channels for the most important project achievements)

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	• Present key outcomes from Platform-ZERO that are relevant to influence EU and national policies

Most of these target groups have already been impacted over the first 18 months of the project through various performed D&C actions. See chapter 12 for further details.

7 D&C channels and KPIs

Various D&C channels have been / will be activated depending on the content to be promoted and targets to be addressed. Key channels are summarised in Table 6 below, in connection with Key Performance Indicators (KPIs). Targets associated to KPIs are being monitored to evaluate the performance of D&C activities: the internal D&C tracker is used for this purpose (see chapter 10).

The progress at M18 is reported in the corresponding column of the table. All KPIs will continue to be monitored and final achieved performance will be reported in D7.3.

Table 6. D&C Channels and KPIs

KPI	Stage 1. target M1-M12	**Actual performance M18**	Stage 2. target M13-M36	Stage 3. target M37-M48	Cumulative target
Public website					
N° of views	500	Around 1000	5000	4500	10000
Social media posts (posted both on Twitter and Linkedin)					
N° of posts	5	Over 30	25	20	50
Peer-reviewed papers (T7.1)					
N° of papers	-	3 published 2 about to be released	2	10	12
Clustering workshops with sister R&I project (T7.3)					
N° of workshops	-	1 scheduled	1	1	2
National and international press releases (T7.1)					
N° of press releases	1	1 released 2nd in preparation	2	2	5
Presentations of scientific research at conferences (T7.1)					
N° of presentations	1	9	8	6	15
Industrial fairs (T7.1)					
N° of attendance	-	8	5	5	10
Training for industry and SMEs (T7.2)					
N° of trainings	-	1	4	3	7

Some additional statistics regarding the traffic on the project website (see Figure 1) and number of followers on social media (see Figure 2) are presented below.

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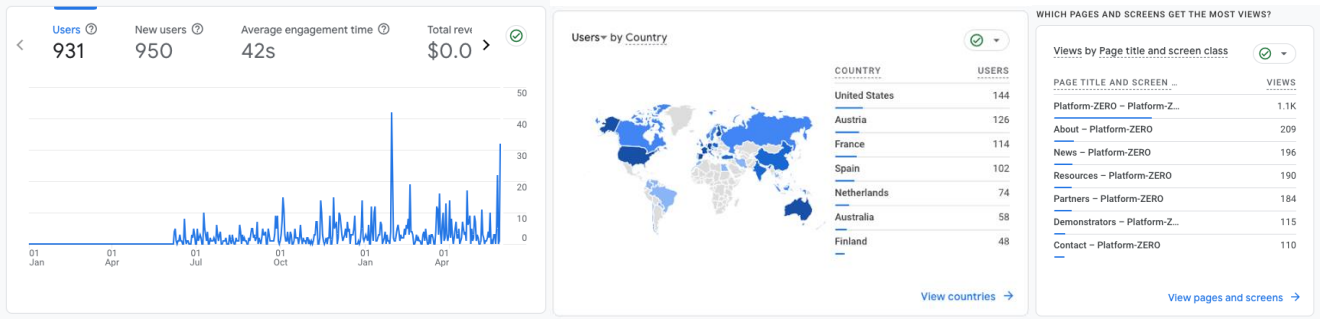

Figure 1. Project website: Google Analytics (from M1 to M17)

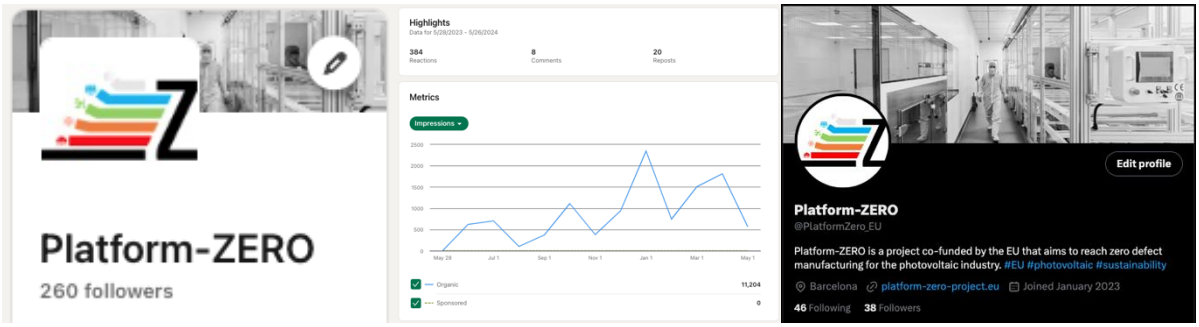

Figure 2. Platform-ZERO LinkedIn and Twitter social media analytics

8 D&C multipliers

When implementing D&C activities, Platform-ZERO partners exploit as much as possible D&C multipliers presented in Table 7 (platforms, clusters, associations to which they are members) in order to achieve a widespread dissemination of project results. For instance:

- we tag the relevant multipliers in our social media posts;
- we ask relevant multipliers to include information about our achievements in their own newsletter circulated to their members;
- we ask relevant multipliers to endorse and/or further promote some of our D&C activities to attract a larger audience, etc.

The list below has been compiled collaboratively by the Platform-ZERO project partners: it is a mix of entities that are active both at global, European, national and local scale. Additional multipliers might be considered during the implementation of the project.

Table 7. D&C multipliers

Network, group, stakeholder		Geographical target	Connection to the consortium	Relevance for Platform-ZERO
	European Materials Characterisation Council (EMCC)	International, Europe	IREC has been in touch through earlier R&I activities	This initiative aims to develop and improve characterisation tools in order to bring the development of nanomaterials and advanced materials in Europe into end products more successfully. Some of the Platform-ZERO research outcomes might feed the working groups of the council.

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	European Materials Modelling Council (EMMC)	International, Europe	AIT is a member	The EMMC elaborates Materials Modelling Roadmaps after intensive consultation and networking with all stakeholders. The EMMC Roadmaps (i) identify major obstacles to widening the use of materials modelling in European industry and (ii) recommends strategies to overcome them. Some Platform-ZERO R&I outcomes could feed this roadmap.
	European Technology Platform for Advanced Engineering Materials and Technologies (EuMaT)	International, Europe	IREC has been in touch through earlier R&I activities	EuMaT aims to assure optimal involvement of industry and other important stakeholders in the process of establishing of R&D priorities in the area of advanced engineering materials and technologies. This EU platform is relevant to disseminate Platform-ZERO outcomes given its particular focus on "*advanced production, processing and manufacturing*" solutions.
	NAMEC / EU PV Cluster	International, Europe	IREC has been in touch through earlier R&I activities	NAMEC builds on the experience of the EU PV Cluster, which has run with success since 2010 to highlight the key enabling role of nanotechnologies and advanced materials for photovoltaics. There are opportunities for Platform-ZERO to be involved in relevant clustering opportunities with other R&I projects through NAMEC.
	Energy Materials Industrial Research Initiative (EMIRI)	International, Europe	IREC and HZB are members	EMIRI aims to drive research, innovation and competitiveness across the advanced materials industry for the benefit of clean and sustainable Energy and Mobility. One focus area is dedicated to Solar Energy, hence of particular relevance for Platform-ZERO.
	European Energy Research Alliance Joint Programme Photovoltaic (EERA JP PV)	International, Europe	IREC, ZSW and AIT are members.	The EERA PV JP is of relevance to support dissemination of Platform-ZERO outcomes since it aims to catalyse European energy research in Photovoltaics to support a climate-neutral society by 2050.
	The European Perovskite Initiative (EPKI)	International, Europe	AIT, HZB, ZSW and Saule Technologies are members.	EPKI aims to raise the awareness on perovskite-based photovoltaics by conveying a common vision through the editing of a common European perovskite whitepaper; to support and initiate next generation PV industrial initiatives; and to facilitate joint-research programs and synergies among universities, institutes and companies. This initiative can help us to involve the perovskite manufacturing stakeholders' value chain to validation our approach and solutions.
	Thin-film PV technology coalition (PVthin)	International, Global	Saule Technologies is a member.	PVthin aims to strengthen global energy security and help create sustainable energy infrastructures by

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				promoting the social, economic and environmental benefits of thin-film solar photovoltaic technologies. This platform can help us to involve the thin-film manufacturing industry to validate our approach and solutions.
	European Industrial Research Management Association (EIRMA)	International, Europe	Saule Technologies is a member.	EIRMA ultimate goal is to make European R&D the leader in generating solutions to the economical, societal and business sustainability challenges of the future. The association can help to raise awareness about Platform-ZERO objectives.
	Silesian Space Valley: Space Technologies Cluster	Local, Poland, Silesia	Saule Technologies is a member.	This local alliance aims to increase and combine the technological, scientific and educational potential of entrepreneurs from the space technology industry. Platform-ZERO breakthrough innovations can be relevant for dissemination to alliance members.
	UN Global Network Poland (UNGC)	International, Poland	Saule Technologies is a member.	UN Global Compact is the world's largest sustainable business initiative. This network can help to promote Platform-ZERO outcomes at national-scale in Poland.
	The Association of European Renewable Energy Research Centers (EUREC)	International, Europe, Belgium	AIT and ZSW are members.	EUREC is the voice of renewable energy research in Europe, representing European Research Centres active in renewable energy.
	Solar Power Europe	International, Europe	AIT and ZSW are members.	SolarPower Europe mission is to ensure solar becomes Europe's leading energy source by 2030. SolarPower Europe can help making link between policymakers and Platform-ZERO outcomes.
	Secartys industrial cluster	Spain	IREC is part of the Steering Committee (Solartys).	A relevant cluster to disseminate Platform-ZERO outcomes to Spanish stakeholders. The cluster has a specific working group on solar energy.
	SusChem	Spain	Lurederra is a member.	SusChem is the European Technology Platform for Sustainable Chemistry. Its "Advanced Materials for Energy production and storage" working group has a particular relevance for Platform-ZERO.
	NanoSpain	Spain	Lurederra is a member.	NanoSpain, Spanish Nanotechnology Network, promotes the exchange of knowledge between Spanish groups working in different fields related to Nanotechnology and Nanoscience increasing collaboration among universities, research institutions and industry.
	Materplat	Spain	Lurederra is a member	Materplat is the Advanced Materials and Nanomaterials Spanish Technological Platform. Its "Energy

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				Innovation group" is of particular relevance to disseminate Platform-ZERO R&I activities.
	NanoFutures	International, Europe	Lurederra is a member	NANOfutures environment is an ETIP European Technology Integrating and Innovation Platform, multi-sectorial, cross-ETP, integrating platform with the objective of connecting and establishing cooperation and representation of Technology Platforms that require nanotechnologies in their industrial sector and products.
	Cluster Energy Efficiency Catalonia (CEEC)	Spain	IREC is part of the Steering Committee.	CEEC is an excellent network to promote Platform-ZERO to Catalunya stakeholders interested by innovations related to energy-efficiency.
	Plataforma Tecnológica Española de CO2 (PTEC02)	Spain	IREC is a member	Spanish CO2 technology platform which can be relevant to connect with Spanish R&D organisations and industry interested in CO2 reduction innovations.
	InnoEnergy	Europe, Spain	IREC is a member.	EIT InnoEnergy brings people and resources together, catalysing and accelerating the energy transition. New ideas, products and solutions that make a real difference, and new businesses and people to deliver them to market. The platform can help disseminate Platform-ZERO outcomes, and it is also useful to potentially hire researchers to work on our project.
	FVEE: ForschungsVerbund Erneuerbare Energien	Germany	ZSW is a member.	The German Renewable Energy Research Association forms a nationwide cooperation structure of institutes researching and developing technologies for renewables, energy efficiency, energy storage and optimized technical and socio-economic interaction of all system components.
	Capenergies	France	R2M Solution France is a member	Capenergies is a cluster of industrial stakeholders located in the southeast of France. It has several members actively involved in the PV industry, which might be early adopters of Platform-ZERO solutions.
	CleanTech Cluster	Austria (Upper Austria)	RISC may use it as a platform for disseminating results	The Cleantech Cluster is the platform for environmental technology and energy technology companies in Upper Austria.
	World Green Building Council (World GBC)	Global, Europe, Italy, Spain and France	R2M is member of the Italian and Spanish GBCs. R2M France partners with the EU network of GBCs in another Horizon Europe project.	The GBCs gather stakeholders from various spheres including manufacturers of sustainable building materials and components. Many of its members are active in the BIPV sector, which is one of the targets of Platform-ZERO.

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	Spreentech Ventures	Italy	R2M is a shareholder	Spreentech Ventures recruits and supports innovative startups offering products and/or services in four areas of interest: Construction 4.0; Green Building, Tech & Mobility; Smart City & Smart Building; Circular Economy & ESG Impact. This network can help to connect Platform-ZERO innovations with investors.
	European Factories of the Future Research Association (EFFRA)	International, Europe, Belgium	Platform-ZERO is a project funded under the "Made in Europe" partnership run by EFFRA. AIT is a member.	Platform-ZERO will necessarily be very closely connected to EFFRA through the various joint D&C activities conducted in the context of the "Made in Europe" partnership.
	European Construction Technology Platform (ECTP)	International, Europe, Belgium	R2M Solution and AIT are members.	ECTP is focused on R&I for the built environment. It is a relevant EU platform to address the R&I stakeholders active in the field of BIPV.
	IEEE Women in Engineering	International, Europe	AIT member is chair of the Austrian section	IEEE Women in Engineering (WIE) is one of the largest international professional organizations dedicated to promoting women engineers and scientists and inspiring girls around the world to follow their academic interests to a career in engineering.
	EU Robotics Association	International, Europe	An AIT employee is an Austrian representative	euRobotics aisbl is a Brussels based international non-profit association for all stakeholders in European robotics. It was founded in September 2012 with the aim to strengthen Europe's competitiveness and to ensure industrial leadership of manufacturers, providers and end-users of robotics technology-based systems and services. Particular relevance to disseminate KER2 of Platform-ZERO
	European Machine Vision Association (EMVA)	International, Europe	AIT is a member.	EMVA is a non-for-profit and non-commercial association representing the Machine Vision industry in Europe. It is relevant network to disseminate KER2 of Platform-ZERO.
	PLATAFORMA TECNOLÓGICA ESPAÑOLA (FOTOPLAT)	National (SPAIN)	Nanostructured Solar Cells Group (UPO) is member	The Spanish Photovoltaic Technology Platform (FOTOPLAT) is an initiative born in March 2011 by the Ministry of Economy and Competitiveness (MINECO) of Spain through the INNFLUYE program. FOTOPLAT aims to bring together in the same structure all the companies and institutions involved with the challenge of keeping Spain and Spanish companies at the forefront of research and industrialization of photovoltaic energy systems, seeking synergies between the different institutions and implementing coordinated strategies.

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	4ZDM cluster	International, Europe	Platform-ZERO has been invited to be part of the cluster	The 4ZDM cluster is composed of completed and running European projects (FP7, H2020, Horizon Europe) that have come together to identify technical cross-cutting issues regarding zero-defect manufacturing such as: intelligent, autonomous, and self–adaptive systems for process monitoring, control and quality management; system approaches for monitoring and data processing of dimensional fluctuations; efficient simulation tools and methods to predict machining system behaviour.
	Cluster Renewable Energies Tirol	Regional Austria / (Italy)	Sunplugged is member	The renewable energy cluster of the region of Tyrol (comprising North Tyrol/Austria, South Tyrol/Italy) is composed of more than 85 innovative organisations (industry, SMEs, research) working in the field of photovoltaics, heat pumps, electric mobility and energy efficiency.
	Technologie Plattform Photovoltaik Austria	National (Austria)	Sunplugged is member	The Austrian Photovoltaics Platform is a joint initiative for Austrian manufacturing operations in the photovoltaics sector and all the relevant Austrian research institutes. The aim is to optimise innovation and research activities to benefit the Austrian photovoltaics sector.

During this first project period, all these networks and platforms were contacted by R2M and were sent our initial press release. This has helped to generate some fruitful discussion, to get our project referenced in some of their website or newsletter, to get additional followers on social media, and sometimes to get some articles published about our research (see Figure 3).

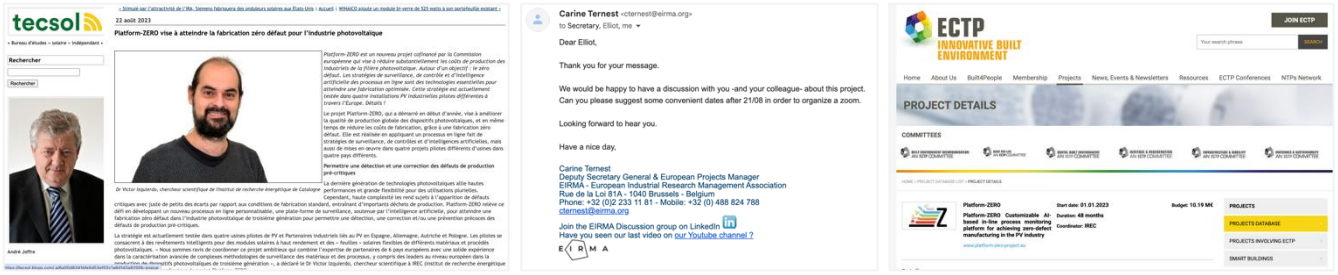

Figure 3. Examples of the impact generated by contacting D&C multipliers (TECSOL article; discussion with EIRMA; ECTP projects database)

With regards to the EFFRA association which is behind the Made in Europe (MiE) partnership, a close relationship has been maintained throughout this reporting period through:

- the updates of the EFFRA portal for monitoring and reporting purpose, see Figure 4;
- participation in EFFRA events (Manufacturing Partnership Days 2023 and 2024), see chapter 12;
- EFFRA tagged in all social media posts.

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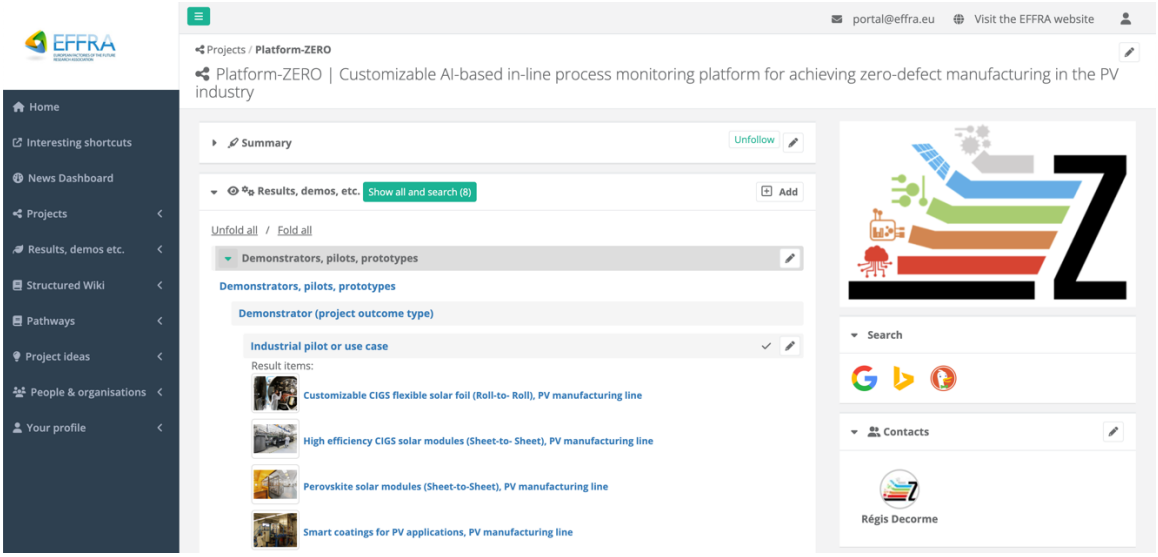

Figure 4. Platform-ZERO project documented in the EFFRA portal

9 Validation process for D&C activities

This chapter reminds validation process which needs to be followed by all project partners before a Platform-ZERO scientific publication goes external.

- Prior notice of any planned publication shall be given to the other Parties at least **30 calendar days** before the publication.

Any objection to the planned publication shall be made in accordance with the Grant Agreement by written notice to the coordinator and to the Party or Parties proposing the dissemination **within 20 calendar days after receipt of the notice**[1]. If no objection is made within the time limit stated above, the publication is permitted.

- Regarding other dissemination and communication activities such as: poster presentations, slides and abstracts for oral presentations at workshops, conferences and summer schools the prior notice period shall be reduced to **15 calendar days**.

In this case, any objection to the planned dissemination shall be made in writing to the Project Coordinator, the dissemination manager and to the partner or partners proposing the dissemination **within 10 calendar days after receipt of the notice**. If no objection is made within the time limit stated above, the dissemination is permitted.

Any dissemination of results (in any form, including electronic) must:

✓ Display the European Union emblem available on the EC website. The Consortium will preferably use the emblem with the Co-funded flag (see Figure 1 below), Platform-ZERO being a project funded at 60% for its for-profit partners.

✓ Include the following disclaimer:

[1] This value was wrongly defined as 30 days in D8.1 Project management handbook.

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Figure 5. EU emblem

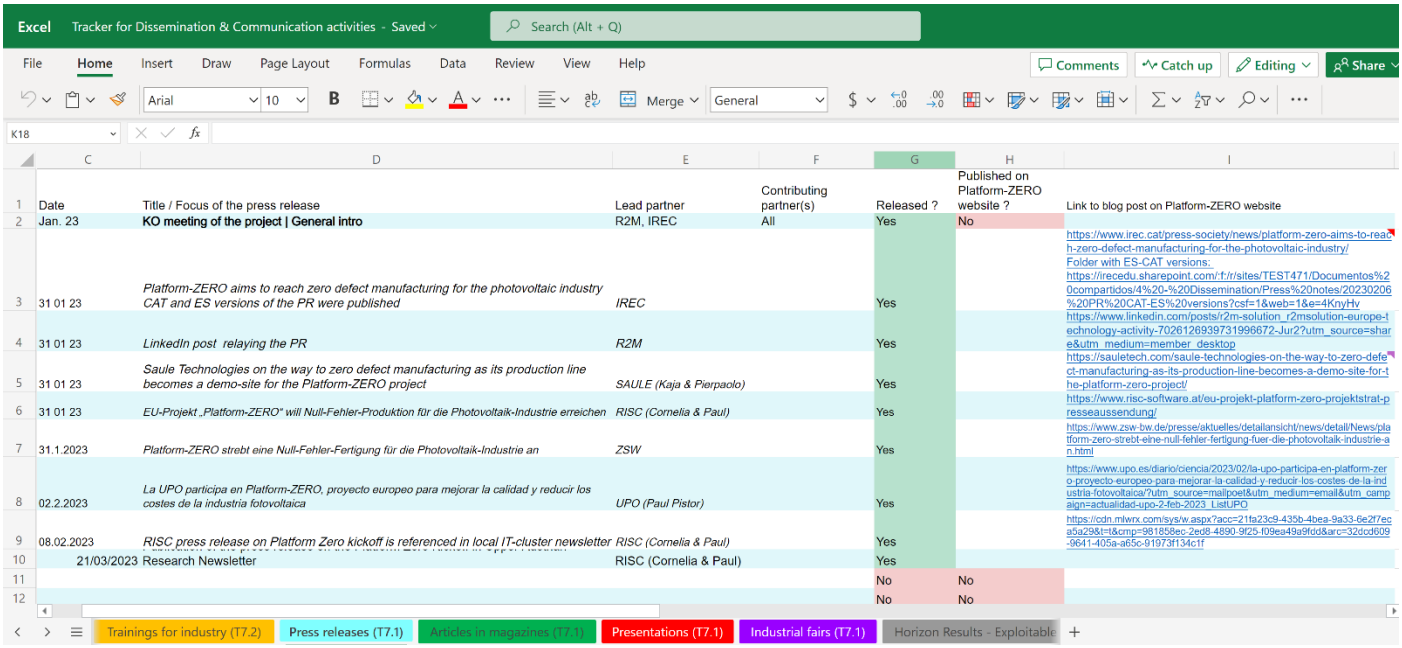
10 Detailed planning and recording of D&C activities

An online spreadsheet (see Figure 2) has been used for a detailed monitoring of both achieved and upcoming D&C activities:

- **Past D&C activities**: these tabs of the tracker allow to record “who did what” and to capture the key feedback & impact of every action for our project. A blog post and social media posts are published for each key achieved activity.
- **Upcoming activities**: a separate list of upcoming events is kept updated so that future D&C actions can be anticipated.

The tracker for D&C activities is accessible through this URL.

Various tabs (at the bottom of the Microsoft Excel Sheet) are used to structure the content and to monitor activities and the progress on dissemination of specific contents (e.g. upcoming conferences, peer-reviewed papers, clustering workshops, press release, etc.) according to the D&C channels highlighted in Chapter 7. Access to this spreadsheet is reserved to the Platform-ZERO project partners and updates are processed in a collaborative way.



	C	D	E	F	G	H	I
1	Date	Title / Focus of the press release	Lead partner	Contributing partner(s)	Released ?	Published on Platform-ZERO website ?	Link to blog post on Platform-ZERO website
2	Jan. 23	**KO meeting of the project | General intro**	R2M, IREC	All	Yes	No	
3	31 01 23	*Platform-ZERO aims to reach zero defect manufacturing for the photovoltaic industry CAT and ES versions of the PR were published*	*IREC*		Yes		https://www.irec.cat/press-society/news/platform-zero-aims-to-reach-zero-defect-manufacturing-for-the-photovoltaic-industry/ Folder with ES-CAT versions: https://irecedu.sharepoint.com/:f:/r/sites/TEST471/Documentos%20compartidos/4%20-%20Dissemination/Press%20notes/20230206%20PR%20CAT-ES%20versions?csf=1&web=1&e=4KnyHv
4	31 01 23	*LinkedIn post relaying the PR*	*R2M*		Yes		https://www.linkedin.com/posts/r2m-solution_r2msolution-europe-technology-activity-7026126939731996672-Jur2?utm_source=share&utm_medium=member_desktop
5	31 01 23	*Saule Technologies on the way to zero defect manufacturing as its production line becomes a demo-site for the Platform-ZERO project*	*SAULE (Kaja & Pierpaolo)*		Yes		https://sauletech.com/saule-technologies-on-the-way-to-zero-defect-manufacturing-as-its-production-line-becomes-a-demo-site-for-the-platform-zero-project/
6	31 01 23	*EU-Projekt „Platform-ZERO" will Null-Fehler-Produktion für die Photovoltaik-Industrie erreichen*	*RISC (Cornelia & Paul)*		Yes		https://www.risc-software.at/eu-projekt-platform-zero-projektstrat-presseaussendung/
7	31.1.2023	*Platform-ZERO strebt eine Null-Fehler-Fertigung für die Photovoltaik-Industrie an*	*ZSW*		Yes		https://www.zsw-bw.de/presse/aktuelles/detailansicht/news/detail/News/platform-zero-strebt-eine-null-fehler-fertigung-fuer-die-photovoltaik-industrie-an.html
8	02.2.2023	*La UPO participa en Platform-ZERO, proyecto europeo para mejorar la calidad y reducir los costes de la industria fotovoltaica*	*UPO (Paul Pistor)*		Yes		https://www.upo.es/diario/ciencia/2023/02/la-upo-participa-en-platform-zero-proyecto-europeo-para-mejorar-la-calidad-y-reducir-los-costes-de-la-industria-fotovoltaica/?utm_source=mailpoet&utm_medium=email&utm_campaign=actualidad-upo-2-feb-2023_ListUPO
9	08.02.2023	*RISC press release on Platform Zero kickoff is referenced in local IT-cluster newsletter*	*RISC (Cornelia & Paul)*		Yes		https://cdn.mlwrx.com/sys/w.aspx?acc=21fa23c9-435b-4bea-9a33-6e2f7eca5a29&t=t&cmp=981858ec-2ed8-4890-9f25-f09ea49a9fdd&arc=32dcd609-9641-405a-a65c-91973f134c1f
10	21/03/2023	Research Newsletter	RISC (Cornelia & Paul)		Yes		
11					No	No	
12					No	No	

Figure 6. Screenshot of Platform-ZERO D&C activities monitoring shared online spreadsheet

11 D&C toolkit

During the first five months of the project, R2M has developed the D&C toolkit which has supported the implementation of D&C activities implemented by all Platform-ZERO project partners over this first reporting period. The toolkit includes:

- **The Platform-ZERO colour palette**: In order to give a recognizable visual identity to the project, a Platform-ZERO colour palette was defined (see Table 8). Each colour is associated to a different feature of the project associated, in turn, to a different objective of the project. This colour palette is employed in the visual dissemination elements of the D&C toolkit.

Table 8. Platform-ZERO colour palette.

Colour	Hex code	Project feature (objective)
	#92D050	Development of advanced sensor stations (S&T Objective 1)
	#FF0000	AI system for autonomous monitoring and control (S&T Objective 2)
	#F07E22	Implementation of a big data management infrastructure and a control system (S&T Objective 3)
	#E7E6E6	Implementation and installation of functional process monitoring platforms (S&T Objective 4)
	#00B0F0	PV manufacturing optimization (S&T Objective 5)
	#000000	Transversal colour of the project

- **The Platform-ZERO pictograms**: Together with a specific colour, each feature/objective of the project pictograms has an associated pictogram that depicts the main idea behind them (see Table 9). These pictograms help understanding the project in a direct and visual way and are employed in the visual dissemination elements of the D&C toolkit, including the project logo. Coloured and white vector format versions were developed by R2M for a proper visualisation on large format items such as posters.

Table 9. Platform-ZERO pictograms.

Pictogram (white and coloured)		Project feature (objective)
		Development of advanced sensor stations (S&T Objective 1)
		AI system for autonomous monitoring and control (S&T Objective 2)
		Implementation of a big data management infrastructure and a control system (S&T Objective 3)
		Implementation and installation of functional process monitoring platforms (S&T Objective 4)
		PV manufacturing optimization (S&T Objective 5)

- **The Platform-ZERO logo**: the logo from the initial project proposal was kept. Vector format versions were developed by R2M for a proper visualisation on large format items such as posters, in various variants (colours, black, edge, and white versions, see Figure 3).

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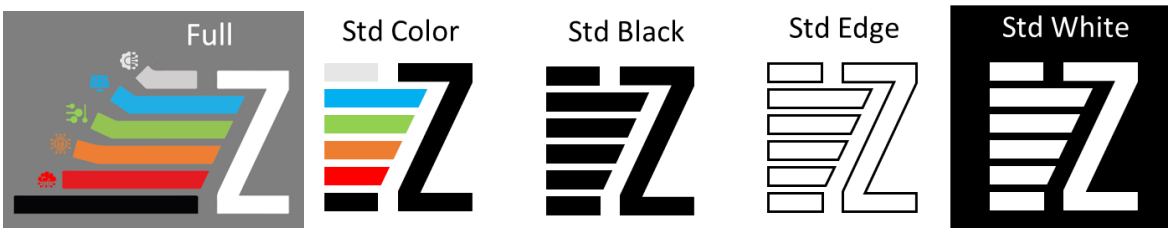

Figure 7. Platform-ZERO logo in various vector format versions

- **The Platform-ZERO social media accounts**: the official social media accounts were created on both LinkedIn and Twitter (see Figure 4). They follow the official channels of all Platform-ZERO project partners. R2M ensured the moderation of both accounts. Platform-ZERO partners were able to contact R2M when they wanted to post news through the project channels. Furthermore, they were encouraged to share news posted on the project's channels through their own institutional accounts, in order to reach a wider impact. The European Commission, Hadea agency and EFFRA association were systematically tagged in the posts.

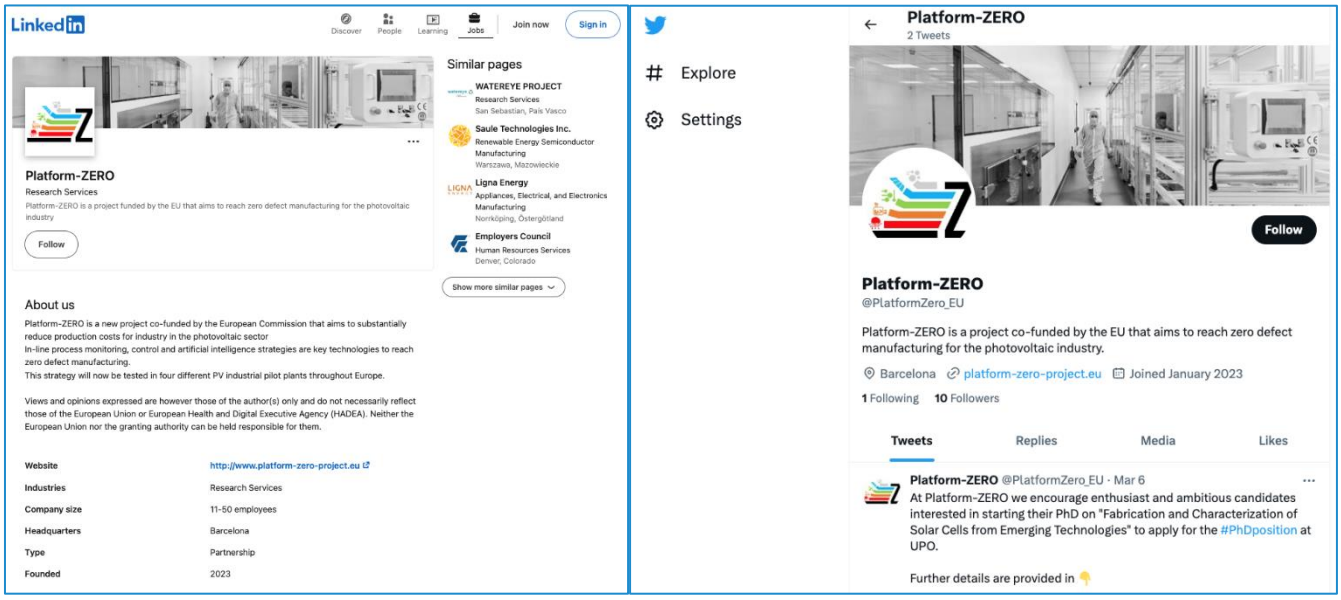

Figure 8. Platform-ZERO LinkedIn and Twitter social media channels

- **The Platform-ZERO roll-up poster & leaflet**: a project roll-up poster and leaflet (see Figure 5) were developed to raise awareness about the project, for instance in events and industrial fairs.

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Figure 9. Platform-ZERO Roll-up poster and project leaflet

- **The Platform-ZERO project standard presentation:** this presentation (see Figure 6) consists in a standard slide deck which presents the project partners, the overall context, an overview of the project objectives, its timeline, expected outcomes, KPIs and funding acknowledgment. Platform-ZERO project partners are invited to tailor this presentation (i.e., to add, amend or potentially remove slides) depending on the audience to be addressed in D&C activities.

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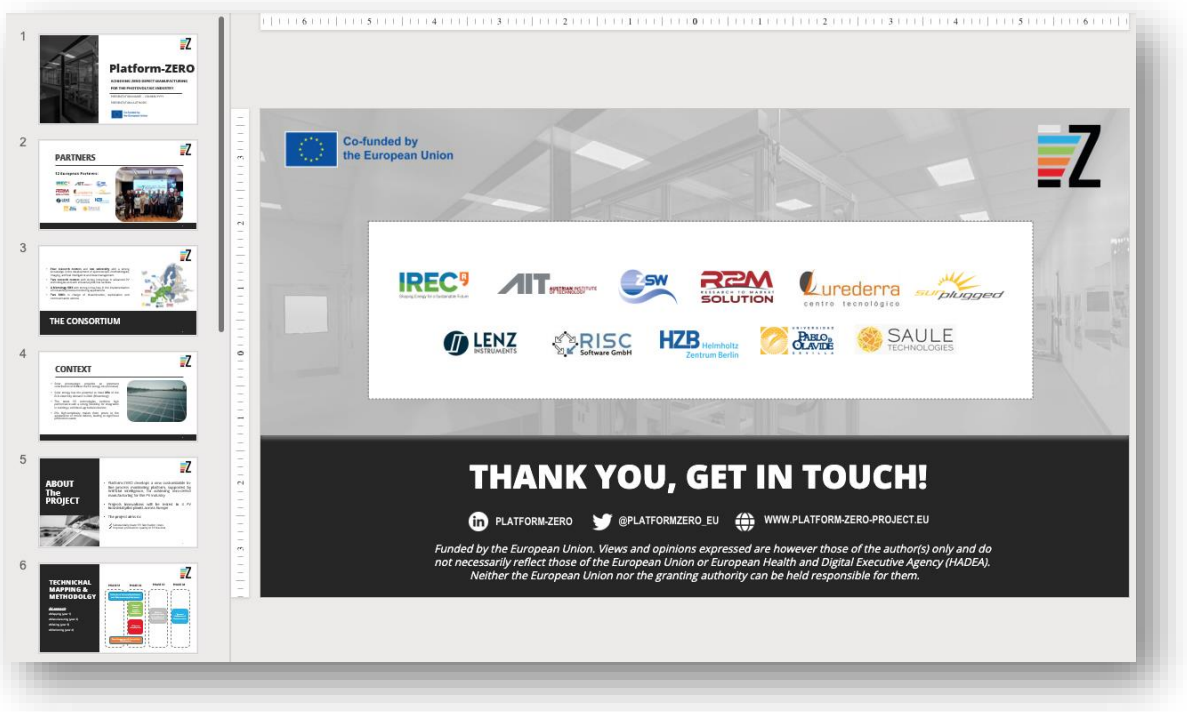

Figure 10. Platform-ZERO standard project presentation

- **Platform-ZERO social media standard banners:** a set of social media banners (see Figure 7) were developed. The aim is to use these banners as much as possible to create the visuals of social media posts, in order to maintain a coherent and homogeneous visual identity.

Figure 11. Platform-ZERO standard project presentation

- **Platform-ZERO project website:** the project website (see Figure 8) is available at http://www.platform-zero-project.eu/ and has been developed with WordPress, tailored with an Astra template, and hosted on a server managed by R2M. The project website includes:
  - a *Landing page* which provides an overview of the project and direct access to the promotional video;
  - An *About page* which provides details about the project objectives and innovations; and gives access to another short video to illustrate the project concept.
  - a *News page* which is fed regularly with blog posts to reflect the progress of R&I activities (each news is replicated on the project social media accounts); More than 30 blog entries were created during the first reporting period.
  - a *Demonstrators page* to present the four PV manufacturing lines where Platform-ZERO innovations will be tested;
  - a *Partners page* to present the project beneficiaries and their role;

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- a *Resources page* where public deliverables and other key public outcomes (e.g. publications) are incrementally uploaded;
- A *Contact us* page with direct access to the contact details of the coordination team and to the dissemination manager.

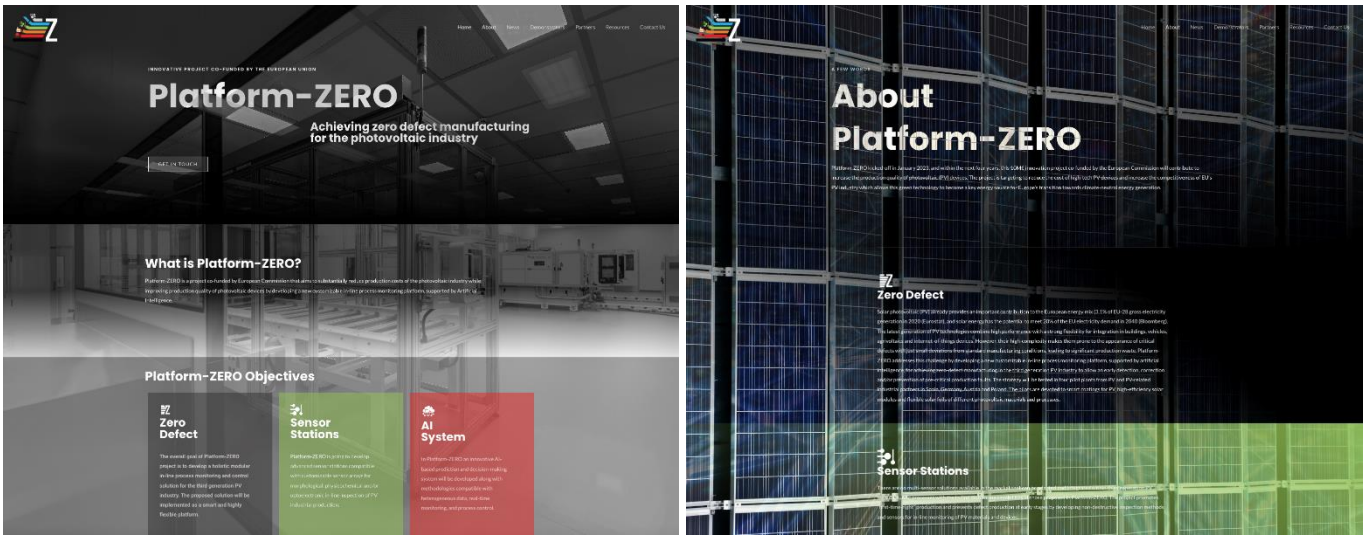

Figure 12. Platform-ZERO project website: 'Home' and 'About' pages

Depending on the project news, specific pages are created to promote some specific content. For instance, at the time of writing this mid-term report, a specific page has been created to advertise the NextGen 2024 conference co-organised by Platform-ZERO (see Figure 13, and more details in Chapter 13).

Figure 13. Specific page on the project website to promote the NextGen 2024 conference

- **DEC material translations**

The DEC toolkit is updated throughout the project in collaboration with the project partners, according to their needs. In order to support promotion of the project in local events, translations of the project leaflet and of the standard project presentations have been performed in Catalan, Spanish, German and French. They are available in the project shared space and on the project website resources section (see Figure 14).

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Figure 14. DEC material translations in CA, ES, DE and FR

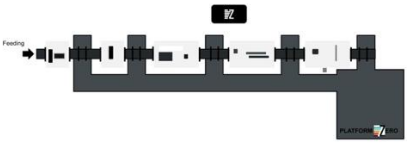
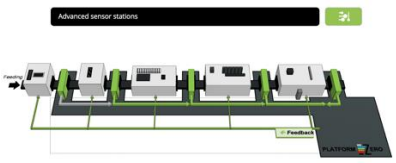
- **Project videos**

Two project promotional videos have been developed to support raising awareness about the project:

1) **An introductory video**, presenting the project vision and concept

The aim of this video is to present the framework for the project, to raise awareness about the concept zero defect manufacturing for the PV industry, and to introduce the Platform-ZERO demo sites where the innovation will be tested. R2M was in charge of coordination of the design, production and dissemination of this video. All partners were invited to provide feedback on the script of the video and to provide potential material (pictures, etc.) they wish to be included in the proposed design. The implementation of the video was realised by the Brussels-based design agency Babylonia, which was able to meet both layout style and budget requirements. In order to meet both the appealing spirit required from promotional materials and the budget available from the project, it was decided to develop a video in the form of a collage made from professional pictures and short videos, with a professional voice-over telling the story of the project. The voice-over was recorded by the professional sound studio 4Audio. A video script was developed (see Table 10) internally by the project partners to meet intended objectives: R2M drafted the script which was then reviewed and improved by all partners.

Table 10. Script of the Platform-ZERO introductory promotional video

		
“Hi ! I'm Victor Izquierdo, Deputy Group leader at IREC, the Catalonia Institute for Energy Research, and we are very excited to be the coordinator of Platform-ZERO.”	Platform-ZERO is a project co-funded by the European Commission	that aims to substantially reduce production costs for industry in the photovoltaic sector.
		
The high-complexity of the latest generation of PV technologies makes	Platform-ZERO addresses this challenge by developing a new	Platform-ZERO will implement: Advanced sensor stations,

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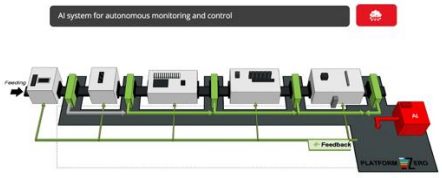
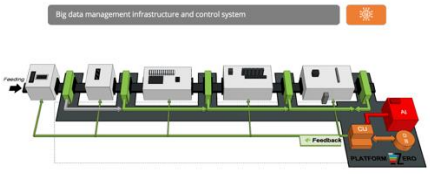
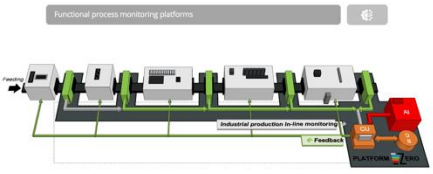
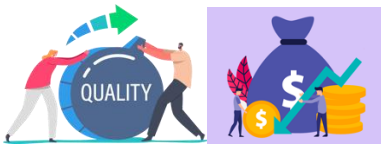
them prone to the appearance of critical defects with just small deviations from standard manufacturing conditions, leading to significant production waste.	customizable in-line process monitoring platform, to reach zero defect manufacturing.	
		
an Artificial Intelligence system for autonomous monitoring and control,	a big data management infrastructure and control system,	and a functional process monitoring platforms,
		
to obtain optimized manufacturing of PV modules.	This strategy will be tested in four different PV industrial pilot plants throughout Europe.	in Spain,
		
in Poland,	in Austria,	and in Germany
		
Platform-ZERO will contribute to increasing the overall quality, and reducing the cost of high-tech PV devices,	increasing the competitiveness of EU's PV industry	and allowing this green technology to become a key energy source for Europe's transition towards climate-neutral energy generation.
IREC, SW, R2M SOLUTION, urederra centro tecnológico, AIT, SAULE TECHNOLOGIES, HZB Helmholtz Zentrum Berlin, sunplugged, LENZ INSTRUMENTS, RISC Software GmbH, Pablo de Olavide	platform-zero-project.eu LinkedIn : **Platform-ZERO** X: @PlatformZero_EU	Co-funded by the European Union "Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them."

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Platform-ZERO is a consortium of 12 European partners from 6 Member States	Follow our research progress on our website and on social media !	

The Platform-ZERO logo, European emblem, and adequate Horizon Europe funding programme support acknowledgements are integrated within the final result. The final video is available at: https://vimeo.com/928761557. It is embedded into the Platform-ZERO website landing page, used to support D&C activities (e.g. displayed on a screen in a project booth), and all partners also contributed to disseminate it through their own channels. It has also been relayed on Youtube channels of project partners when they have it available (e.g. on IREC Youtube Channel).

Figure 15. Platform-ZERO introductory video

2) **A technical video**, illustrating the project concept with an animation

A second video was developed by UPO. It details the technical concept of the project, by showing an animation of the different technical components (see Figure 16) which together form the Platform-ZERO global innovation. This second video is available on the About page of the Platform-ZERO website where more technical details about the overall concept are presented.

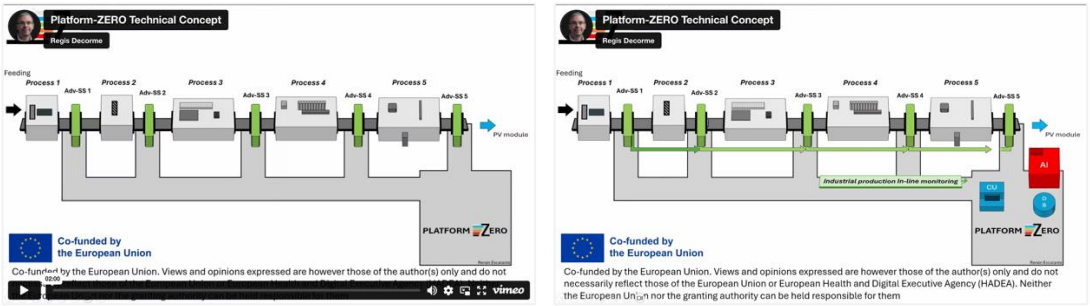

Figure 16. Platform-ZERO second video on the technical concept

12 Past D&C activities over the first reporting period

This chapter provides a summary of main D&C actions performed from M1 to M18. This information has also been reported in the EC F&T portal (i.e. continuous reporting module) as well as in the EFFRA Portal when relevant.

12.1 Peer-reviewed papers

4 journal papers have been published during this first reporting period.

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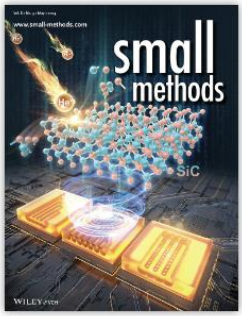
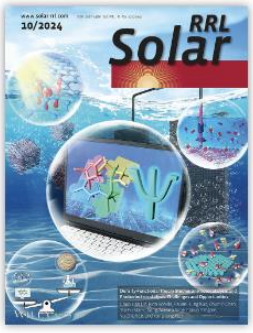
	pudu: A Python library for agnostic feature selection and explainability of Machine Learning spectroscopic problems Enric Grau-Luque [1], Ignacio Becerril-Romero [1], Alejandro Perez-Rodriguez [1,2], Maxim Guc [1], and Victor Izquierdo-Roca [1] 1 Catalonia Institute for Energy Research (IREC), Jardins de les Dones de Negre 1, 08930 Sant Adrià de Besòs, Spain. 2 Departament d'Enginyeria Electrònica i Biomèdica, IN2UB, Universitat de Barcelona, C/ Martí i Franqués 1, 08028 Barcelona, Spain. DOI: 10.21105/joss.05873
Partners:	IREC
Published on:	12 December 2023
Blog post:	https://www.platform-zero-project.eu/2023/12/29/pudu-a-python-library-for-agnostic-feature-selectionand-explainability-of-machine-learning-spectroscopicproblems/

	Research Article | Open Access **Accelerating the Development of Thin Film Photovoltaic Technologies: An Artificial Intelligence Assisted Methodology Using Spectroscopic and Optoelectronic Techniques** Enric Grau-Luque, Ignacio Becerril-Romero, Fabien Atlan, Daniel Huber, Martina Harnisch, Andreas Zimmermann, Alejandro Pérez-Rodríguez, Maxim Guc, Victor Izquierdo-Roca First published: 28 March 2024 | https://doi.org/10.1002/smtd.202301573
Partners:	IREC
Published on:	28 March 2024
Blog post:	https://www.platform-zero-project.eu/2024/05/28/accelerating-the-development-of-thin-film-photovoltaic-technologies-an-artificial-intelligence-assisted-methodology-using-spectroscopic-and-optoelectronic-techniques/

	Research Article | Open Access **Competition between Transport and Recombination in Dye Solar Cells at Low Light Intensity** Patricia Sánchez-Fernández, Clara A. Aranda, Renán Escalante, Antonio J. Riquelme, Renaud Demadrille, Paul Pistor, Gerko Oskam, Juan A. Anta First published: 25 April 2024 | https://doi.org/10.1002/solr.202400149
Partners:	UPO
Published on:	25 April 2024
Blog post:	https://www.platform-zero-project.eu/2024/05/29/competition-between-transport-and-recombination-in-dye-solar-cells-at-low-light-intensity/

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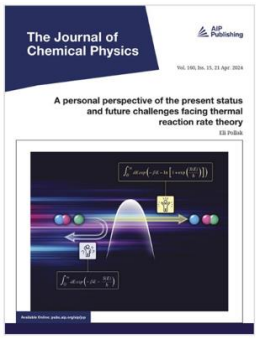	PERSPECTIVE I APRIL 16 2024 **The dual nature of metal halide perovskites** FREE Juan A. Anta; Gerko Oskam; Paul Pistor Check for updates + Author & Article Information *J. Chem. Phys.* 160, 150901 (2024) https://doi.org/10.1063/5.0190890 **Article history**
Partners:	UPO
Published on:	16 April 2024
Blog post:	https://www.platform-zero-project.eu/2024/06/03/the-dual-nature-of-metal-halide-perovskites/

12.2 Clustering workshops

1 clustering workshop with sister projects is currently being organised by our project in the upcoming Sustainable Places 2024 international conference (23-25 Sept. in Luxembourg). The workshop is entitled *"Advanced manufacturing of new-generation renewable plants"* and is already accepted into the programme of the event.

Figure 17. "Advanced manufacturing of new generation renewable plants" workshop at Sustainable Places 2024

Sister projects confirmed in the event at the time of writing this report: **SEAMLESS-PV ; SuperTandem ; and ENGINE**. R2M is coordinating the organisation of this clustering workshop, which will be chaired by IREC. Projects will have the possibility to publish a post-workshop publication in Open Research Europe, in the dedicated collection associated to the conference.

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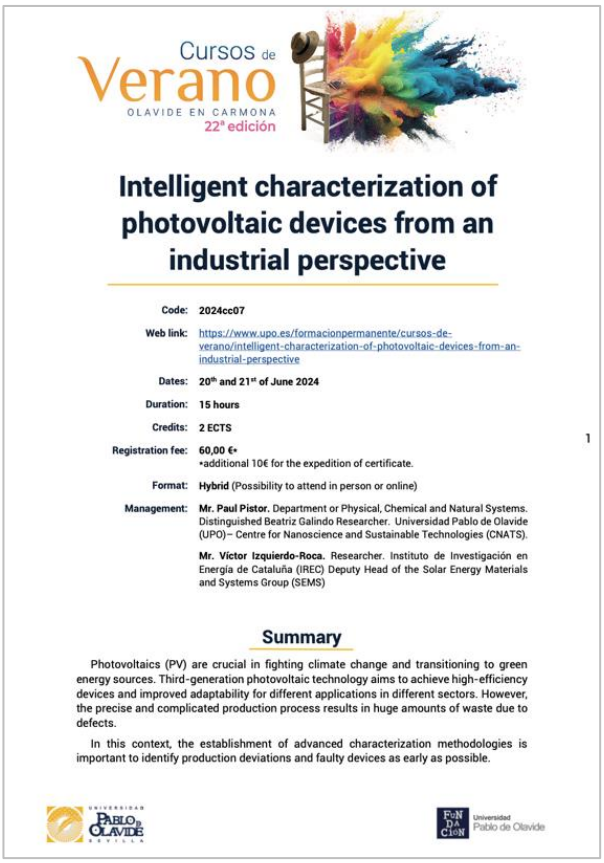
12.3 Trainings

1 training session has been organised through of a Summer School entitled *"Intelligent Characterization of PV Devices – IntelPV*", focused on the advanced characterization and monitoring of third-generation photovoltaic (PV) technologies, utilizing artificial intelligence (AI).

This special program was designed to gather to industrial engineers and PhD students who are keen on learning about state-of-the-art AI techniques and their application in the photovoltaics industry. The summer school took place in Carmona, near Seville, on the 20th and 21st of June 2024. It explored AI-enhanced characterization and monitoring tools from an industrial perspective, emphasizing their integration into PV production lines. The training addressed the critical challenges in PV manufacturing, particularly the production inefficiencies that lead to material waste and increased environmental impact. The programme was tailor-made for those involved in photovoltaics, related opto-electronic applications, and material sciences, who aspire to bridge the gap between academic research and industrial application.

Several Platform-ZERO partners were involved in the programme, from UPO (leading organiser of the event), IREC, AIT, RISC and R2M-FR.


Cursos de Verano
OLAVIDE EN CARMONA
22ª edición

Intelligent characterization of photovoltaic devices from an industrial perspective

Code: 2024cc07

Web link: https://www.upo.es/formacionpermanente/cursos-de-verano/intelligent-characterization-of-photovoltaic-devices-from-an-industrial-perspective

Dates: 20th and 21st of June 2024

Duration: 15 hours

Credits: 2 ECTS

Registration fee: 60,00 €*
*additional 10€ for the expedition of certificate.

Format: **Hybrid** (Possibility to attend in person or online)

Management: **Mr. Paul Pistor.** Department or Physical, Chemical and Natural Systems. Distinguished Beatriz Galindo Researcher. Universidad Pablo de Olavide (UPO)– Centre for Nanoscience and Sustainable Technologies (CNATS).

Mr. Víctor Izquierdo-Roca. Researcher. Instituto de Investigación en Energía de Cataluña (IREC) Deputy Head of the Solar Energy Materials and Systems Group (SEMS)

Summary

Photovoltaics (PV) are crucial in fighting climate change and transitioning to green energy sources. Third-generation photovoltaic technology aims to achieve high-efficiency devices and improved adaptability for different applications in different sectors. However, the precise and complicated production process results in huge amounts of waste due to defects.

In this context, the establishment of advanced characterization methodologies is important to identify production deviations and faulty devices as early as possible.

1


Sponsors

Fundación Cajasol

Collaborators

IREC Shaping Energy for a Sustainable Future

CNATS Centro de Nanociencia y Tecnologías Sostenibles

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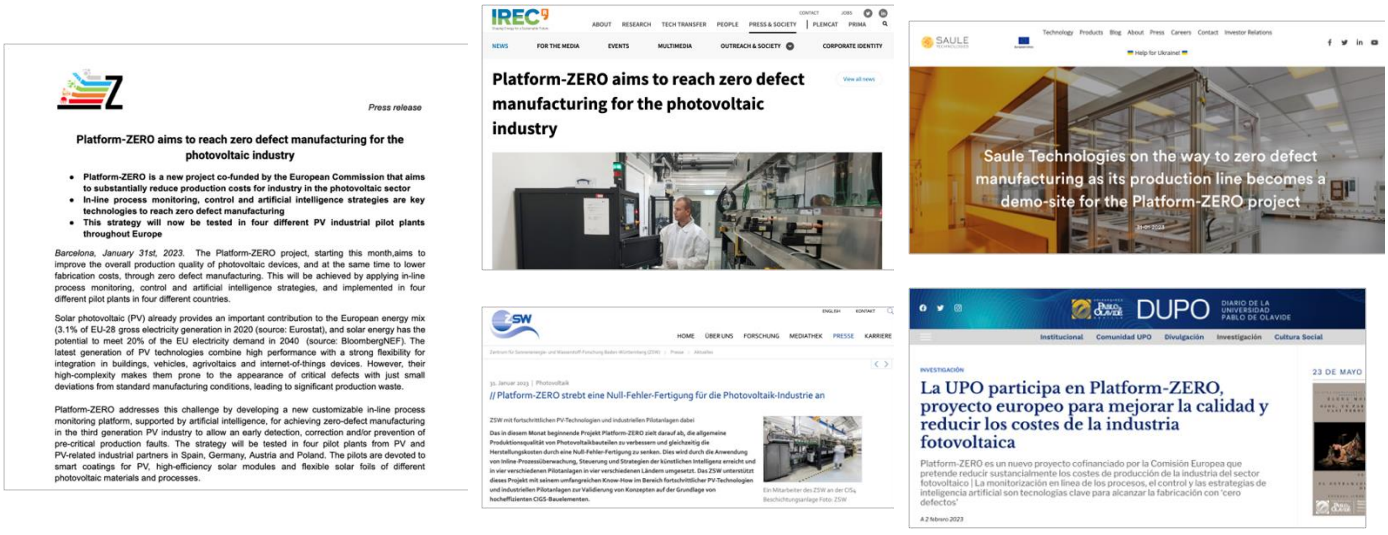
12.4 Press Release

A first press release was published in conjunction with the start of the project. It was disseminated by all project partners through their own communication departments and/or through their social media channels.



First press release, and a few examples of how project partners disseminated its content

A second press release is scheduled to be released after the first review meeting of the project. It will provide an update on intermediate results of the project and the overall research progress.

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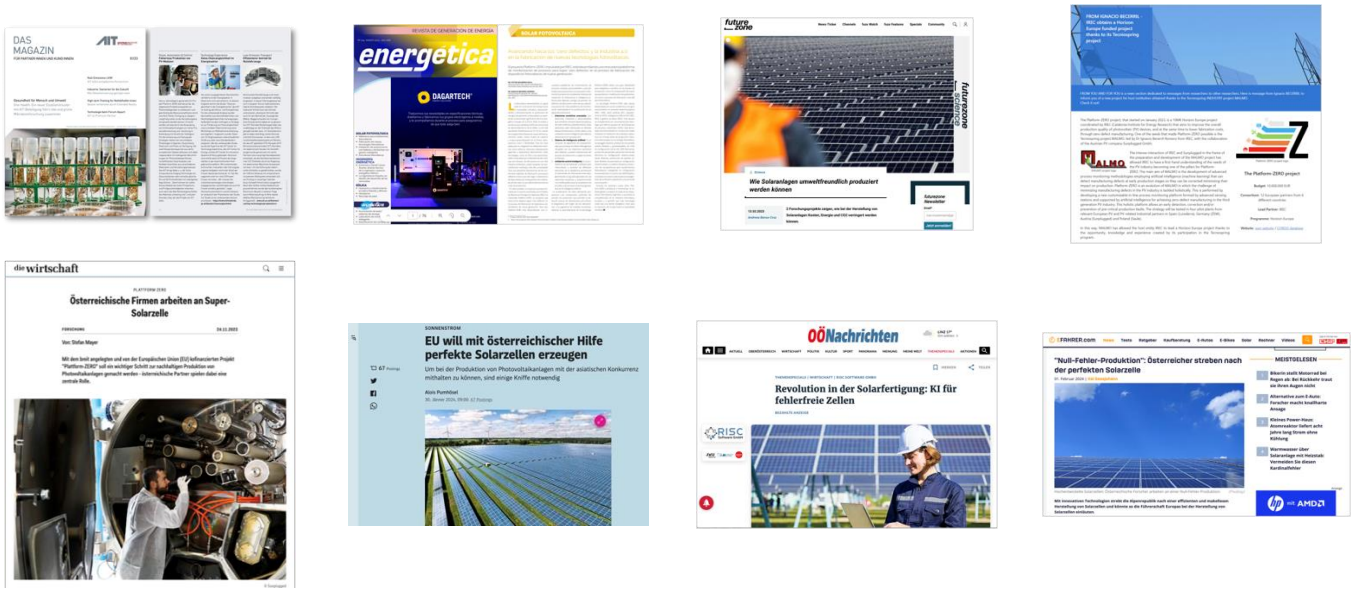
12.5 Articles

Resulting from the various D&C activities conducted by the project beneficiaries, **9 articles** about our project were published in various magazines and online web portals, such as Energetica21, FutureZone, ACCIO, Die Wirtschaft, Nachrichten, DerStandard, eFahrer, AIT magazine, etc.



Examples of articles about Platform-ZERO released during the first reporting period

These articles are referenced in the EC F&T portal (i.e. continuous reporting module) as well as in the EFFRA portal.

12.6 Industrial fairs

Participation in **8 industry / exhibition events** were recorded over this period (in some large events such as InterSolar, Platform-ZERO was represented through several Platform-ZERO's partners' booths). At the beginning of the project, project leaflets were distributed at Platform-ZERO company booths. While on the latest exhibitions, the project is also represented with its own dedicated stand featuring the Platform-ZERO visual identity (e.g. EU Industry Days).

The following events were attended:

- InterSolar 2023, Munich, Germany (AIT, ZSW)
- VNL Logistiktag 2023, Linz, Austria (RISC)
- EU PVSEC 2023, Lisbon, Portugal (ZSW booth)
- EU Industry Days 2023, Malaga Spain (R2M-FR & R2M-IT)
- ANUGA Food Tec 2024, Cologne, Germany (LENZ)
- OÖ Zukunftsforum, Linz, Austria (RISC)
- Control fair 2024, Stuttgart, Germany (AIT)
- Österreichsicher Logistiktag, Linz, Austria (RISC)

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Some pictures from the industrial exhibitions in which Platform-ZERO participated

Coordination efforts were also made with the industrial partners in order to be able to show at the booths some small samples of next generation PV devices which are considered in our use cases. This helps making our stand more tangible and attractive.

12.7 Presentations in events

Our project was presented in **9 events**, both international and local ones. In some instances, presentations were coupled with a presence with a booth (e.g. such as during the participations to the EFFRA Manufacturing Partnership Days). The following events were attended over this first reporting period:

- Lecture University of Applied Sciences Hagenberg, Austria, April 2023, RISC;
- Sustainable Places 2023, Madrid, Spain: presentation of the project in the Industry 4.0 session, roll-up poster and leaflets distribution, R2M-FR;
- Workshop of European project SUNRISE. June 2023. Workshop of European Project SUNRISE. Development and integration of sensors. Participants experts in recycling, sustainability and energy efficiency, LUREDERRA;
- "Berlin Long Night of Science", Berlin, Germany, June 2023, Poster presentation and distribution of leaflets at HZB exhibition, HZB;
- Intelligent monitoring over PV fabrication lines: Platform-Zero project a bonding example between Science & Industry, August 2023, Chile, UPO;
- EFFRA, The Manufacturing Partnership Day 2023, Brussels, Belgium, September 2023, IREC, R2M: presentation and exhibition;
- European Researchers' Night 2023, Barcelona, Spain, September 2023, IREC: Poster displayed in the European Corner;
- The Manufacturing Partnership Day 2024, Brussels, Belgium, May 2024, R2M: presentation and exhibition;
- UPO- Science fair 2024, Sevilla, May 2024, UPO: poster and presentation.

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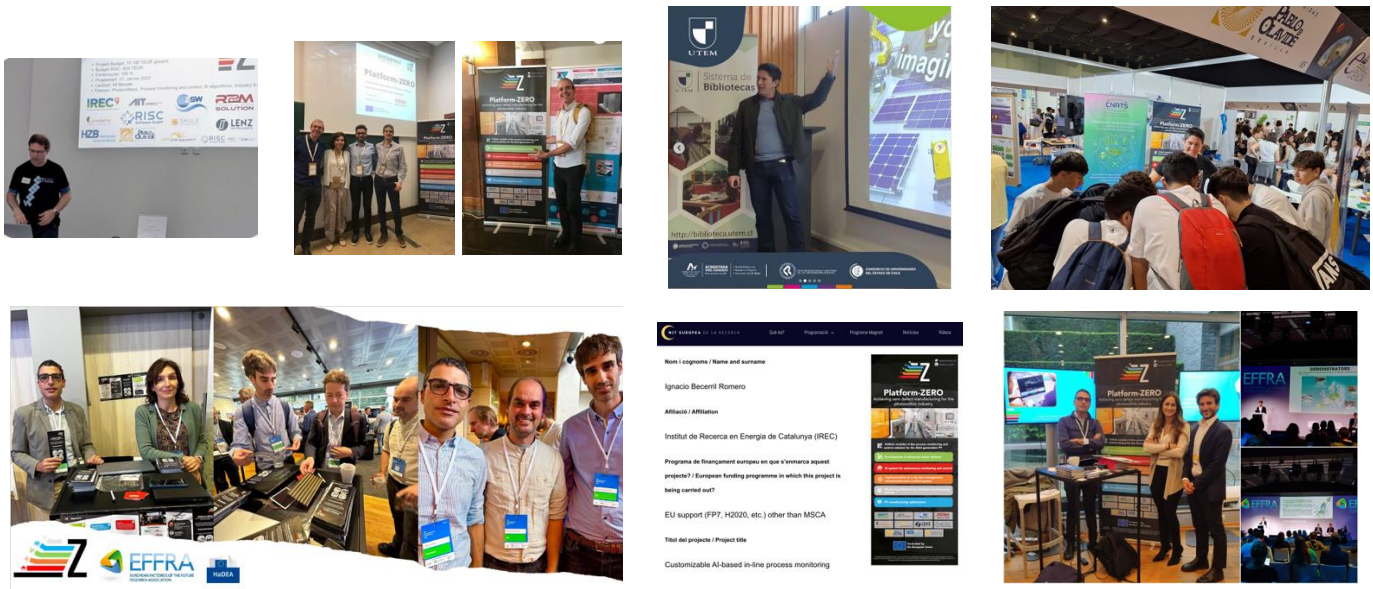

Some pictures from the events where Platform-ZERO was presented (oral presentation, poster, etc.)

12.8 Other media

Platform-ZERO was also presented in a NCBR podcast episode (May 2023), thanks to Saule Technologies (Konrad Wojciechowski).

Platform-ZERO introduced in a NCBR podcast (Poland)

13 Upcoming D&C activities for the next months

Table 11 below presents some of the foreseen activities already planned (or under preparation) by project partners for the next coming months at the time of writing this report (M18).

Table 11. Major D&C activities foreseen by project partners from M18

IREC Shaping Energy for a Sustainable Future	• Organisation of the NextGen 2024 International School and Workshop (see further down for more details)

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	• One journal paper in preparation in collaboration with AIT: "*Methodology based on reflectance and transmittance spectroscopy, including imaging, for the monitoring of quality of different layers used in thin film solar cells*". • One conference paper in preparation (EU PVSEC 2024): "*Optical inspection approach for in-line industrial monitoring of nano and micrometric layers quality in thin film photovoltaics technologies*"
AIT AUSTRIAN INSTITUTE OF TECHNOLOGY	• EU PVSEC 2024: participation with a Platform-ZERO booth with Sunplugged
ZSW	• Intersolar 2024: participation with a ZSW booth • EU PVSEC 2024: participation with a ZSW booth
R2M RESEARCH TO MARKET SOLUTION	• Sustainable Places 2024: clustering workshop with sister projects (see Chapter 12.2) • Contribution to NextGen 2024 International School and Workshop led by IREC • Continued collaboration with the 4ZDM cluster (first call held on 28 May)
Lurederra centro tecnológico	• MEETECH SPAIN 2024 (Madrid): Research Organization meeting fair. Dissemination of different research projects.
sunplugged	• EU PVSEC 2024: participation with a Platform-ZERO booth with AIT
LENZ INSTRUMENTS	• Yet to be decided
RISC Software GmbH	• Yet to be decided
HZB Helmholtz Zentrum Berlin	• Yet to be decided
UNIVERSIDAD PABLO DE OLAVIDE SEVILLA	• Journal paper in "Progress in PV": Enhancing Carbon-Based Perovskite Solar Cell Performance with the Integration of a Screen-Printed NiCo2O4 Layer: A Path to Higher Efficiency • 32nd International Materials Research Congress (IMRC2024), Cancun: presentation of the project.
SAULE TECHNOLOGIES	• Yet to be decided

A major event coming next is also the organisation by IREC, and with the support of all Platform-ZERO partners, of the **NEXTGEN (Next Generation High Efficiency Photovoltaics) International School and Workshop**, now entering its 5th Edition, in collaboration with the RenewPV School, in Palma, Mallorca, Spain, from the 9th to the 12th of September 2024.

Overview: This year's edition, set against the backdrop of Caixa Forum Palma, aims not only to continue the tradition of excellence established by previous editions but also to elevate the discourse to new heights. Our commitment to advancing the field of high-efficiency photovoltaics remains unwavering, with an enhanced focus on fostering greater interaction between academia and industry. The dialogue between young

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researchers, senior academics, and industry members is more crucial than ever as we navigate the challenges and opportunities presented by the transition from laboratory to industrial scale.

NEXTGEN 2024 will boast a roster of top-tier presentations by keynote and invited speakers, reflecting the cutting-edge in new and emerging materials, novel device concepts addressing advanced PV applications and their transfer to industry for the successful industrial implementation of competitive PV technologies.

NEXTGEN will include a specific “Lab to Industry” session (From Lab to Factory: Revolutionizing Photovoltaics with New Advanced Monitoring Approaches) on Monday, September 9th 2024. In this session, relevant industry representatives will describe the main challenges and needs related to the lab to industry transfer of next generation PV technologies, fostering industry-academia interaction. This will also include a short training session on the development and adoption of innovative Artificial Intelligence strategies for the achievement of high yield/high reliability industrial processes.

14 Conclusions

This report presented a mid-term update on the implementation of the Dissemination & Communication strategy of the Platform-ZERO project, detailing activities already achieved over the last 18 months, and key upcoming activities for the next project period. The D&C strategy is implemented during the whole project lifetime. This report will be again updated at the end of the project (D7.3 at M48) to report on the progress toward achieving the KPIs final targets presented in Section 7 of the report. In addition, the EC online F&T portal will continue being updated (i.e. on the continuous reporting module), as well as the EFFRA portal, to report our D&C achievements on a continuous basis.

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