



RECLAIM

Refurbishment and re-manufacturing
of large industrial equipment

Communication & Dissemination Master Plan

Mid-term update - September 2021 (M24)

**AUTHORS: DARIA KULEMETIEVA, MAËVA PRATLONG, GIL
GONÇALVES**

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Technical References

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¹ PU = Public

PP = Restricted to other programme participants (including the Commission Services)

RE = Restricted to a group specified by the consortium (including the Commission Services)

CO = Confidential, only for members of the consortium (including the Commission Services)

Document history

V	Date	Beneficiary	Author
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0.2	10/09/21	ESCI	Daria Kulemetieva
0.3	22/09/21	SAZ	Mae'va Pratlong
0.4	23/09/21	UPORTO	Joao Reis
1	23/09/21	ESCI	Daria Kulemetieva





Summary

Present D9.1 “Communication and Dissemination Master Plan” is an updated version of the D9.1 submitted in M3. It will replace the original Communication Plan delivered in M3.

This Master Plan outlines the communication and dissemination activities planned by RECLAIM partners for the whole project duration. It describes the overall communication strategy of the consortium, and functions as a guide for project partners when speaking about or on behalf of the project.

- **A framework for C&D success**
- **Tools & channels (why, timing, deployment)**
- **Key messages & proof points**
- **Multipliers & stakeholders**

D9.1 also outlines tools to keep the dissemination and communication records of the project such as detailed analytics for web statistics and specific tools for measuring social media outreach.

Disclaimer

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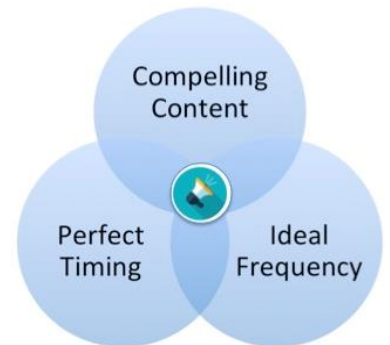
1. Creating lasting impact

RECLAIM will create impact with communication and dissemination actions to policy, technical, public and non-expert audiences that **build trust and accelerate transition to circular processes and digitalisation in industry**.

The project will profile and celebrate industries deploying re-manufacturing techniques that aim to reduce obsolescence of manufacturing machinery and prove the benefits of high-tech refurbishments and retrofitting.

This begins with RECLAIM's five pilot sites, where we will take pockets of proven performance and **share the knowledge and tools to make innovative new tools and solutions mainstream**.

Our mission is to do this across multiple online and in person channels using a creative mix of compelling and coherent content. **Consistent quality, frequency and timing of editorial, visual and academic outputs with clear calls to action** will help build awareness, understanding and uptake among the projects' target audiences.



Creating lasting impact with RECLAIM communication & dissemination content delivery principals

Dissemination

The RECLAIM dissemination strategy and activities work to ensure project outcomes - concepts, scientific results, tools, methodologies, results of validation work, standardisation punch-lists, policy and market recommendations - are widely disseminated to the appropriate target audiences.

Dissemination will actively support and promote the exploitation and future success of project results. Driven by its innovative nature, RECLAIM is aligned with industry and market trends, and has the potential to impact the market shortly after project completion.

Close collaboration with exploitation actions will be critical to the adoption and uptake of RECLAIM solutions - by consortium companies, their suppliers and the wider marketplace. A roadmap for identified exploitable results (D8.2) and a plan for scale-up, uptake and replication (D8.3) due for the end of the project will both have significant impact on shaping dissemination and communication content and actions after project end.

RECLAIM has commercial ambitions in a transformative time for digital applications and tools in industry. Refurbishment and re-manufacturing have significant potential as a standalone industry. This could represent up to €90 billion turnover and associated employment of 600,000 by 2030 according to a recent market study. Uptake and use of project results during and after the project duration is considered as a major success indicator.

Communication

The RECLAIM communication strategy focuses on informing and demonstrating the **societal, environmental and economic benefits** generated to a wide range of audiences outside the core project group.





Communication focus will be on our journey and process, tangible results and “human” success stories to stimulate positive emotions and relatable progress.

Video, visuals, social media content, journalistic articles and news releases are some of the planned activities to bring the project’s story, ambitions and impacts to life. This proprietary content will be **distributed using our own media** (social, website), **activated by project ambassadors and partners** (their own social, web, networks, conferences, presentations etc.) and **promoted to trade and technical press** via ESCI’s network of journalists and public relations activation.

ESCI will deploy a three-stage development process and storytelling techniques to use this content and get high levels of engagement:

1. **AWARENESS:** of a credible and visible consortium working to create real value
2. **ACTIVATION:** understanding of RECLAIM and well informed of its solutions
3. **ACTION:** confident and committed to adopt digital retrofitting with RECLAIM tools

Planning and execution

A four-year plan of activities, expected impacts, impact assessment and key partners has been defined and created by the consortium. The project was extended by 6 months, due to the COVID-related constrains; this does not change much in the interdependencies between the project plan and the communication and dissemination activities.

The project plan reflects connections with key deliverables and activities in work packages across the project and the building progress and resources in RECLAIMs active funded lifetime. This table provides a general roadmap for communication and dissemination activities, which will intensify as the project progresses and more results become available.

Our editorial content and activation pathways will be under constant review to identify the best opportunities and get communication and dissemination results. Our rolling reference points and editorial guidelines are highlighted below.






Year 1	Year 2	Year 3	Year 4
<ul style="list-style-type: none"> ○ Create general public awareness ○ Introduction in RTD networks & industrial cluster 	<ul style="list-style-type: none"> ○ Continue building awareness in SMEs ○ Publications of RECLAIM concepts and methods in scientific networks ○ RECLAIM technology demonstration 	<ul style="list-style-type: none"> ○ Building interest by demos ○ Promotion of RECLAIM prototypes in selected manufacturing domains 	<ul style="list-style-type: none"> ○ Promotion of RECLAIM Solution in selected manufacturing domains
Activities			
<ul style="list-style-type: none"> ○ Project Portal ○ Social Networks (LinkedIn, Twitter, Facebook, YouTube) ○ Press release, newsletter, events ○ Project workshops 	<ul style="list-style-type: none"> ○ Journal Publications (3 papers per year) ○ Seminars & EU workshops ○ Promotion activities (newsletters, etc.) ○ Conferences participation (2-3 conferences per year) 	<ul style="list-style-type: none"> ○ Demonstration in exhibitions ○ Industrial workshops ○ Clustering activities ○ Industrial Fairs ○ Online videos/articles 	<ul style="list-style-type: none"> ○ Demonstration in exhibitions ○ Industrial workshops ○ Clustering activities ○ Industrial Fairs ○ Online videos/articles
Expected Impact			
<ul style="list-style-type: none"> ○ Tweets, blog entries & social media to attract younger users ○ Increase industrial interest by highlights of production application ○ Increase scientific interest through major advances beyond SoA ○ Promotion of project findings 	<ul style="list-style-type: none"> ○ Benchmark with international SoA ○ Receive expert feedback through review ○ Achieve citations on RECLAIM work ○ General public, scientific & industrial awareness ○ Generate community interest in the investigated use cases 	<ul style="list-style-type: none"> ○ Receive feedback from potential users of the project results ○ Receive expert feedback – Track complementarity & differentiation of projects ○ Investigate findings of other projects ○ Achieve generalized outcomes (e.g. reference architecture) 	<ul style="list-style-type: none"> ○ Receive feedback from potential users of the project results ○ Receive expert feedback ○ Investigate findings of other projects
Impact Assessment			
<ul style="list-style-type: none"> ○ Re-tweets, Blog entries, Contact requests ○ Google analytics analysis, Visitor feedback by online survey 	<ul style="list-style-type: none"> ○ Paper citing the project research ○ No. of accepted peer-reviewed papers ○ Review comments to publications ○ Quality analysis of provided feedback 	<ul style="list-style-type: none"> ○ Participation in the workshops ○ Feedback report of workshops ○ Elements of commonality achieving great impact 	<ul style="list-style-type: none"> ○ Participation in the workshops ○ Replication RECLAIM's results
Partners			
<ul style="list-style-type: none"> ○ Academic & Research Institutes 	<ul style="list-style-type: none"> ○ Academic & Research Institutes ○ Technology Providers ○ End-users 	<ul style="list-style-type: none"> ○ End-users ○ Technology Providers ○ Academic & Research Institutes 	<ul style="list-style-type: none"> ○ End-users ○ Technology Providers ○ Academic & Research Institutes

Figure 1 - RECLAIM communication and dissemination roadmap

Rolling reference points and editorial guidelines for activation:

- 1. Key deliverables:** not all deliverables are created equal in terms of their communication & dissemination potential. Together with the coordinator and WP9 stakeholders, focus deliverables for additional treatment - i.e. accompanying infographics - will be identified.
- 2. Event opportunities:** an evolving list of 2-3 events per year for full WP9 support plus cultivating and supporting for project ambassadors and specialists in their own forums, events and spheres of influence.
- 3. Hot topics and conversations:** RECLAIM remains a niche area of interest, with a concentrated group of recognised specialists. Wherever possible, we will need to hook into bigger spheres such as live tweeting at events, connecting to major legislative developments and trade or even mainstream interest in Industry 4.0

2. Welcome to RECLAIM

Clear and consistent language, key messages and proof points are essential to creating the awareness, activation and action we seek!

Whether catching a target audience’s attention via a LinkedIn post, developing a script for a project video, delivering a presentation or speaking to a colleague or end user, common key messages and narrative are vital. Providing a messaging house and supporting statements also guides website texts, print materials and more. Perhaps even more importantly, they are also a resource to allow all project partners to feel well equipped and confident ambassadors for RECLAIM - adding their own personal touch and expertise on top where they wish to.





These messages and supporting statements give different types of detail to address a range of stakeholders. From big picture angles to connect with the broader context and decision-makers, to more technical and solution driven material. These will be fine-tuned and tested in editorial, events and media.

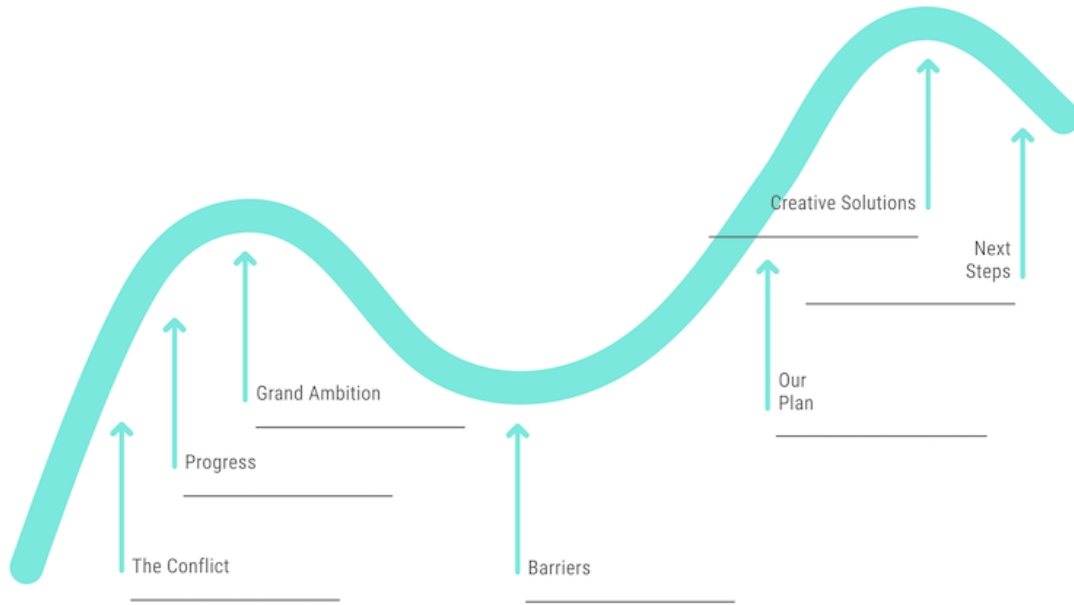


Figure 2 - Storytelling arch to give shape to our narrative, engage audiences and give a call to action

2.1 Narrative and discussion points

Elevator pitches and resources about the project from different perspectives will be based on a single, simple umbrella statement

RECLAIMing productivity, resource efficiency and a competitive edge with high-tech refurbishment of industrial equipment

The European context for manufacturing and policy

Improvements in manufacturing are essential for Europe to generate value, buy the natural resources it needs and protect its environment.

The European Union and its 'Factories of the Future' programme is working towards a smart, green and inclusive economy. RECLAIM helps to address and innovate in its key areas:

- **energy- and resource-efficient manufacturing processes**
- **socially sustainable, safe and attractive workplaces**
- **high-tech companies involved in innovative manufacturing**





Factories of the Future must improve their environmental credentials by minimising energy consumption, embracing closed loops for products and production, and improving sustainability in materials and production processes.

RECLAIM solutions can help economic as well as environmental sustainability by improving productivity and reconfiguring production facilities to meet new challenges in a cost-effective way.

Global statement

Manufacturing is a pillar of innovation and growth for Europe, representing 15% total employment and 80% of exports. Manufacturing is equally essential for production of innovative products and systems that affect every one of us - transportation, household appliances, health products, just to name a few.

Well-functioning equipment is a key to industrial productivity. However, a significant share of equipment in European production lines is approaching the end of their designed lifetime.

These ageing machines can suffer **unplanned downtime causing significant losses** - in financial terms and of the resources in production when they fail. Simple disposal of the outdated machinery is costly and carries a large environmental footprint. **New approaches are needed to ensure European manufacturing remains competitive and protects the environment.**

Researchers and industry representatives from nine European countries formed RECLAIM with an ambitious goal to provide **replicable solutions that could help European manufacturing sector meet these and future demands.**

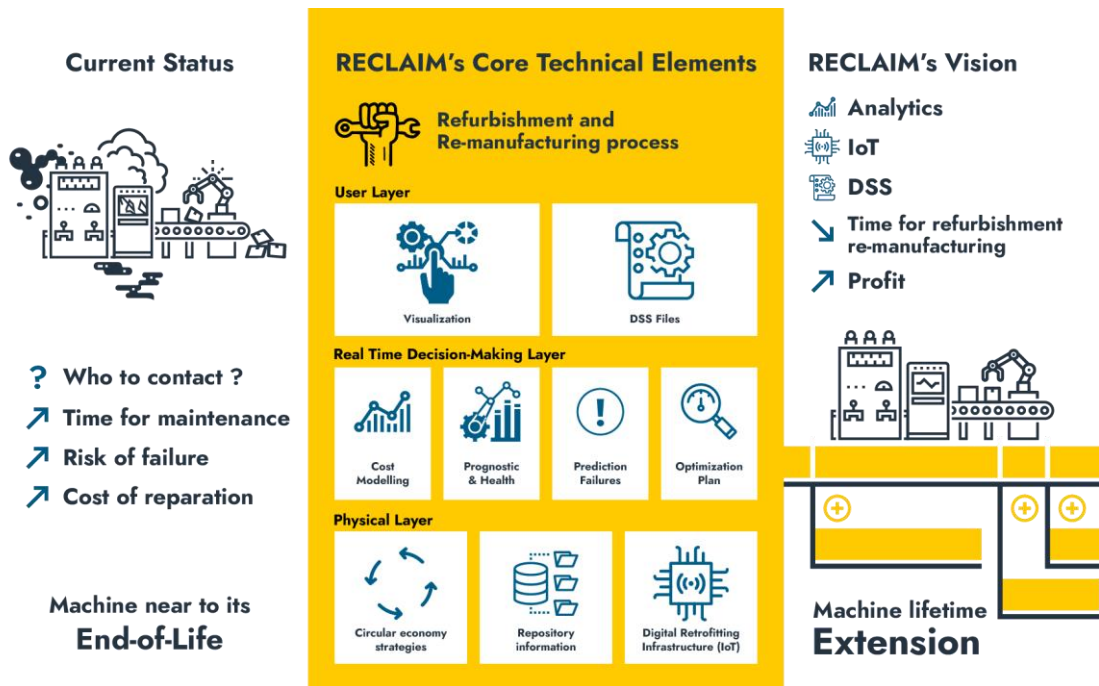


Figure 3 - RECLAIM added value & concept





Big picture pitch

The way we manage supply chains and produce goods is undergoing a significant change - big enough to be considered 'the fourth industrial revolution' (Industry 4.0). **A digital transformation of industrial processes** based on the seamless and timely exchange of information across supply chain participants, the extensive deployment of virtual operations and maintenance and a connected Industrial Internet of Things (IIoT) technologies in manufacturing.

The promise and benefits are considerable - smart factories, machines and supply chains that become more efficient, productive and less wasteful. But there are significant gaps in knowledge, skills and adoption. European manufacturing is losing global market and export share, inefficient use of resources has been calculated to cost European industry €630 billion annually and industry is still a significant burden on our environment in terms of pollution and generation of waste.

Within this context, RECLAIM acts specifically to deploy digital retrofitting to machinery and production lines - **keeping resources in the system and increasing their effectiveness at the same time.**

Deployed correctly, it will **make European industry more sustainable, productive, cost-efficient and competitive.**

Project pitch

RECLAIM focuses on the **important role well-functioning equipment has in industrial productivity.** This is especially important as a significant share of European manufacturing machinery is approaching the end of their designed lifetime.

Ageing machines can suffer unplanned downtime causing significant losses - in financial terms and of the resources in production when they fail. Simple disposal of the outdated machinery is costly and carries a large environmental footprint.

RECLAIM will **build awareness, skills and replicable solutions in refurbishment and remanufacturing techniques.** Digital retrofitting demonstrations in five different industries will increase cooperation and capacity at these sites and prove a range of solutions available to accelerate impact at sites across Europe.

The project hopes to **benefit the environment and the economy with new recycle and reuse techniques for machinery** - reducing obsolescence and proving the advantages of high-tech refurbishment.

Benefits include up to **15 years more useful lifetime** for machinery, with **greater resource efficiency and less incident disruptions**; major increases in operational efficiency; reduced maintenance costs and more value-added services and competitiveness.

Technical pitch

RECLAIM solutions aim to both extend machinery lifetime while also improving productivity and performance. The project will focus on **harnessing digital analytics, the Internet of Things (IoT) and circular economy strategies to improve predictive maintenance and upgrade legacy machines responsibly and effectively.**





Improving informed analysis and decision-making is a key objective. RECLAIM will create a novel *Decision Support Framework* to assess the health status of machinery and propose methods, tools or services for the appropriate lifetime extension strategy. The framework uses IoT sensors, novel prediction and process optimisation techniques to strengthen real-time evaluation and bring implications of strategic choices to life.

Nine RECLAIM solutions (described in greater detail in [Annex 1](#)) are grouped into modules and components of technical excellence, comprised of:

- A **physical layer** of smart sensors and cybersecurity
- A **real-time decision-making layer** featuring analytics, prognostics, maintenance and planning
- A **user layer** to visualise and localise information on equipment refurbishment and re-manufacturing operations





Proof points in sustainability, productivity, cost efficiency & competitiveness

	SUSTAINABILITY	PRODUCTIVITY	COST EFFICIENCY	COMPETITIVITY
TOP LINE	<ul style="list-style-type: none"> Industry today is still responsible for a significant burden on our environment in terms of pollution and generation of waste Factories of the Future must improve their environmental credentials by minimizing energy consumption, embracing closed loops for products and production and improving sustainability in materials and production processes Legislation to improve waste prevention and reuse could save 8% on annual business turnover in industry¹ 	<ul style="list-style-type: none"> Since the financial crisis, labour productivity in the 28 EU member states has grown just 0.7 percent annually² Well-functioning equipment is a key to industrial productivity. However, a significant share of machinery in the European production lines is approaching the end of their designed lifetime - increasing failures and down time 	<ul style="list-style-type: none"> Current inefficient use of resources has been calculated to cost EU industry €630 billion annually³ Operation, maintenance of equipment is one of the biggest expenses in the manufacturing – unplanned downtime cost nearly \$50 billion to plants and factories worldwide, 42% of it is because of asset failure 60% of wasted expenses come from unnecessary operation and maintenance costs⁴ 	<ul style="list-style-type: none"> Today around 50% of costs in the manufacturing sector are related to raw materials, energy and water used in industrial processes European manufacturing is losing global market and export share due to strong growth of Chinese and other Asian producers

¹ Industry in Europe: facts and figures on competitiveness & innovation, 2017, EC

² Information Technology and Innovation Foundation, 2018

³ Guide to resource efficiency in manufacturing, Europe Inova

⁴ SPD Group, AI and Machine Learning in Manufacturing





	SUSTAINABILITY	PRODUCTIVITY	COST EFFICIENCY	COMPETITIVITY
PROJECT LEVEL	<ul style="list-style-type: none"> • Extending the lifespan of large industrial equipment in factories using refurbishment and re-manufacturing techniques can significantly reduce environmental footprint and resource consumption. RECLAIM demo cases in 5 industries will add up to 10-15 years to the expected useful lifetime • Lower defect and wastage in manufacturing enables circular economy by minimising waste and resources use in the entire product lifecycle. RECLAIM solutions at a textile bleaching site will reduce wasted materials by 10% 	<ul style="list-style-type: none"> • Outdated machinery and unplanned downtime can cause significant losses for companies and employees. RECLAIM solutions are targeting between 10 - 50% less incident disruptions. • RECLAIM solutions to monitor quality, identify deviations and predict failures at a high-end kitchen production line aim to increase operational effectiveness by 60% 	<ul style="list-style-type: none"> • Ageing equipment often requires time-consuming manual data crunching and analysis to gain any real performance and maintenance insights. RECLAIM demo cases will reduce repair costs by between 10-50% • RECLAIM's re-use and remanufacturing approach requires some initial investment; but fundamentally reduces equipment costs in medium-to-longer term and increases ROI on high capital expenditure machinery • Remote inspection, diagnosis and assistance using Augmented Reality improves response times, reduces travel costs and mutualises key staffing 	<ul style="list-style-type: none"> • Refurbishment and re-manufacturing have significant potential as a standalone industry. This could represent up to €90 billion turnover and associated employment of 600,000 by 2030 according to a recent market study • RECLAIM's suite of solutions improve key global manufacturing index criteria such as quality of physical infrastructure and develop innovative new IoT and AI innovations • RECLAIM helps EU industry move from an equipment-based business to a value-add business





	SUSTAINABILITY	PRODUCTIVITY	COST EFFICIENCY	COMPETITIVITY
TECHNICAL LEVEL	<ul style="list-style-type: none"> Smart sensors and digital retrofitting monitor operations will help optimise power consumption and better manage doses of chemicals and other resource-intensive elements of the production process A Decision Support Framework (DSF) will support and improve refurbishment and re-manufacturing of machinery decisions, helping to extend the useful life of machinery and reduce consumption of new resources 	<ul style="list-style-type: none"> Data mining algorithms will help propose decision trees, genetic algorithm, and ensure the extraction of valuable information from IoT data, giving a real-time health assessment of different production aspects RECLAIM's prognostics and health management tool will capture data to calculate overall equipment efficiency and other useful production and predictive maintenance data 	<ul style="list-style-type: none"> A cost modelling and financial analysis toolkit will estimate resources needed for multiple strategic choices and allow multiple real time cost implications to be visualised based on the equipment health status Machine learning techniques, sensors and real-time visualisations in one decision support framework improves ability to manage and predict equipment and production quality and effectiveness - improving management of supply chain and investments 	<ul style="list-style-type: none"> RECLAIM's fault diagnosis and predictive maintenance digital twin opens up new services, business models and optimization Machine learning and augmented reality enabled interaction give European machinery companies a high-tech edge

Figure 4 - Proof points in sustainability, productivity, cost efficiency & competitiveness





2.2 Branding & visual identity

In the first months of the project, ESCI created a strong and dynamic visual identity, which reflects project values and goals, provides an easily identifiable and attractive design and thus can facilitate dialogue and recognition with key stakeholders and influencers.

An attractive and consistent RECLAIM visual identity is expected to facilitate meeting communication and dissemination objectives and reflect project values and goals. This includes logos, info graphics and standard templates such as PowerPoint presentations, Word report styles and letterheads. It also advises the consortium on correct acknowledgements of EU funding and on the correct use of the EU logos.

RECLAIM Logo

A range of logos in dark, white and yellow key colours have been produced to stand out on a range of digital and print media.

They exist in horizontal and square formats with and without the full project name baseline. Icon format logos for twitter and YouTube handles also present. Files are available in .png .pdf .ai and .svg formats to cover all needs and applications.



Figure 5 - RECLAIM logo block in yellow



Figure 6 - Three colour ways





Figure 7 - Square and horizontal with baseline



Figure 8 - Social media banner

Design and fonts

Inspiration for the design came from turning cogs of machinery, their movement and the physical act of repair indicated by the wrench. Laid over each other and used as a background, they evoke the topological lines of a mapped landscape - just as RECLAIM seeks to give tools and solutions to navigate the new industry 4.0 landscape and challenges.

Professional and non-professional fonts exist. So that ESCI design teams can get the best look and print quality; and regular users have a 'day-to-day' font within immediate reach on all their devices for Word, PowerPoint, etc. Professional fonts are Jost and Teka. The daily font is Trebuchet MS.



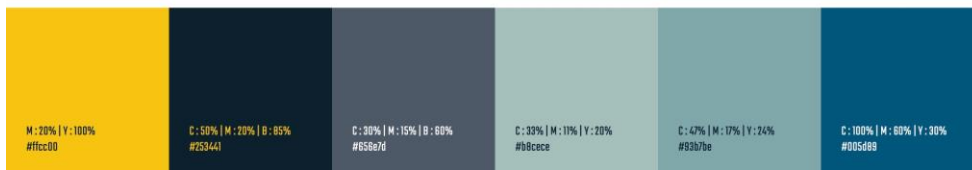


Figure 9 - RECLAIM professional fonts & colour palette

Icons and graphics



Figure 10 - RECLAIM sector graphics

To help differentiate and bring to life the different sectors being demonstrated in RECLAIM, an icon for each has been developed. These are used in PowerPoint, graphical maps and info graphics to make communicating in person and online more visual, informative and engaging.





2.3 Website & social media

Deliverable 9.4 submitted in M4 describes the website in greater detail. A brief overview:

The website is a first point of contact for the majority of people with RECLAIM. Whether they have googled a key word and stumbled, sought out the project after hearing its name at a conference or been linked back to the website for more information, the website aims to provide a satisfactory level of information and a positive user experience online.

RECLAIM is a modern and dynamic website that moves away from being a repository towards being a ‘digital anchor’ for RECLAIM content and a pillar of the dissemination and communication strategy. Priority has been given to presenting an easy to update and well-connected website with RECLAIM content featured in the media, Twitter feeds, interviews and news posts front and centre. An important characteristic of this layout is that it is responsive to smart devices such as smart phones and tablets, allowing easy use and facilitating presentation of information. A social media feed from [@Reclaim_FoF twitter feed](#) gives some added dynamism and live content to the home page and reference to both [LinkedIn](#) and Twitter channels for regular news and information is indicated on each page.

The website embodies the key messages, calls to action, branding and design features already detailed in this document.



Figure 11 - Home page





Figure 12 - Navigable map of demonstration sites and sectors

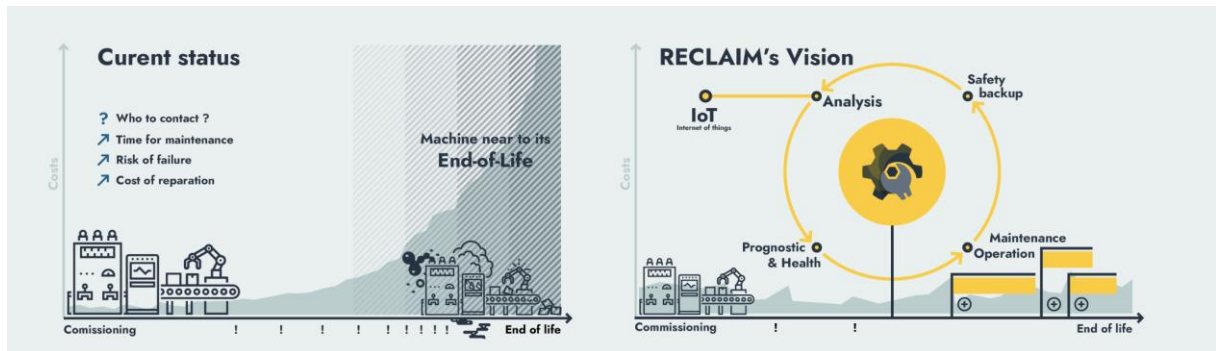


Figure 13 - Info Graphics of RECLAIM concept

Social media channels & training

Due to the industrial and professional nature of the project, [LinkedIn](#) and [Twitter](#) will be the focus social media outreach and distribution channels. The project may also use SlideShare to distribute professional presentations, infographics and solution factsheets.

YouTube hosts project video content, allowing it to be embedded into websites, social media posts, as well as generate some organic reach of its own thanks to the platform's users and search.





Figure 14 - Twitter channel

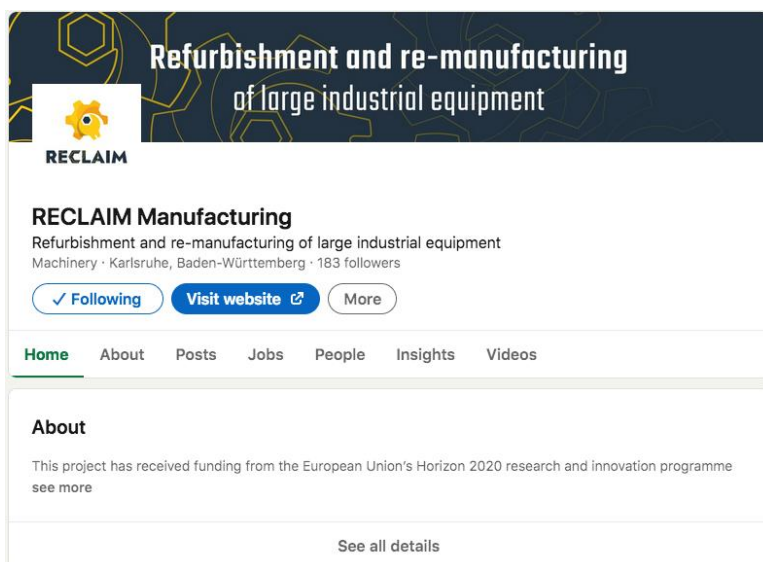


Figure 15 - LinkedIn channel after 2 months

In M17, ESCI conducted an **online communication training** for the project partners. The training provided tips and tools on how to use social media channels to communicate about RECLAIM and related themes to maximise the outreach and ensure visibility among the partner’s network of industry stakeholders. This will help to exploit the existing social network channels of consortium partners to enhance the dissemination of project activities and deliver results towards the target audiences. At least one representative per partner attended the training. A recording of the training was made available to all the partners together with the training materials.





2.4 Publicity & dissemination activities

Technical publications

From the very beginning, the project committed itself to participate in academic conferences and publications at every suitable opportunity.

The RECLAIM consortium aims to generate at least 10 articles in Open Access scientific journals and technical papers.

As of M24, the project published 5 scientific publications:

- Fontana, Alessandro, et al. "Circular economy strategies for equipment lifetime extension: A systematic review." *Sustainability* 13.3 (2021): 1117, Quartile: Q2
- Zacharaki, Angeliki, et al. "RECLAIM: Toward a New Era of Refurbishment and Remanufacturing of Industrial Equipment." *Frontiers in Artificial Intelligence* 3 (2020), Quartile: N/A
- Perez-Alfaro, Irene, et al. "Low-Cost Piezoelectric Sensors for Time Domain Load Monitoring of Metallic Structures During Operational and Maintenance Processes." *Sensors* 20.5 (2020): 1471, Quartile: Q1
- Wang, Zezhong, et al. "Towards Smart Remanufacturing and Maintenance of Machinery-Review of Automated Inspection, Condition Monitoring and Production Optimisation." 2020 25th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA). Vol. 1. IEEE, 2020
- Rossini, Rosaria, et al. "REPLICA: A Solution for Next Generation IoT and Digital Twin Based Fault Diagnosis and Predictive Maintenance." *Eclipse SAM IoT Conference* (2020).

To keep track of all the scientific publications and ensure that all publications will be publicly available to the community, UPORTO and ESCI created a public repository at [Zenodo](#) with a list of the conference and journal papers produced within the project.

As a way of making sure all scientific publications accepted for conferences and journal are properly disseminated, a dissemination workflow was defined for all partners willing to publish their research achievements.



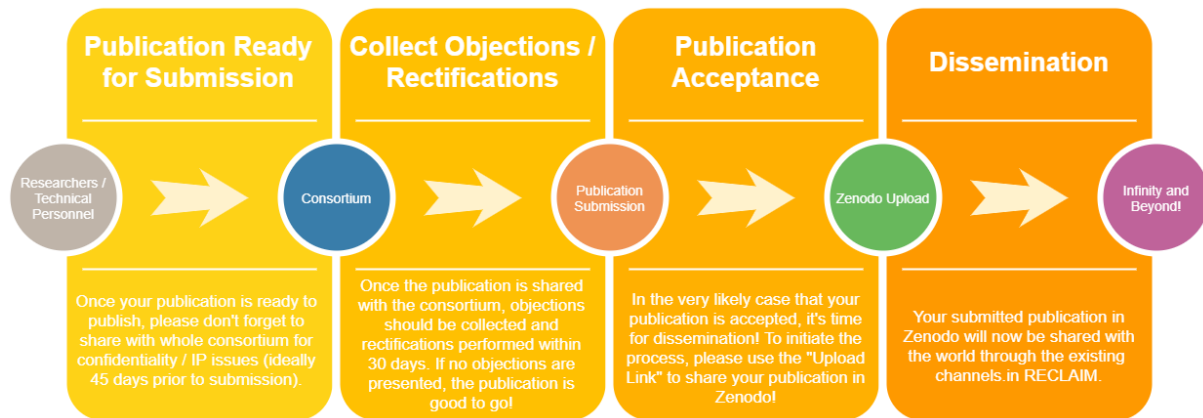


Figure 16 - Dissemination workflow

Researchers and PhD students from the academic partners but also from the industrial organisations will further disseminate their achievements as open access publications in international journals such as Engineering Applications of Artificial Intelligence (IF 2.368), Expert Systems with Applications (IF 2.981) or IEEE journals like IEEE Intelligent Systems (IF 3.532) or IEEE Transactions on Automatic Control (IF 2.777). All publications will be issued in accordance to the IP management plan of the consortium.

As of M24, the following publications are envisioned:

- **Publication about an IoT Gateway with Artificial Intelligence acceleration using FPGAs.**
This publication will be further fostered by FINT, connected to Task 3.1 and aims at accelerating data ingestion and processing at the gateway level, mainly at the Edge layer;
- **Publication about fault diagnostics and predictive maintenance simulation engine using Digital Twin.**
This publication will be led by Links Foundation connected to Task 3.3, and will explore the REPLICA architecture already proposed for simulation based diagnostics and machine maintenance.
- **Publication about algorithms for quality prediction and process parameter optimisation.**
This publication will be further fostered by UPORTO concerning Task 3.4 and aims to develop innovative approaches based on pipeline strategies for modular and scalable solutions.
- **Publication about prognostic and health management (PHM) Toolkit.**
This publication will be led by HWH regarding Task 4.2 and aims at developing new solutions for machine monitoring and diagnostics, as well as the management of its components concerning degradation and wear-out factors.
- **Publication about cost modelling and financial analysis toolkit.**
This publication will be led by Aston University concerning Task 4.3 and aims on the development of a model to assess refurbishment and remanufacturing costs once specific actions need to take place to avoid machine disposal and foster reuse.
- **Publication about Augmented Reality mechanisms.**
This publication will be led by CERTH concerning Task 5.5 and aims at developing





new augmented reality user interfaces to assist refurbishment and remanufacturing activities;

- **Publication about integrated decision support framework (DSF) for refurbishment & remanufacturing optimisation.**

This publication will be led by CERTH regarding Task 4.4 and is the central piece of the RECLAIM project, where all the predictive and optimization modules concerning quality, cost, circular economy and health management are put together and be used in the defined Pilots;

- **6 publications, one per pilot, demonstrating the advantages and limitations of the developed technology in real industrial environment.**

These publications will be important due to their impact in the scientific and industrial community in the topic of refurbishment and remanufacturing, where the achieved results are expected to foster the adoption of technologies to implement circular economy measures and start shaping the industrial mindset towards such challenge.

Open Access Policy

Open Access is a key for RECLAIM partners, who are committed to knowledge sharing both with their academic peers and the industry.

In the Grant Agreement, it is stated that each beneficiary should disseminate its results (including scientific publications) by appropriate means, unless this would be against its legitimate interests. In the same document, there are concrete guidelines regarding the Open Access Policy divided into two steps:

(1) Each beneficiary must ensure free of charge online access for any user to all peer-reviewed scientific publications related to its results.

(2) The beneficiary should render the results accessible as soon as possible in a repository of scientific publications and ensure open access to the data.

Furthermore, beneficiaries should provide as many options as possible related to the right to copy, distribute, search, link and mine the public documents.

There are different options of open access publishing and different publishers may use one or more of these variants. **All partners are advised to aim for one of the following options, preferably Gold Open Access:**

Gold Open Access

Gold open access makes publications freely accessible from the moment they are published. In addition, Gold open access licenses grant wide-ranging exploitation rights. The immediate availability of the publication and the results leads to a higher level of visibility, which has a positive impact on how widely a publication is disseminated and how frequently it is cited.

Green Open Access

Green open access makes publications freely accessible after an embargo period. Different publishing houses impose different embargo periods. Green open access does not offer the same legal framework for content licensing as the Gold. Scientific exploitation is only permitted within the confines of the legal restrictions of copyright law. The author's contract has to be therefore carefully reviewed to enable the re-use of the article in a way that fulfils all the legal stipulations.

Hybrid Open Access





Hybrid open-access journals contain a mix of open access articles and closed access articles. Publishers that follow this model only provide open access for those individual articles for which the authors pay a publication fee.

Conferences, workshops and events

The initial CDMP envisioned yearly participation in a **major forum or trade show** in the field of industrial automation as well as relevant co-events organised by respective exhibitions under the guidance of UPORTO.

Most of the Conferences and physical events were cancelled in 2020, however, as of M24, RECLAIM participated at the [32. BIMU Fair](#) (the most important Italian event dedicated to digital manufacturing, automation, enabling technologies and subcontracting industries), where UNI represented the RECLAIM project. The aim of this particular event was to increase the awareness about the [importance of standardisation](#) in the predictive maintenance sector and present the RECLAIM [standardisation toolkit](#). Apart from representing the project at the booth, UNI also joined one of the workshops as speaker

Apart from that, ASTON presented the project on the [4th International Workshop on Autonomous Remanufacturing](#), [Second Digital Engineering workshop](#), as well as “Connected Everything” Festival.

As a first step towards scientific events’ organization, UPORTO proposed a Special Session in ETFA2020 conference with publications about preliminary results of the project (the goal was not achieved, but one paper from the project was approved for publication).

Finally, UPORTO in close collaboration with SUPSI organized and chaired a Special Session in ETFA2021 international conference on the topic of “Refurbishment and re-manufacturing of machinery in Cyber-Physical Production Systems”, where preliminary results about the project were presented and disseminated-

As Conferences started resuming and the project progresses, partners aim to present the RECLAIM solutions on international conferences. Special sessions and workshops around the core themes of RECLAIM will be organised in international recognised conferences like INDIN (IEEE International Conference on Industrial Informatics), ETFA (IEEE Conference on Emerging Technologies & Factory Automation), ICPS (IEEE International Conference on Industrial Cyber-Physical Systems) and MFI (IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems).

Webinars & tutorials

Together with the technology partners and pilot site leaders, WP9 will organise a series of trainings, webinars and hackathons in order to disseminate the RECLAIM approach and learnings, but most importantly, to empower industries, SMEs, entrepreneurs and end-users with the project learnings and the developed tools. Whenever possible, synergies with related projects and initiatives, especially RECLAIM’s sister project LEVEL UP, will be sought.

Training: 4 training activities to teach and inform about technologies developed by partners in RECLAIM as a way to disseminate the main achievements. The webinars will be focused on the technologies developed per partner that can be cross-pilot.

Webinars: 6 webinars to disseminate and inform other industries how to formulate the problem of remanufacturing / refurbishment according to new RECLAIM technologies. The webinars will be focused on pilots’ results.





Hackathon: One hackathon to teach and inform about RECLAIM solutions and technologies to students and young professionals in the area of manufacturing and similar to project topics, where the learning process is through experimentation and exploration.

Training (Online)

Goal

To present, teach and inform about innovative technologies developed by partners within the project. The strategy is to disseminate specific technological solutions that can be applied to a myriad of industries - solutions such as IoT or Artificial Intelligence - that can solve a specific problem of strategic decision making, shop-floor interoperability, etc.

Organisation

There will be a total of 4 webinars, where one or multiple technologies will be presented. Due to confidentiality and privacy, reference to the pilot sites will be obfuscated and hidden to avoid unwanted disclosure of information and any conflict of interest. These webinars will be hosted by technology providers in collaboration with pilot coordinators, supported by UPORTO and ESCI.

A tentative list of technologies:

RECLAIM Technology	Type	Partners	Tasks
Reliability Analysis Tool	Software	SUPSI	T2.5
IoT Gateway with AI acceleration	Infrastructure	FINT	T3.1
Fault Diagnosis and Predictive Maintenance Simulation Engine using Digital Twin	Software	LINKS	T3.3
Algorithms for quality prediction and process parameter optimization	Software	FEUP	T3.4
Prognostic and Health Management Toolkit	Software	HWH	T4.2
Cost Modelling and Financial Analysis Toolkit	Software	ASTON	T4.3
Integrated Decision Support Framework (DSF) for Refurbishment & Remanufacturing Optimization	Software	CERTH	T4.4
AR mechanisms	Software	CERTH	T5.5

Hackathon (Online)

Goal

Teach and inform about RECLAIM solutions and technologies to students and young professionals in the areas of manufacturing and topics similar to the project, where the learning process is through experimentation and exploration.

The central idea is to present a challenge to several working groups where the participants need to solve it within a specific timeframe of 24/48h. In the end, all the results are presented by the participants and contrasted to the RECLAIM solutions.



**Challenge: *Let's play RECLAIM!***

Present different industrial scenarios in different Digitalisation Readiness Level (DRL) together with the building blocks presented in the consolidated view. A high-level example of a challenge might have the following motto “*How would you refurbish a 20-years old machine?*”. According to the different DRLs, different blocks might be required, and perhaps new ones, to reach a certain digitalisation level. For each selected building block, the technologies and how these relate should be detailed in a text format. For example, for RECLAIM communication bus, MQTT or OPC-UA might be proposed, justified and explained the integration with other building blocks or technologies, like Artificial Intelligence algorithms.

Organisation

Prior to the challenge: 1) 3 pilots in different DRLs will be chosen and transformed to be suitable for the challenge, and 2) The consolidated view reviewed and organised to make sure the necessary building blocks exist to solve the problem. Due to confidentiality and privacy, all the presented results will be obfuscated and hidden to avoid any conflict of interest.

This challenge will be organized by UPORTO, ESCI and SEZ with the strong support of the related technology providers within the RECLAIM consortium, e.g. LINKS, ICE, SUPSI, HWH or FINT.

Webinars (Online)**Goal**

To present, disseminate and inform industries how to formulate the problem and solve challenges similar to those tackled within RECLAIM. In contrast to the Trainings, webinars will be pilot-centered. However, the idea is to not only present the results from RECLAIM pilots, but also to explain the decisions taken towards specific solutions and show how these might be applicable to other contexts and ultimately the impact on industry. This way, the participants of the webinars will be aware of solutions provided by RECLAIM, opening opportunities for technology exploitation and new ways of problem solving.

Organisation

A total of 6 webinars will be organised: one webinar per pilot, with the main technologies and results demonstrated to a broad audience of manufacturing companies and Original Equipment Manufacturers (OEMs). Due to confidentiality and privacy, all the presented results will be obfuscated and hidden to avoid any conflict of interest. These webinars will be hosted by the pilot coordinator in collaboration with the technology providers, UPORTO and ESCI.

Planning

- Webinar (WB1): “White Goods Manufacturer 1”, Gorenje
- Webinar (WB2): “White Goods Manufacturer 2”, Gorenje
- Webinar (WB3): “Footwear Manufacturer”, Fluchos
- Webinar (WB4): “Wood Manufacturer”, Podium
- Webinar (WB5): “Friction Welding Machines”, Harms & Wende
- Webinar (WB6): “Textile Manufacturer”, Zorluteks





The project will also try to piggyback on established meet-ups and networking events to make sure emerging markets will benefit from RECLAIM insights, test usability and see how the solutions work.

Final event

A **final workshop** will be organised by UPORTO and project partners in conjunction with a relevant international or European event concerning Open Innovation and Collaborative Engineering to illustrate the overall outcomes of the project.

The workshop will target business and IT communities of the European manufacturing industry as well as the Fab-Lab and Makers domains, to present the legacy of the project and its plans for further developments. This will be a vital opportunity to raise the profile of RECLAIM at its conclusion and present the final results to the key stakeholders.

The event will be a culmination and showcase for all the content, insights, videos and materials generated by RECLAIM, as well as a springboard for future commercial ventures.

Editorial content

An array of editorial content will be produced by ESCI to increase visibility of the project and raise awareness on the theme of re-engineering and refurbishment.

This editorial content includes an **introductory video**, **8 infographics**, **4 journalistic articles** and **8 quick-fire interviews** with experts in the refurbishment industry, innovators, first adopters of the RECLAIM approach and other stakeholders will be produced. As of M24, an [introductory video](#) was produced, a series of articles and interviews that were published on the website, social media and distributed via partners' networks.

Supporting communication material (**posters**, **rollups**, **postcards**, a **brochure** and high-end **presentation templates**) aims to strengthen the visual impact of the project. As of M24, a rollup, a corporate presentation and a series of infographics were produced and are supporting the communication & dissemination efforts of partners.

Furthermore **4 videos** on selected pilot cases will be produced to raise awareness of benefits of the goals of RECLAIM to various target groups. Material and initiatives need to be presented in an understandable manner, while targeted content needs to be translated in languages relevant to the project, i.e. Slovenian, Czech, Spanish, German, Italian and Turkish.

Overview of selected content formats & purpose

Info graphics

In a modern multi-channel environment, it is difficult to get someone's attention, to capture their imagination, especially in the fast-paced digital world. By working with RECLAIM content, consortium experts and a lively design team, a series of info graphics on topical and substantive issues will be produced. A total of **eight info graphics** over duration of the contract will be deployed to attract new interest, increase engagement and deliver powerful messages clearly.





Journalistic articles	A total of four original journalistic articles will profile the skills, experiences, credibility and performance of the demonstration sites and project in more detail. Always anchored on the project website, they will be shared with influential multiplier websites in specialist media, stakeholder networks and established online groups or platforms like LinkedIn.
Quick fire interviews	Throughout the project, key technical experts, end users and stakeholders will respond to quick-fire interviews relating to their experiences, ambitions and challenges in achieving project solutions and objectives. These will primarily draw on the demonstration site ecosystems and interview people both internal and external to the project's consortium. One-three interviews per year and a total of 8 will be produced. Initially published on the project website, quotes, images and points of view expressed will drive social media activities and promotion.
Rolling news items	A project like RECLAIM generates lots of developments, insights and news. Not just directly linked to the project; but also the lively academic, policy and commercial achievements of consortium members. Several news items a year generated directly by WP9 partners and a number more from consortium members are expected each year to define a lively pace of news that reflects positively on the project
Postcard flyers	Easy to distribute, postcard flyers provide information on printed material for face-to-face meetings at fairs, workshops and conferences. The format is also cost effective for each partner to print and maintain their own stocks to distribute individually to potential end-users and other stakeholders during the duration of the project. The support will give simple call to action to remain up to date over time and drive people towards RECLAIM social media channels.

Figure 17 - Overview of selected content formats & purpose

Clustering & networking activities

To further bundle benefits and create impact, opportunities to use synergies with projects financed under the same topic, further relevant Horizon 2020 and national projects will also be identified and assessed from the starting point of this task on - December 2019. The RECLAIM partners will discuss cross-fertilisation and the implementation of at least one joint activity, aiming at maximising the projects impact in common areas, strengthening the Factories of the Future community and supporting the European Factories of the Future Research Association (EFFRA).

RECLAIM will further connect with main multipliers, such as national industrial clusters and technology platforms, in order to present RECLAIM knowledge or results and benefit from their wider communities to multiply dissemination efforts. This will happen in the frame of meetings or presentations at primary events of these multipliers, such as “Made in Europe Partnership Event“ or “Industrial Technologies 2020 - Transition to a Sustainable Prosperity” co-organised by EFFRA.

A list of relevant projects and multiplier organisations has been compiled and circulated within the RECLAIM consortium for internal update and internal strategic planning of the





contacts. In order to respect personal data privacy, this list only entails names and details about projects and organisations, not individuals. The list shall be regularly updated by all partners.

RECLAIM is in close contact with its sister project [LEVEL-UP](#) (Grant Agreement No. 869991), the further project funded under the same call topic of the Horizon 2020 research and innovation programme of the European Commission: [DT-FOF-06-2019 - Refurbishment and re-manufacturing of large industrial equipment \(IA\)](#). LEVEL UP is about Protocols and Strategies for extending the useful Life of major capital investments and Large Industrial Equipment. LEVEL-UP is coordinated by the research organization AIMEN from Spain and will be demonstrated in 7 demonstration sites from different sectors together with 31 further consortium partners. LEVEL-UP started in October 2019 like RECLAIM and will last like RECLAIM until end of September 2023. A kick-off meeting of the cooperation was initiated to present the respective main project partners leading dissemination, communication, exploitation and standardisation activities in both projects. Planned activities and possible synergies were discussed, especially in the field of communication, dissemination and standardisation, but also to exchange views on methods for baseline and KPI comparison, as well as data acquisition in very old plants.

2.6 Monitoring activities

As RECLAIM aims to distribute content and engage on numerous platforms, tracking data where possible is important to evaluate actions and impact. A range of tools is applied to keep the dissemination and communication record of the project such as specific tools for measuring social media outreach, detailed analytics for web statistics and number of uptakes from multiplier platforms.

ESCI created a monitoring tool for regular reporting on past events and actions for all Consortium members, plus upcoming highlights for the project and within each demo site. This allows to promote the events on social media and the website, network with the involved stakeholders and thus increase the impact of the action. More important events become a source of interviews, articles and more.

ESCI has been monitoring the social media performance of the project, using the integrated analytics functions of the platforms, as well as Digimind (www.digimind.com) from M1 to M13 and Falcon (www.falcon.io) from M13 onwards for social media insights.

As of M24, the LinkedIn profile of the project has 183 followers, the Twitter profile 204 followers. The number of followers has been rising constantly, with the major growth after the launch of the website and the first communication campaigns.

In M1-M24, the project posts got estimated 15.000 impressions on LinkedIn and 75.000 on Twitter. The most popular posts are those directly related to the project activities (the Kick-Off Meeting, the project introductory video, the virtual General Assemblies, and on-site meetings). As the project will be producing more results, we expect to have a significantly higher outreach throughout the channels.

The number of website visitors has been evolving in a very positive way as well, starting from 100 visitors per month directly after the website launch in M4 and reaching a stable 1500 visitors/month rate by M24.





ESCI monitors the data and shares it with the consortium every six month. Additional monitoring frequency can be done around specific events, campaign actions or local demonstration site initiatives.

This will add to D9.4 Report on Communication and Dissemination Activities (M42).





Annex 1

RECLAIM solutions & innovations in full

Physical Layer

Building block 1: Smart sensors & digital retrofitting

Building Block 2: Cybersecurity for IoT

Real Time Decision-Making Layer

Building block 3: Decision Support Framework (DSF)

Building block 4: Financial Analysis

Building block 5: Prognostics Toolkit

Building block 6: Predictive Maintenance

Building block 7: Refurbishment & Re-manufacturing Planning

Building block 8: Data Analytics

User Layer

Building block 9: Augmented Reality interface

Physical Layer

- **Building block 1: Smart sensors & digital retrofitting**

An adaptive sensor network and digital retrofitting infrastructure attached to the refurbished or remanufactured machines will retrieve data and accelerate predictive maintenance tasks.

Main innovations: RECLAIM includes IoT controllers with hardware acceleration capabilities. A network of low-cost programmable logic IoT devices will deliver high performance analytics and health monitoring for operation profiling and predictive maintenance tasks. Those IoT devices will offer a sweet spot between performance, flexibility and power consumption.

- **Building Block 2: Cybersecurity for IoT devices**

Cybersecurity endpoint protection will be embedded both into digital retrofitting infrastructure design. Secure IoT devices protect sensitive and personal data.

Main innovations: Security by design mechanisms will secure user and device authentication, encryption, intrusion detection/intrusion prevention, and overall enhanced cyber-secure operation.





Real Time Decision-Making Layer

- **Building block 3: Decision Support Framework to optimise lifetime-extension strategies**

The Decision Support Framework (DSF) is designed to support and improve refurbishment and re-manufacturing of machinery decisions. DSF will identify and propose strategies based on different criteria such as the impact and value of refurbishment, extension to asset life, optimal timing, machine condition and possible upcoming failures, production planning, and resource allocation.

The DSF will bundle all the tools in the real-time decision-making layer together into one, easily navigable tool. It will have attributes from both knowledge and model-driven type decision making tools, including scoring mechanisms, rule-based decision making and AI algorithms. Data mining algorithms will help propose decision trees, genetic algorithm, and ensure the extraction of valuable information from IoT data.

A visual analytics suite to capture and translate insights will provide users with actionable strategies, alternatives process models, KPIs visualisation and real-time health assessment of different production aspects.

Main innovations: Flexible knowledge- and model-driven DSF which is adaptive and reliable in real-time momentary situations to a) improve competitiveness; b) maximize productivity; c) increase resource use efficiency; and d) increase awareness of resource use efficiency deviations for the existing or future control process units.

- **Building block 4: Cost modelling and financial analysis toolkit**

Short presentation: This component provides an effective cost estimation tool for cost and financial impact. It will take into account all types of life extension strategies and activities - helping to estimate the resources needed for each activity. The modelling will be linked to incoming data generated, providing real time life cycle cost estimation.

The toolkit will be developed to perform these functions across multiple industries, expanding their benefits and impact to European manufacturing.

Main innovations: Monte-Carlo Simulation statistical modelling and discrete event simulation will deliver a precise cost and financial analysis to support reliable decision-making on refurbishment and re-manufacturing strategies. Multiple real time cost implications may be visualised based on monitoring of the equipment health status.

- **Building block 5: Prognostic and health management toolkit**

A component-level prognostics and health management tool will be developed to increase equipment lifetime, productivity and service quality. RECLAIM will use shop floor data in order to calculate overall equipment efficiency and extract other meaningful information for prediction and prevention capabilities.

Main innovations: Capturing data from devices to improve the decision-making process for predictive maintenance, leveraging the interactions and relationships between device data and expert data.

Creating integrated equipment degradation and quality probability based on system level and influence diagrams using both expert knowledge and operational data.





- **Building block 6: Fault diagnosis and predictive maintenance digital twin**

A factory environment digital twin will monitor and predict performance and status of factory assets. This will provide all the information needed to perform proper maintenance planning, optimising production throughput and reducing stoppages.

The system will monitor patterns in real time and compare them with historical data, to autonomously identify repeated scenarios and create rules to handle them.

Main innovations: Training, testing and adoption of predictive maintenance algorithms to better predict future outcomes.

- **Building block 7: Refurbishment & re-manufacturing toolkit**

Production planning optimisation using IoT data will create high value information for monitoring production as a precursor to deploying improvement and control steps. Smart sensors (building block 3) together with system constraint and behaviour recognition ensure the best possible outcomes.

Main innovations: Machine learning techniques will make long-term optimisation of production planning possible - preventing failures, malfunctions and abnormalities, as well as obtaining better predictive performance.

- **Building block 8: In-situ repair data analytics**

Industrial analytics are used to identify and recognise machine operational and behavioural patterns to make fast and accurate predictions and act with confidence when needed. A visual analytics suite will use a) perception (monitoring) elements on the shop-floor and 2) comprehension (inspection, exploring) thanks to an extensive network of sensors.

Main innovations: Tailored solutions for existing data structures added to new batch and streaming visual analytics will give powerful repair and drill-down analysis.

User Layer

- **Building block 9: AR-enabled multimodal interaction mechanisms**

A novel way to visualise and localise information on equipment refurbishment and re-manufacturing operations.

Using a network of sensors and proposals from the decision support framework, technicians will be able to vision an augmented reality of several streams of data.

During refurbishment and re-manufacturing, the system will provide animated 3D stepwise instructions on disassembly and reassembly required, as well as support in the form of on-the-job remote assistance with real-time audio-visual communication and 3D annotation to technicians during the procedure.

Main innovations: Real-time localisation and 3D augmented reality with natural language, hand gesture and gaze input interaction algorithms and real-time AR annotation for remote assistance.

