Methodology for designing Strategies/Action Plan for Mediterranean e-waste prevention and management

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Contents

Executive summary

The European Union (EU) faces both critical challenges and promising opportunities in the management of Waste Electrical and Electronic Equipment (WEEE). With the continuous evolution of technology and the growing use of electronic devices, the EU emphasizes the need for effective strategies to mitigate the environmental, economic, and social impacts associated with electronic waste.

Proper WEEE management is essential for the EU and participating countries to meet their sustainability targets and transition toward a circular economy. By applying the proposed methodology and localized action plans, project countries can significantly reduce the environmental footprint of WEEE, enhance resource efficiency, and contribute to building a sustainable future.

In this context, the eWAsTER initiative, under the Interreg Euro-MED Programme, brings together partners from eight countries—Portugal, Spain, Greece, Bulgaria, Slovenia, Italy, Cyprus, and Bosnia and Herzegovina—to develop and implement policies aimed at improving e-waste management. The core objective is to transform the linear electrical and electronic (E&E) sector into a sustainable circular model, fostering innovative eco-business models and reducing environmental damage in the Mediterranean region.

Based on comprehensive diagnostics, common challenges have been identified, including inadequate infrastructure, ambiguous regulatory frameworks, low collection and recycling rates, a weak repair culture, and limited public awareness. eWAsTER addresses these issues through a structured approach that includes drafting Local Action Plans (LAPs), jointly testing solutions for e-waste prevention and management, and deploying transnational strategies for e-waste management.

Pilot actions within the project combine logistical solutions with community-driven initiatives focused on environmental education and civic participation. These pilots aim to engage citizens and institutions, collect significant quantities of e-waste, and generate new business opportunities in the collection, sorting, repair, and reuse of electronic waste across the Mediterranean region.

Strengthening the political and economic framework is essential for promoting these business models. The strategy advocates for the effective implementation of Extended Producer Responsibility (EPR), access to financial incentives, the development of repair centers, and the integration of digital tools that support traceability, diagnostics, and business planning in the e-waste sector. Additionally, international collaboration is promoted to harmonize standards, exchange best practices, and enhance the competitiveness of new circular businesses in a cross-border context.

Beyond offering technical and regulatory solutions, eWAsTER seeks to transform e-waste into a catalyst for regional economic development. By combining innovation, regional cooperation, and business promotion, the strategy positions the Mediterranean region as a benchmark for advancing the circular electronics economy and building a resilient, sustainable, and value-generating business ecosystem.

Abbrevations

EEE	Electrical and Electronic Equipment
EPR	Extended Producer Responsibility
ERDF	European Regional Development Fund
EU	European Union
FDES	Framework for the Development of Environmental Statistics
HS 2022	Harmonized System 2022 (customs classification codes)
IEMN	International E-Waste Management Network
LAP	Local Action Plan
POM	Put on Market
RoHS Directive	Restriction of Hazardous Substances Directive
WEEE	Waste Electrical and Electronic Equipment
Wformal	Formal collection of e-waste

1. Introduction

1.1. The programme: Interreg Euro Med

Interreg Euro-MED is a European Union funding programme that supports transnational cooperation.

The Interreg Euro-MED Programme supports cooperation across Mediterranean borders. The programme provides funds for projects developed and managed by public administrations, universities, private and civil society organisations.

The Programme brings together partners from 69 regions of 14 countries from the Northern shore of the Mediterranean with a common objective: a climate neutral and resilient society for the benefit of its citizens.

Interreg Euro-MED supports projects, initiatives and policies related to climate change and the environment in line with the priorities and specific objectives set out by the European Commission for the Cohesion policy. The Programme decided to embed such objectives into missions for a more comprehensive approach.

Four missions have been identified. They pull together different thematic issues and initiatives to reach goals that isolated projects could not reach otherwise:

- Innovative sustainable economy: The Innovative Sustainable Economy Mission of the Interreg Euro-MED Programme works to boost a fair transition to a circular economy through two governance projects that develop innovative technical knowledge and ensure these new solutions are transferred into public policies.
- Natural heritage: The Natural Heritage Mission of the Interreg Euro-MED Programme focuses on protecting, restoring and valorising the natural resources of the Euro-Mediterranean area. Two governance projects work in close cooperation to upscale knowledge and results produced at the European level, and to transfer and mainstream them into effective policies.
- Green living areas: The Green Living Areas Mission aims to improve the lives of Mediterranean citizens by promoting the development of green living areas. As part of the Interreg Euro-MED Programme, the Mission undertakes projects that bring local communities to life with green development at their epicentre, reducing negative climate impacts on the region's ecosystems, and enhancing climate resilience.
- Sustainable tourism: The Sustainable Tourism Mission of the Interreg Euro-MED Programme focuses on fostering a circular tourism considering the sustainability of ecosystem services using innovation technologies, and promoting the preservation of natural resources and cultural heritage.

1.2. The project: eWAsTER

Electrical and electronical equipment - from washing machines and vacuum cleaners to smartphones and computers – these products can define the modern world, and it is hard to imagine life without them today.

The term WEEE, also referred to as 'e-waste', is an abbreviation of waste electrical and electronic equipment. A key component of the definition is the word 'waste' and what it logically implies – that the item has no further use and the owner is obliged to dispose of it in its current state. WEEE includes nearly any household or business item containing circuitry or electrical components with either power or battery supply.

The management of WEEE in Europe is a pressing issue, as the growing volume of electronic waste poses significant challenges for sustainable waste management. WEEE consists of a complex mixture of materials, including hazardous substances (e.g., brominated flame retardants (BFRs) and polychlorinated biphenyls), risk elements, plastics, and on the other hand valuable resources like rare earth elements. Safely handling and disposing of WEEE is crucial to mitigate environmental and health risks, while also promoting resource recovery.

Enhancing the process of collecting, processing, and reusing electrical and electronic equipment at the end of their lifespan can optimize the utilization of resources and facilitate the transition towards a circular economy. The "Preventing e-waste from polluting MED water by turning waste into a resource (eWAsTER)" project is c-funded by the European Union (Interreg Euro-Med project) consisting of 10 partners from 8 European countries namely:

- Portugal: Alentejo Science and Technology Park (PACT)
- Greece: Rethymno Municipality
- Italy: Marche Region
- Slovenia: Environmental Research Institute (ORZ)
- Bosnia and Herzegovina: Neum Municipality
- Bulgaria: Union of Bulgarian Black Sea Local Authorities
- Italy: Union of the Municipalities Pian del Bruscolo (UCPB)
- Spain: Provincial Waste Consortium of Malaga (RSU Malaga)
- Bosnia and Herzegovina: Association LINK Entrepreneurial Center (LINK)
- Cyprus: Aradippou Municipality

The project eWAsTER aims to promote local and regional policies for better e-waste management, to reduce e-waste environmental damage in the selected areas, while promoting new innovative eco-business models based on the conversion of the currently lineal electrical and electronic (E&E) sector into a sustainable circular model. There are three main Work Packages (WP) which are briefly described as follows:

- WP1: To create local and regional Action Plans for e-waste prevention and management, based on the project self-assessment tools and the project "Methodology for designing Strategies for Mediterranean e-waste prevention and management"

- WP2: To demonstrate and test the feasibility and effectiveness of 8 innovative solutions selected from the 8 consortium LAPs, providing validation at small scale prior to applying the solution at full scale and to transfer them to the programme Area.
- WP3: To enlarge the number of institutions up-scaling tested solutions from WP2, and increase the number of institutions using the project tools to create new Action Plans and Strategies for Mediterranean e-waste prevention and management.

This **Methodology for designing Strategies/AP for Mediterranean e-waste prevention and management** is part of the WP1, which is under the responsibility of the WP leader ORZ. The Methodology, as a practical tool to support administrations in the design of Strategies, includes all the potential solutions for e-waste management from existing EU initiatives.

2. Background

2.1. General information

The European Union (EU) is a political and economic union made up of 27 member countries, most of which are located in Europe. Over the years, it has evolved into a complex and highly integrated supranational organization. Its primary goal is to promote peace, stability, and prosperity among its member nations. The EU operates on core principles such as democracy, the rule of law, and the protection of human rights.

One of the EU's key achievements is the establishment of a single market, which enables the free movement of goods, services, capital, and people across member states. This increases economic efficiency and drives competition. The EU also implements coordinated economic policies that address issues like competition, trade, and regional development. Additionally, it provides financial support to help develop less economically advanced regions, promoting economic cohesion and reducing disparities.

The member states of the EU cover a broad range of geographical areas, from Northern Europe to the Mediterranean. The EU has developed comprehensive environmental policies to address pressing challenges such as climate change, biodiversity loss, and pollution. These regulations are designed to promote sustainable practices and reduce the environmental impact of economic activities.

The EU strongly supports the transition to a circular economy, which focuses on using resources more efficiently, recycling, and minimizing waste. It encourages sustainability in both production and consumption. Moreover, the EU has set ambitious targets to increase the share of renewable energy in its energy mix, investing in clean technologies and reducing dependency on fossil fuels. The EU also plays a leading role in global efforts to tackle climate change, setting clear targets to cut greenhouse gas emissions and move towards a low-carbon economy.

Within this project scope, 8 European countries were studied regarding their WEEE regulations, EEE POM, WEEE generation, collection, reuse and repair potential.

Country	Year	Collection Rate	WEEE Collected	Target	Distance to Target
Bulgaria	2019	76%	8.8	9.8	1.0
Cyprus	2018	22%	3.8	15.1	11.2
Spain	2020	36%	7.1	16.7	9.7
Greece	2021	33%	5.9	15.4	9.5
Italy	2021	42%	8.0	16.0	8.0
Portugal	2019	29%	5.1	14.9	9.8
Slovenia	2021	44%	7.4	14.2	6.8
Bosnia and Herzegovina	2019	22%	3.8	15.1	11.2

2.2. WEEE Management

The European Union has established an advanced and comprehensive framework for managing Waste Electrical and Electronic Equipment (WEEE). This system incorporates a wide network of collection points operated by municipalities, retailers, and private entities. It is supported by detailed procedures for both the initial collection and final processing stages to ensure efficient recycling of materials into secondary raw resources. At the same time, components that are hazardous or non-recyclable are handled and disposed of in a safe and controlled manner. Most EU countries are equipped with the necessary facilities and infrastructure to manage hazardous waste effectively.

In 2022, Europe led the world in e-waste generation, producing 17.6 kg per capita. However, it also achieved the highest official collection and recycling rate, with 7.5 kg per capita processed—equating to 42.8% of total e-waste generated.

Meeting the targets outlined in the WEEE Directive remains a significant challenge for the project countries. A major issue is the lack of accurate data on the quantities of WEEE, which hampers strategic planning. The administrative burden associated with the collection system is substantial, and regulations can often create barriers to efficient operations. Legal provisions are frequently vague in terms of practical implementation, resulting in large volumes of WEEE being exported to avoid stricter domestic requirements.

Managing WEEE is further complicated by the hazardous components of many devices and their increasingly complex designs. Products are often not engineered for longevity, reuse, or repair—featuring built-in lithium batteries, glued housings, and short life spans.

From a logistical and economic perspective, WEEE management faces additional hurdles. Processes such as collection, testing, and repair are labour-intensive and costly. Transport routes for collection and returns can be inefficient, and in many cases, repairing items is more expensive and time-consuming than recycling them.

Illegal collection practices and insufficient coverage of collection infrastructure are also common issues across the project countries. Much of the collected e-waste is not of adequate quality or quantity for effective reuse or repair. Consumers are often unaware of available options for collection and repair, limiting the demand for refurbished products and suppressing repair activity.

Countries including Portugal, Spain, Bulgaria, Greece, Cyprus, Italy, Slovenia, and Bosnia and Herzegovina have adopted legislative frameworks aligned with EU directives, aiming to improve WEEE management. These laws define the responsibilities of producers, distributors, and consumers while promoting reduction, reuse, and environmentally sound disposal.

Nevertheless, shared challenges persist. Improper disposal, weak collection networks, and insufficient coordination among governments, industry stakeholders, and the public complicate WEEE handling. The rapid pace of technological development and the increasing volume of electronic devices continue to put pressure on recycling systems and demand adaptive, forward-thinking strategies.

2.3. WEEE Collection

The EU Waste Electrical and Electronic Equipment (WEEE) Directive sets out key requirements for the collection, treatment, and recovery of electronic waste. Currently, the European Commission

is reviewing the directive to evaluate its continued relevance, simplify its provisions, and determine if a full revision is warranted. Complementing this is the EU Directive on the Restriction of Hazardous Substances (RoHS), which aims to mitigate risks to human health and the environment arising from electronic and electrical equipment waste.

The WEEE Directive outlines two approaches for calculating e-waste collection rates in EU Member States. The WEEE generated method calculates the rate by dividing the mass of e-waste collected by the estimated amount of e-waste generated in the same year. This method shows a positive trend, with the collection rate rising from 40% in 2014 to 54% in 2021—driven largely by increased collection efforts.

The second approach is the EEE Placed on the Market (EEE POM) method, which compares the mass of e-waste collected in a given year to the average amount of electrical and electronic equipment placed on the market in the three previous years. This method saw an increase in collection rates from 39% in 2013 to 50% in 2016, but a subsequent decline to 44% by 2020 due to growing volumes of new equipment being introduced to the market.

Member States can choose either calculation method each year to report their progress toward meeting the EU's collection targets. The WEEE generated method has a target of 85%, while the EEE POM method carries a target of 65% (in place since 2019). Despite these benchmarks, only three out of 27 EU Member States—Croatia, Bulgaria, and Poland—have achieved the target according to the latest data. This means 24 countries are currently underperforming, with most falling below the 50% threshold when using the EEE POM method.

Extended Producer Responsibility (EPR) is a cornerstone of the EU's e-waste collection strategy. This principle requires manufacturers to bear the costs of managing their products at the end of their life cycle, encouraging more sustainable product design with recycling and recovery in mind. To support this, Member States have developed comprehensive systems including designated collection sites, take-back programs at the point of sale, and specialized recycling centres.

These systems rely on collaboration between public authorities, private enterprises, and local governments. Public outreach and education initiatives also play a vital role—informing consumers about where to dispose of used electronics, the benefits of recycling, and the broader importance of responsible electronic waste management.

2.4. WEEE Recycling

Extended Producer Responsibility (EPR) plays a pivotal role in the recycling of Waste Electrical and Electronic Equipment (WEEE). It places the responsibility for the entire lifecycle of electronic products—including their end-of-life collection, recycling, and disposal—on the manufacturers. This policy framework incentivizes producers to incorporate recyclability and sustainability into product design from the outset. EPR also establishes defined recycling targets for various categories of WEEE, ensuring that both manufacturers and recycling operators contribute to reducing environmental harm and maximizing the recovery of valuable raw materials.

The Restriction of Hazardous Substances (RoHS) Directive complements WEEE efforts by limiting the presence of toxic substances in electrical and electronic equipment. By reducing the hazardous content in products, the RoHS Directive supports safer, more efficient recycling. A public consultation conducted in mid-2022 as part of the RoHS Directive review highlighted potential

areas for reform. Key suggestions included revising rules around the reuse of recovered spare parts—potentially improving both carbon efficiency and resource conservation—and allowing substance exemptions only when suitable alternatives are not widely available across the EU market.

Despite these policy measures, several obstacles continue to hinder effective WEEE recycling. A significant challenge is limited access to specialized recycling facilities, particularly in certain regions, coupled with regulatory barriers that can complicate processing and logistics. Even when facilities are available, achieving high levels of material recovery is not always feasible. Some components and materials are inherently difficult to isolate or recycle, which lowers the overall efficiency of the process.

Another crucial element in WEEE management is the secure handling of personal data stored on electronic devices. Ensuring that all data is thoroughly erased before recycling is essential for protecting consumer privacy and building trust in recycling systems.

2.5. WEEE Reuse and Repair

The project countries have made the reuse and repair of WEEE a strategic priority, aligning with the broader goals of the circular economy. Efforts are focused on extending product lifespans and encouraging manufacturers to design devices that are durable, upgradeable, and easy to repair. Current initiatives are working toward legislation that guarantees consumers access to vital repair information, spare parts, and maintenance services for their electronic products.

Grassroots movements, such as repair cafés and reuse centers, are gaining traction—particularly in countries like Slovenia. These community-based initiatives provide individuals with opportunities to learn repair skills, access necessary tools, and contribute to reducing e-waste by prolonging the usability of their devices. At the same time, they help build local engagement and foster a culture of sustainability and shared responsibility.

Policymakers in these countries are also considering incentives to promote sustainable behaviors and support responsible consumption patterns. Despite these developments, reuse and repair currently account for only a small fraction of WEEE management across the project nations.

Slovenia stands out as a relative success story, demonstrating encouraging results with reuse rates reaching 8 kg and 6 kg per capita per year, respectively. However, similar progress has been more limited in other countries due to several ongoing barriers.

One major challenge is the absence of a comprehensive legal framework. There are no binding requirements for repairability, spare part availability, or minimum service life of products. The economic viability of repair is also problematic—testing and repairing equipment can sometimes cost more than purchasing a new item. In addition, reusable products often cannot be removed from collection points, and professional distribution networks for refurbished goods remain underdeveloped.

Other hurdles include a shortage of skilled repair professionals, low consumer demand for repaired items, and inadequate systems for quality assurance and product guarantees. These factors collectively limit the scalability and impact of reuse and repair activities, despite growing awareness and policy interest in the field.

2.6. Challenges

2.6.1. WEEE Management

Meeting the collection and recycling targets set by the WEEE Directive remains one of the key challenges for the project countries. In practice, significant data gaps persist regarding the volume of WEEE generated, making effective planning and policy development difficult. Additionally, the collection systems face high administrative burdens, and various regulations often complicate or restrict operational processes.

Legal requirements related to WEEE management are frequently unclear in terms of practical implementation, contributing to inefficiencies. As a result, a substantial portion of WEEE ends up being exported, primarily due to stricter compliance demands in many EU Member States.

Product design itself presents another major challenge. Many electronic devices are manufactured with built-in lithium batteries, glued casings, and complex internal components, which makes disassembly and recycling more difficult. These products are also typically not designed with reuse or repair in mind and often have short life spans, further complicating sustainable waste management.

The processes of collection, testing, and repair also involve high labor and transportation costs, especially for returns and redistribution. Repairing WEEE is often time-consuming and costly, making it economically less viable than recycling.

In addition, illegal collection practices and an insufficient number of collection points are widespread across the project countries. The WEEE that is collected is frequently unsuitable for reuse or repair due to issues with both quality and quantity.

Another key barrier is the lack of consumer awareness. Information on collection options, as well as the benefits and availability of reuse and repair services, is often limited. This leads to low public engagement and minimal demand for refurbished products, further discouraging investment in repair infrastructure and services.

2.6.2. WEEE Collection

Extended Producer Responsibility (EPR) continues to serve as a cornerstone of WEEE collection efforts. Under EPR, producers are obligated to finance the collection, treatment, and environmentally responsible disposal of electrical and electronic waste. This framework aims to drive manufacturers to design products with circularity, repairability, and sustainability in mind.

All participating eWAsTER countries have introduced formal collection systems to facilitate WEEE recovery. These include fixed collection sites, take-back schemes linked to new purchases, and public-private partnerships between national governments, municipalities, and private sector actors. Public information campaigns have been implemented to raise awareness about the environmental importance of proper WEEE disposal and to inform citizens about where and how to return their used electronics.

Nevertheless, collection rates across eWAsTER countries remain low, falling short of EU WEEE Directive targets. While countries like Slovenia and Italy see high volumes of EEE placed on the

market (POM)—over 25 kg/capita and 22 kg/capita respectively—the proportion collected through official channels is often under 50%. Slovenia reported a collection rate of 7.2 kg/capita in 2022, while Italy and Greece remained around 6.3 kg/capita and 6.0 kg/capita, respectively.

These disparities illustrate the need for enhanced coordination, investment in infrastructure, and expanded public outreach to improve WEEE collection and move towards circular economy goals in the eWAsTER project countries.

2.6.3. WEEE Recycling

One of the major challenges identified in the eWAsTER project is the limited access to appropriate recycling facilities, coupled with regulatory and logistical barriers. Existing facilities can recover valuable materials from WEEE, achieving high recovery rates is often difficult. Complex product designs, hazardous materials, and hard-to-separate components reduce the overall efficiency of recycling operations.

A critical aspect of responsible recycling includes the secure deletion of data from electronic devices prior to processing, which remains an area requiring further standardization and investment.

2.6.4. WEEE Reuse and Repair

There is a lack of legal framework e.g. obligatory reparability, availability of spare parts, no specifications on the minimum service life, cost constraints, testing the equipment is sometimes more expensive than the retail value. Beside this, the reusable products may not remove from the collection points and limited number of professional distributions channels. Despite this, there is a limited availability of skilled personnel for repair, interested customers, quality controls and product guarantee are limited.

Efforts to promote WEEE reuse and repair across the eWAsTER project countries face numerous systemic obstacles. Chief among them is the lack of a supportive legal framework. There are no mandatory requirements for product repairability, availability of spare parts, or minimum service life, which significantly limits the feasibility of extending product lifespans.

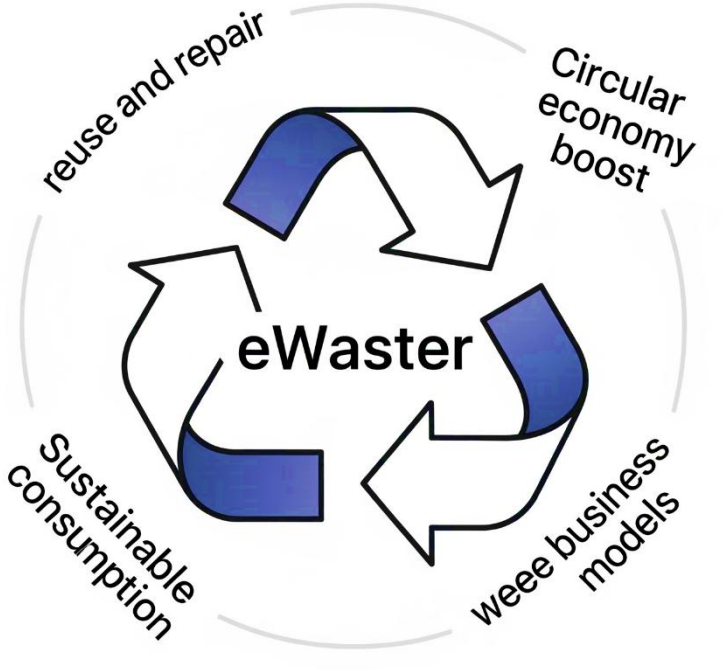
Economic challenges further complicate reuse and repair. The cost of testing and repairing old equipment often exceeds the price of new products, discouraging consumers and businesses alike. Additionally, reusable items are often not removed from collection points, and the distribution channels for refurbished electronics remain underdeveloped.

Other significant barriers include a shortage of trained repair technicians, low consumer interest, inconsistent quality standards, and a lack of warranty or guarantee mechanisms. These issues collectively restrict the potential of repair-based circular strategies, despite growing interest from policymakers and civil society organizations in encouraging sustainable product life cycles.

3. Strategies

The vision for WEEE management strategies focuses on tackling the challenges posed by electronic waste through a comprehensive approach that emphasizes reuse and repair, recycling, and responsible disposal. It aims to minimize environmental harm while fostering a sustainable, circular economy for electr0onic products.

This vision promotes extending the lifespan of electronic devices, reducing the overall generation of WEEE, encouraging responsible consumption patterns, and supporting the creation of innovative WEEE-related business models. With a particular focus on the Euro-Med region, the strategy seeks to drive circular economy growth, stimulate innovation, and contribute to sustainable regional development.



3.1. Prioritize strategies

As the volume and complexity of electronic waste continue to grow across Europe and beyond, the need to shift from a linear "take-make-dispose" model to a circular approach in electronics management has become increasingly urgent. The traditional model not only places immense pressure on the environment through hazardous waste and resource depletion but also exacerbates global inequalities—particularly in lower-income countries where unmanaged WEEE often ends up.

In response, global and regional frameworks—such as the European Green Deal, the EU Circular Economy Action Plan, and the UN Sustainable Development Goals—are pushing for a systemic transformation in how electronic products are designed, used, and discarded. Yet, creating a truly circular electronics sector requires more than individual recycling initiatives or one-off pilot projects. It demands a coordinated, multi-stakeholder effort anchored in long-term planning and supported by strong policy frameworks.

The eWAsTER project, focused on countries in the Euro-Mediterranean region, recognizes that effective WEEE management must address a broad set of challenges—from outdated regulatory systems and weak infrastructure to low consumer awareness and inconsistent enforcement. The project seeks to develop strategic interventions that can generate meaningful impact, supporting the design of systems that are resilient, inclusive, and scalable.

Importantly, the move toward circularity is not just a technical issue, it is also political, social, and economic. Choices about which circular strategies to implement are often influenced by power dynamics, institutional capacities, and competing policy goals.

Within the Euro-Med region, this transition presents an opportunity to boost sustainable innovation and green entrepreneurship. By prioritizing circular strategies—such as repair, refurbishment, material recovery, and reuse—the eWAsTER project aims to foster new business models and stimulate job creation. Support for enabling environments, including training programs, policy harmonization, and regional collaboration platforms, will be key to unlocking the environmental and economic benefits of a circular electronics economy in this strategically significant area.

3.1.1. Policy framework

An effective and future-oriented WEEE policy framework must prioritize legislation that promotes environmentally sound and circular management of electronic devices. The goal is to support sustainable practices across the full lifecycle of electrical and electronic equipment—from design and production to disposal and material recovery. Central to this framework is the creation and enforcement of clear, practical regulations that facilitate repair, reuse, and recycling, while safeguarding both public health and the environment.

A key aspect is the mandatory labelling of products, including transparent information on hazardous substances and end-of-life handling instructions. Enhanced product traceability is equally vital, ensuring that devices can be tracked throughout their lifecycle. This would empower all stakeholders—from producers to recyclers—to make responsible decisions and manage WEEE more effectively.

The eWAsTER project also emphasizes the need for standardized treatment and recycling protocols. These should include specific procedures for safely dismantling electronic products, recovering valuable materials, and minimizing the release of hazardous substances like mercury, lead, and flame retardants. Furthermore, policies should set strict limits—or outright bans—on hazardous chemicals in electronics, reinforcing safety and compliance with EU and international standards.

Crucially, robust enforcement mechanisms must underpin these policies. This includes establishing market surveillance systems, conducting regular inspections, and applying penalties for non-compliance. Such systems would help to ensure that manufacturers, importers, and waste handlers meet their legal obligations.

To support circularity, reuse and repair should be actively encouraged through targeted policy measures. These may involve financial incentives such as grants, tax reductions, or subsidies for businesses that offer repair services or refurbish electronics. Consumer-oriented policies, such as

the right to repair, should also be integrated into national legislation to promote long-term product use.

3.1.2. Collection and Repair Infrastructure

An effective WEEE management strategy, as promoted by the eWAsTER project, must be built upon robust systems for data collection, reporting, and monitoring. Accurate and transparent information is essential to evaluate progress, identify bottlenecks, and guide policy and operational decisions. Manufacturers, waste operators, and other relevant stakeholders should be legally required to submit detailed data on the types and volumes of electronic waste generated, collected, treated, and processed. A centralized and harmonized monitoring system is key to tracking outcomes and assessing the real impact of WEEE management efforts across the Euro-Med region.

Another core component is the development of a comprehensive and accessible collection infrastructure. The WEEE management highlights the importance of strategically located fixed collection points, take-back systems, and recycling centers, which must be user-friendly and well-integrated into local waste services. In remote or underserved areas, the introduction of mobile collection units can bridge the accessibility gap, ensuring that all citizens have a convenient way to dispose of their end-of-life electronics responsibly.

Community involvement plays a vital role in maximizing the efficiency of these systems. The eWAsTER project emphasizes targeted awareness campaigns, local events, school programs, and public workshops to educate citizens about the importance of WEEE recycling and to shift public behavior toward responsible disposal. Aligning WEEE collection with existing municipal services can improve sorting efficiency, optimize logistics, and facilitate coordinated action between municipalities and WEEE handlers.

Digital tools and platforms can further enhance these efforts. Mobile applications, web-based booking systems, and geo-located collection maps allow citizens to easily locate drop-off sites, schedule pickups, or find information about how to properly manage their electronic waste. These solutions not only improve accessibility but also contribute to the transparency and traceability of the WEEE collection process.

Regular evaluation and adaptation of these systems is crucial. Feedback from users, data from collection points, and emerging trends in WEEE generation should inform ongoing improvements to collection infrastructure and outreach strategies. Retailers can also be actively engaged by offering in-store drop-off services, thereby integrating WEEE return into existing consumer routines.

In parallel, the promotion of reuse and repair is a cornerstone of the eWAsTER project's vision. Establishing and supporting repair centers and refurbishment workshops is essential for extending the lifespan of electronic devices and diverting usable items from the waste stream. These centers, staffed by trained professionals, not only offer reliable repair services but also serve as educational hubs. To ensure the availability of skilled personnel, vocational training programs should be developed to build local expertise in electronics repair and diagnostics, supporting green job creation.

Digital matchmaking platforms can scale these repair efforts by connecting consumers with local repair professionals, offering transparent pricing and service ratings. In tandem, collaboration with manufacturers is needed to promote product designs that support durability, disassembly, and upgradability—including modular components, standardized connectors, and easy-to-replace parts.

To further incentivize repair over replacement, extended warranties, product guarantees, and affordable access to spare parts should be encouraged through public policy and industry commitments. The effectiveness of such measures should be tracked through a comprehensive monitoring framework, measuring not only the number of repaired devices but also their social, economic, and environmental impact—from waste reduction to job creation and CO_2 savings.

3.1.3. Circular producers

To advance sustainable electronic product management, the eWAsTER project emphasizes the need for increased investment in research and development. This includes exploring innovative materials and technologies that improve the repairability, recyclability, and environmental sustainability of electronic devices throughout their lifecycle. Strategic R&D can play a pivotal role in enhancing product performance while reducing environmental footprints.

A key focus is on designing products for longevity, modularity, and ease of maintenance. Products should be built using durable components, with standardized connectors and easily replaceable parts, allowing users and professionals alike to extend their usability. Clear, accessible disassembly instructions and user-friendly repair guidance should become standard industry practice.

Right-to-repair principles are central to this vision. The project promotes public access to repair manuals, diagnostic tools, and parts replacement guides, empowering both consumers and independent technicians to maintain and repair devices. Active collaboration with repair communities, NGOs, and policymakers can help establish stronger legal frameworks and cultural acceptance for repair-oriented practices across the Euro-Mediterranean region.

Supporting this, manufacturers must commit to supplying authentic spare parts at fair prices and providing repair kits that enable users to fix their devices. These initiatives should be complemented by well-structured take-back schemes, ensuring broken or obsolete devices are collected efficiently and directed toward refurbishment or responsible recycling, thus preventing harmful environmental impacts and supporting the circular flow of resources.

Incorporating circular economy models into business practices is another transformative step. Leasing, subscription-based access, and product-as-a-service models can keep devices in circulation longer and ensure their proper return for repair or recycling. At the same time, consumer awareness campaigns and reward-based programs can help shift public attitudes, encouraging individuals to repair rather than discard electronics and to return old devices through official channels.

To ensure accountability and continuous improvement, the project stresses the need for robust impact tracking systems. Stakeholders should define clear metrics for monitoring the number of products repaired, refurbished, or diverted from landfills, as well as measuring environmental and economic benefits. Certifications and product labelling schemes that communicate repairability

ratings can help build consumer trust and provide a strong incentive for companies to prioritize sustainable design.

3.1.4. Circular users

Individuals are not just end-users—they are key agents of change who can significantly impact the sustainability of electronic product lifecycles through repair, reuse, and responsible consumption.

Fostering a repair-oriented culture is another foundational goal. This involves both reviving traditional repair skills and creating new economic and social opportunities. Through support for repair cafés, local workshops, and technical/vocational training programs, the project encourages the formation of community-based repair networks. These spaces—accessible and well-promoted—can serve as hubs for skills development, community empowerment, and job creation, especially in underserved or rural areas.

To enhance user participation, digital tools are also being promoted within the project. Mobile apps and websites can connect users with certified repair services, provide DIY repair tutorials, and include features like price comparison and review systems. These platforms can be linked to incentive-based systems, such as loyalty programs that reward responsible behaviours—e.g., discounts on repairs, sustainable product purchases, or free services for accumulated points.

Economic incentives and supportive policies are critical levers to enable behavioural change. Governments and local authorities are encouraged to introduce repair vouchers, tax credits, and small grants to reduce the financial burden on individuals choosing repair over replacement. These policies ensure that consumers and independent technicians have access to repair manuals, spare parts, and tools, and that manufacturers are required to design products with repairability in mind—including modular components and user-friendly interfaces.

3.1.5. Circular re-users

Reuse is a cornerstone of the circular economy and offers a powerful opportunity to reduce environmental impact, extend product lifespans, and stimulate local job creation. Within the framework of the eWAsTER project, the reuse of electrical and electronic equipment is seen not just as an environmental imperative, but also as a driver of social and economic development in the Euro-Mediterranean region.

The first strategic priority is to strengthen digital infrastructure to support collection and reuse. By leveraging technological tools such as mobile applications, online platforms, and smart drop-off kiosks, citizens can easily locate nearby collection points, assess the condition of their devices, and even schedule pick-ups. Transparency throughout the process—including clear communication on where collected devices go and how they are handled—is essential to build public trust and encourage participation.

A major challenge in many project countries is the informal nature of refurbishment and second-hand trade. Many operators in this sector lack formal recognition, financial access, and proper infrastructure. The eWAsTER project addresses this by encouraging formalization and capacity-building, including training programs, access to micro-finance, and support in joining official distribution networks. These actions help scale up reuse efforts while ensuring compliance with environmental and safety standards.

3.1.6. International collaboration.

Electronic waste management cannot be effectively tackled in isolation, especially given the globalized nature of electronics production, trade, and disposal. The eWAsTER project recognizes that addressing e-waste requires cross-border cooperation, harmonized regulations, and strengthened institutional capacities, particularly in the Euro-Mediterranean region where trade routes and waste flows often transcend national boundaries.

A key pillar of this approach is the alignment of international and regional regulatory frameworks. Currently, significant differences exist between countries in how e-waste is defined, processed, and monitored. By promoting regulatory convergence in line with international standards—such as the Basel Convention and relevant EU directives—the project supports efforts to prevent illegal waste shipments, enhance traceability, and ensure safe and responsible trade in second-hand and reusable electronics.

To make this possible, the project calls for the establishment of bilateral and multilateral cooperation mechanisms. These partnerships can facilitate the creation of shared treatment and refurbishment centres, the transfer of clean technologies, and joint capacity-building efforts, especially in non-EU partner countries with limited infrastructure. In the context of the Mediterranean basin, regional collaboration can generate economies of scale in recycling, improve environmental outcomes, and strengthen resilience across borders.

Another strategic priority is the development of institutional capacity in countries where e-waste regulation and enforcement remain underdeveloped.

Digital innovation also plays a vital role. The project advocates for shared digital platforms and traceability tools, such as blockchain-enabled tracking systems or interoperable databases that monitor electronics across their entire lifecycle. These tools can help reduce illegal dumping and provide transparency in transboundary e-waste movements.

3.1.7. Financial scheme

Promoting environmentally responsible practices in the electronics sector requires the deployment of targeted financial incentives and support mechanisms that encourage sustainable behaviour across the entire lifecycle of electronic products. These tools can help shift both business operations and consumer habits toward circularity and long-term resource efficiency.

A foundational step is to reward companies that integrate sustainability into product design and operations. Financial incentives—such as tax deductions, eco-labelling benefits, or subsidies—can motivate manufacturers to prioritize durability, repairability, and recyclability in their products. These incentives not only reduce environmental impact but also improve the market competitiveness of businesses adopting green design standards.

Consumers and organizations must also be incentivized to engage in environmentally sound disposal and reuse practices. Programs that offer discounts on new purchases, loyalty points, or cashback schemes in exchange for returning old or broken devices can increase participation in e-waste collection and recycling systems. Recognizing and rewarding responsible behaviour fosters a culture where sustainable consumption becomes the norm.

Repair-focused enterprises, including local workshops and social economy businesses, play a crucial role in extending the lifespan of electronic devices. To strengthen this sector, governments

and institutions can provide targeted financial support—including grants, tax relief, or operational subsidies—for businesses that demonstrate strong environmental and ethical standards. Additionally, green financing options, such as low-interest loans, can help scale repair, refurbishment, and recycling operations, especially for small and medium-sized enterprises.

Public funding should also be channelled toward community-based repair initiatives, which often struggle with limited resources. Support for equipment upgrades, technician training, and workspace improvements can increase their service capacity and outreach.

Improving access to spare parts is another critical priority. Governments can collaborate with manufacturers to create policies or incentive schemes that promote the affordable and consistent availability of genuine components. This would allow independent repair businesses to operate effectively and offer cost-efficient services to consumers.

An innovative financial model that complements these efforts is the subscription-based repair service. In this system, consumers pay a monthly or annual fee to access regular maintenance or repair for their devices. This model provides predictable income streams for repair providers and offers a convenient, budget-friendly way for users to prolong the life of their electronics—reducing unnecessary waste generation in the process.

Ultimately, a well-designed mix of financial tools and public-private collaboration can accelerate the transition toward a circular electronics economy—one where sustainable choice is not only the right thing to do but also the most accessible and rewarding.

4. Methodology

In order to support the consortium to implement and integrate the pilot action into their WEEE management according to their operational sectors in the local or regional level throughout the project, a number of steps need to be taken including number of testing period, feedback and evaluation. Therefore, the methodology is translated into the following implementation phases:

4.1. Phase 1: Local Information gathering

In the initial stage of the self-assessment process, the principal key local actors of every partner will be tasked with responding to a structured questionnaire designed to evaluate various competencies essential for effective WEEE management. Among these local key actors are producers, importers, companies working in waste management, recyclers, reuse organizations, local authorities (depending on the country - municipalities, regional authorities). To obtain these results and conclusions from the responses to this questionnaire, it is advisable to collect responses from approximately 100 key actors.

The questionnaire aims to furnish a comprehensive assessment of managing local key actors' capabilities in strategic management, awareness, comprehension of processes and sustainability imperatives.

Questions, created by ORZ, were thoroughly decided and agreed among all partners, and cover the topics that partners believe are the most pertinent. At the end of one consortium online meeting, 18 questions were agreed on by all consortium partners. The final questionnaire for local key actors agreed upon is attached to this document, in Annex 1.

It is recommended that these questions be collected through online means (via Google Form, for example), and subsequently translated into the local language if necessary.

After the Second Validation Workshop in Slovenia in July/2025, the consortium agreed to define an interview methodology in order to collect qualitative data. This qualitative data aims to assist the Med Methodology in defining concrete and detailed challenges and potential solutions, and should be developed alongside key actors of each partner's choosing. Each partner should conduct a minimum of one interview, although more are encouraged. The partner ORZ created an instruction document to help the rest of the partners to standardize the questions and the way these interviews are conducted. This instruction document is attached in this document in Annex 2.

4.2. Phase 2: Desk research and policy analysis

In addition to the questionnaires, it is also important to have legislative data from each country in this area to provide further information.

This phase focuses on reporting legislation and regulation to manage WEEE in an environmentally responsible and sustainable manner. It is crucial for establishing a regulatory foundation that ensures proper disposal, recycling, and overall management of electronic waste including reuse and repair.

It is advisable to follow the following index to collect the necessary information for this phase:

- Situation of the WEEE policy
  - Legal framework in the country
  - Waste Management Plan (s)
  - Rates and figures related to the country and region
  - Analysis of situation
  - Collection network in the country
  - Collection and processing of WEEE in the country
- Actors involved in the policy instrument
  - Main actors in the policy

4.3. Phase 3: Online Self-Assessment tool

In order to carry out all questionnaires and gather data, it is necessary to develop an online self-assessment tool.

The resulting online self-assessment tool, from the research, assessment, prototyping and co-development process, is a stand-alone tool that will help WEEE supporters to carry out a self-assessment of its competency to managing the current WEEE situation in a better way.

The primary objective of this eWAsTER tool is to provide support to both project consortium partners and other stakeholders engaged in WEEE management, with the purpose of enhancing their overall performance. The purpose of the tool is to facilitate users in comprehending their present WEEE management performance in the context of prospects, as well as identifying the subsequent actions required to enhance performance.

The tool encompasses the fundamental principles of the circular economy model, which include sharing, leasing, reuse, repair, refurbishing, and recycling. These principles serve as guidelines for decision-making at all levels and define the objectives that a sustainable and eWAsTER should strive to achieve. These objectives provide strategic guidance for the transition to a circular WEEE model, offering significant support for the strategic management of WEEE. The essential cooperation among actors involved in the WEEE management is seen as a crucial factor in supporting the implementation of all WEEE principles.

This online platform will provide the user with a personalized experience, guiding them through a series of questions to tailor the assessment to their specific needs.

In this online assessment tool, the user needs to answer a series of questions first in order to receive the corresponding methodology to apply. These questions have a dynamic nature:

depending on the answer the user gives to certain questions, more can be shown. In other words, the questions on this form to decide the methodology is graph based, where the different questions are connected through the answers.

Upon the completion of the questionnaire, the user answers undergo a meticulous analysis. The tool then interfaces with a comprehensive database, a repository enriched with methodologies, to give the user the correct methodology to follow according to the given answers to the previous dynamic form.

Following the database consultation, the user is then seamlessly guided to a final page. This page serves as a culmination of the methodology consultation, presenting a concise yet comprehensive methodology conclusion. Here, they will find the suggested methodology to follow based on the thorough analysis of the responses together with the precise steps to carry out the selected methodology. Recognizing the importance of accessibility and reference, we extend the convenience of a downloadable PDF format. This downloadable document encapsulates the methodology conclusion, allowing the user to maintain a tangible record for future consultation and decision-making.

Within this, the manual and video instruction of the self-assessment tool will be provided. For the project consortium, the partners will receive online training on how to use the tool and how can they utilize the results to define the action plan in the next step.

The chosen technology for developing this dynamic, user-centric app is React, a powerful JavaScript library known for its efficiency in creating interactive and responsive user interfaces. Developed and maintained by Facebook, React employs a declarative syntax that allows developers to describe the desired UI state, making the code more readable and maintainable.

To access the correct methodology conclusion based on user input, the React app will seamlessly integrate with a robust database. This database will store the methodology conclusions associated to certain key values, facilitating efficient data retrieval. The integration between React and the database ensures a seamless flow of information, enhancing the overall functionality of the app.

As it can be seen, with React we can build the requested platform for the online assessment tool. However, to further enrich the user experience while navigating through the app, we are going to use an excellent complementary library to build and manage forms in React based apps, being this library SurveyJs. SurveyJS is an open-source JavaScript UI library used for creating surveys, polls, quizzes, and web forms. It is MIT-licensed, meaning it is free and open-source, and it can be integrated into any web application.

In summary, React's robust features, such as its declarative syntax, component-based architecture, virtual DOM and the additional SurveyJs library support, make it an ideal choice for developing an app with a dynamic form like the one we need for the online assessment tool. The integration with a database ensures data-driven methodology conclusions, while hosting on a Plesk server with a unique domain provides a reliable and branded online presence for the application. This strategic combination of technologies sets the stage for a powerful, user-friendly, and efficient app that aligns with the goals of providing a personalized and seamless user experience.

To develop effective transnational strategies, it is crucial to have a comprehensive understanding of the current management practices of WEEE in the project countries. This understanding should

extend beyond statistical data to include the various stakeholders involved in WEEE management chains. Accordingly, a conclusions assessment report will present the findings from the WEEE country profiles created for the project. These profiles include an analysis of existing policies, a comparison of policy implementation levels, an assessment of the WEEE market size, key producers and consumers, as well as insights gathered from consultations with key stakeholders.

The document relative to this section is the Annex 3. The online self-assessment tool is explained more in details.

4.4. Phase 4: Presentation of the Local Action Plan

The Action Plans will be developed based on the visions, goals, prioritized tactics, and the results of the online self-assessment plan. A comprehensive set of eight action plans will encompass a comprehensive list of activities, an implementation schedule, and the necessary resources required for regional and local partners to effectively develop pilot actions in subsequent stages.

The peer reviews and technical partners will provide support and conduct reviews for the preparation of Action plans.

Annex 4 of this document contains the stakeholder validation process for the Local Action Plans.

4.5. Phase 5: Pilot Action design and Implementation

The design of the pilot actions within the eWASTER project is grounded in the findings of the Local Action Plans (LAPs), WEEE market analyses, and the proactive engagement of key regional stakeholders. Each pilot action plan is required to present a detailed operational framework encompassing strategic goals, governance and administrative structure, required resources, role distribution, implementation timelines, communication strategies, and mechanisms for monitoring and evaluation.

The implementation phase focuses on translating planning into tangible results, delivering measurable enhancements in WEEE management practices and fostering broader stakeholder involvement. This stage promotes an inclusive model that actively involves local governments, private sector actors, academic institutions, civil society organizations, and community members.

As an integral component of the eWASTER project's workplan, three pilot solutions have been developed to test and validate the strategic directions outlined in the LAPs. These pilot initiatives are practical instruments for evaluating the relevance, scalability, and real-world effectiveness of circular economy strategies in the WEEE sector across the project's regions:

4.5.1. Pilot 1: WEEE REUSE

WEEE REUSE promotes the creation of new business models for the reuse of plastic and e-waste, with a focus on creating jobs for vulnerable individuals. Partners will visit companies — namely Social Enterprises, NGOs, and public institutions — to analyse their profile and assess their capacity to introduce new business models.

WEEE REUSE means to promote the employment of vulnerable individuals and social groups in e-waste reuse and recycling activities. This test may look at the operational and financial efficiency and effectiveness of employing these target groups. WEEE REUSE should also look at the promotion of specific CSR measures in the existing e-waste companies for creating jobs for vulnerable individuals.

4.5.2. Pilot 2: WEEE PROCURE

The test promotes new eco-innovative business models based on the eco-renting of EEE, in cooperation between the demand side and the offer side, which allows the creation of a new eco-business benefitting:

- Tenderers get continuous updated technology, without generating e-waste.
- Sellers can create a new business line, including equipment maintenance and reselling of equipment through the enlargement of EEE usability in a second life.

4.5.3. Pilot 3: WEEE BEHAVE

The third pilot solution adopts a community and education-based model aimed at encouraging citizen participation in WEEE collection. This solution promotes social involvement through motivational challenges and educational campaigns, particularly targeting youth. Key features include:

- School competitions, where students and their families are mobilized to collect as much WEEE as possible.
- Community challenges between neighborhoods, municipalities, or associations with incentives for collective participation.
- The use of the “Greta Effect”, leveraging the influence of young people to inspire behavioral change in their households and communities.

This model aims to raise awareness, foster environmental responsibility, and turn WEEE collection into a socially recognized and valued activity.

Upon completion of the pilot phase, the results will be evaluated and integrated into updated versions of the Local Action Plans. This will ensure that the tested solutions serve as a solid foundation for sustainable and replicable public policies. Finally, each territory will work towards the formal endorsement of its plan, including the signing of a Cooperation Agreement to consolidate the results and ensure continuity beyond the duration of the project.

5. Evaluation and Monitoring

An evaluation and monitoring plan aims to assessing the effectiveness of the project, to ensure the achievement of objectives, efficient utilization of resources, and the production of desired outcomes. This plan has the potential to assist stakeholders in effectively monitoring progress, identifying areas that require improvement, and tracking performance throughout the project period where numbers of the peer review, assessment of each stage are conducted for the development of action plans and pilot actions.

The main objectives of this plan include verifying progress towards the expected results defined in the work packages, measuring the impact in terms of circularity, sustainability, and replicability of the proposed solutions, detecting and correcting deviations from schedules, budgets, and technical objectives, and evaluating the effectiveness of collaboration among the consortium partners.

Key performance indicators (KPIs) will be used, grouped into three levels: process indicators, such as the number of workshops held, reports delivered, and tools developed (e.g., the digital monitoring tool and the economic evaluation module); outcome indicators, such as the degree of implementation of circular economy strategies by pilot companies and the number of companies interested in replicating the model; and impact indicators, including measurable improvements in resource efficiency, waste reduction, and socio-economic improvements in the target regions.

The methodology will combine qualitative and quantitative approaches, including document review and analysis of deliverables from the work packages, surveys and interviews with partners, pilot companies, and stakeholders, as well as participatory evaluations during key events such as regional and transnational workshops. Additionally, a digital management platform will be used for data collection, storage, and analysis, facilitating progress visualization and the generation of periodic reports.

The evaluation and monitoring will be structured in quarterly phases, with key milestones such as internal evaluations at the end of each quarter, interim progress reports every six months, external evaluations at the conclusion of the pilot phases, and a final comprehensive evaluation report at the end of the project. The consortium will appoint an evaluation coordination team within the project management work package, responsible for overall supervision, while each partner will have a focal point responsible for ensuring data collection and timely reporting.

Annex 1

Questionnaire survey on e-Waste management at the local level

Basic data

1. **Name of organization/project partner:**
    - [Text entry space]
2. **Country/Region of Operation:**
    - [Text entry space]
3. **Contact person (first and last name, e-mail address):**
    - [Text entry space]

Regulatory Framework and Policy Implementation

Does your country have specific regulations or laws related to e-waste management?

Yes

No

If the answer is Yes, please provide the law number/link to the official document:

[Text entry space]

Economic Findings and Financing

How is e-waste management financed in your local community? (Select all that apply)

Government incentives

Contributions from manufacturers

User contributions

International donations

Other: [Text input space]

Statistics

Amount of e-waste produced annually in your local community :

For each year, select the appropriate category based on quantity:

2021

< 1,000 tons

1,000 - 5,000 tons

> 5,000 tons

2022

< 1,000 tons

1,000 - 5,000 tons

> 5,000 tons

2023

< 1,000 tons

1,000 - 5,000 tons

5,000 tons

Amount of e-waste collected annually in your local community:

For each year, select the appropriate category based on quantity:

2021

< 1,000 tons

1,000 - 5,000 tons

> 5,000 tons

2022

< 1,000 tons

1,000 - 5,000 tons

> 5,000 tons

2023

< 1,000 tons

1,000 - 5,000 tons

> 5,000 tons

Market Stakeholders and Innovations

Does your country encourage innovation and development of technologies to better manage e-waste?

Yes

No

If yes, please describe briefly:

[Text entry space]

Public Awareness and Education

Are there national or local programs to raise public awareness of e-waste?

Yes

No

If yes, please describe briefly:

[Text entry space]

Management of e-Waste

What are the main e-waste collection channels in your local community? (Select all that apply)

Public collection centers

Return points at merchants

Separate collection at home

Commercial collection centers

Other: [Text input space]

Does your local community run programs to reuse electronic devices before recycling?

Yes

No

If yes, please indicate the proportion of e-waste intended for reuse:

< 10%

10% - 20%

> 20%

Implementation of the Priority Order of Waste Management

How would you rate the effectiveness of the implementation of the priority order of waste management (waste prevention, reuse, recycling) in your local community?

Very effective

Efficient

Medium effective

Inefficient

Very ineffective

13. **In which segment of e-waste management do you see the greatest potential for improvement?** (Choose one option)

Prevention of waste generation

Reuse

Recycling

Other: [Text input space]

Waste Prevention

Is your local community taking steps to reduce e-waste generation? (Select all that apply)

Yes, by designing sustainable products

Yes, by promoting longer product life

Yes, with product return and repair programs

No

Other: [Text input space]

Recycling and Treatment of e-Waste

What proportion of collected e-waste is recycled in your local community?

< 30%

30% - 60%

> 60%

Does your local community enforce e-waste treatment and recycling standards?

Yes

No

If yes, please provide a brief description of the standards: [Text entry space]

Tracking and Reporting

Are there systems in place to track and report e-waste streams in your local community?

Yes

No

How do you rate the transparency and reliability of e-waste data?

Very transparent and reliable

Partially transparent and reliable

Not transparent

Thanks for your cooperation. The data will be used for the purpose of the e-WAsTER project, Interreg Euro-MED.

Annex 2

Instructions for Interview in Activity 1.2, Task 1. Standardised Data Date: 2024-07-11 1.

1. Preamble for Interview Instructions

As agreed during Day 1 of VW2, each partner shall conduct 1 interview with at least 1 key actor of their choice, although more are encouraged. This will ensure a critical mass of qualitative data to be analysed concerning e-Waste challenges and solutions.

2. The Interview Should:

- Last between 30 to 60 minutes.
- Focus on concrete e-waste challenges and respective solutions.
- Pertain to as many of the different steps of e-waste circularity as possible, namely collection, valorisation, reuse, recycling, and repairing.
- Be conducted with the most important or influential key actors. Although left to the criteria of each partner, the chosen key actor's involvement should: span as many of the aforementioned steps as possible; be as territorially wide as possible.
- Have questions asked in a neutral manner, so as to not bias responses from the selected key actors.

3. Topics of Discussion:

- What's leading to the low level of e-waste circularity in the project's regions, and what's worsening it in the Mediterranean.
- How to encourage stakeholders at all levels to help and work on the issue. This discussion should encompass the public targeted by each pilot (Businesses – REUSE; Public Administrations – PROCURE; General Public – BEHAVE).
- Political and socio-economic factors on the issue, namely potential risks of deploying new policies for e-waste behavioural change, recycling and valorisation.

4. Question Examples:

- What do you believe is the main cause for e-Waste in the Mediterranean Sea?
- Currently, what solutions for this issue are working? Which are making it worse?
- Which target group do you believe has the biggest impact on e-Waste circularity? What impact is that?
- Can entrepreneurs and the business sector contribute to alleviating this problem, or even finding solutions for it?
- How do political and social factors impact the enforcement of e-waste regulations in the Mediterranean region? What can or should be done about it, at a national, regional, and municipality public administration level?
- How can consumers in Mediterranean countries be encouraged to reuse or recycle their electronic devices responsibly?
- How do socioeconomic factors affect behaviour around e-waste circularity?
- What is the financial outlook on working on the circularity of e-Waste?

5. Report Preparation:

The interview can be recorded, as long as the participating key actor agrees to it. If demanded by the key actor, a data processing form should be presented, which will be prepared by Lead Partner PACT.

After the interview, likely to be conducted in each partner's language, the full text should be translated in one of two manners: (1) Through the eTranslate tool, after which the text should be revised for inconsistencies; (2) Manually.

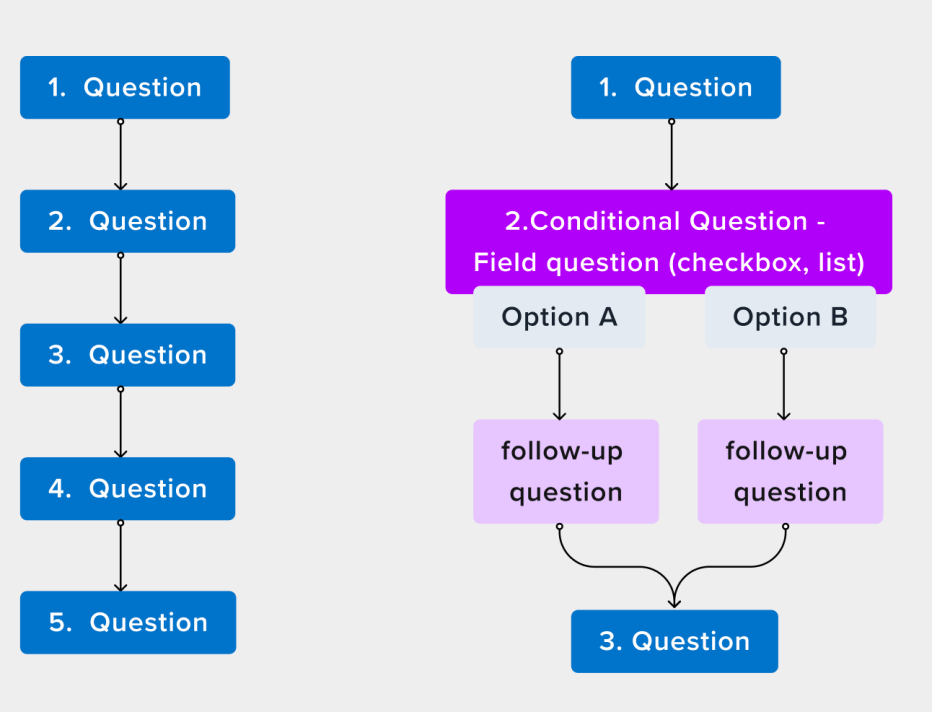
Then, a report on the discussion shall be prepared. The report should be a 1–2 page summarisation of the discussion, presenting a clear conclusion for each topic and question asked. It must include the views and opinions of the key actor on each topic presented. Once finished, both the report and full text must be uploaded to basecamp, on the folder under (eWAsTER > Project Management > WP1 > Standardised Data). For any questions, the activity leaders at PP05 ORZ should be contacted at the following address: marinzver55@gmail.com

Annex 3

Online Assessment Tool

What are conditional forms?

Conditional forms, also known as dynamic or smart forms, redefine the user experience by adapting in real-time based on responses. This innovation minimizes cognitive load, maximizes engagement, and optimizes data collection. It's not just about aesthetics; it's a fundamental shift in how users interact with digital interfaces. A crucial advantage of conditional logic is its profound impact on user engagement. Traditional forms often lead to disengagement as users navigate through irrelevant fields. In contrast, conditional forms create a more conversational experience, responding to users in a way that mirrors natural human interactions. This conversational flow keeps users focused and enhances satisfaction with the form-filling process.



Normal form vs conditional form

The reduction in form length achieved through conditional logic is not just about decluttering; it's about respecting users' time and attention. Imagine a multi-step registration form where users select their industry. Based on this choice, subsequent questions dynamically adjust to gather industry-specific information. For instance, a user indicating "Healthcare" might be prompted with questions related to medical qualifications, while a user choosing "Technology" might face queries about programming languages. This targeted approach streamlines the form-filling experience.

Furthermore, the benefits extend to data accuracy. By tailoring questions to users' contexts, the likelihood of errors decreases. In the example above, the conditional logic not only expedites the form completion but also ensures that users aren't burdened with irrelevant queries, reducing the chances of inaccuracies due to user fatigue or misunderstanding.

Consider an online learning platform during the onboarding process. A new user indicates their programming language familiarity as "Intermediate." The form, leveraging conditional logic, dynamically generates questions aligning with an intermediate skill level, such as preferred projects or areas needing improvement. Simultaneously, a user with an "Advanced" skill level might encounter more sophisticated inquiries about specific frameworks or advanced topics. This tailored approach aids in providing a personalized onboarding experience and sets the stage for more relevant future interactions.

Creating conditional forms greatly increases the functionality and usability of the form and makes the form experience more personalized and efficient for users. This feature has many advantages as it can be seen bellow:

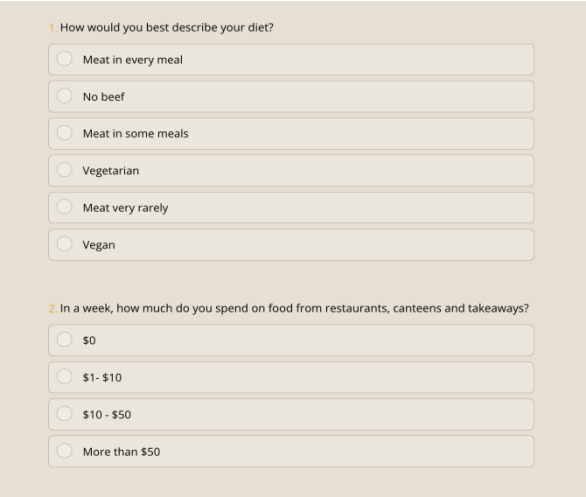
1. Shorter forms: It can help to reduce the number of required fields by only asking for additional information if it is necessary. This can make the form shorter and easier to complete, which can increase the overall conversion rate.
2. Efficient and accurate data: It can improve the accuracy and relevance of the data collected by only asking relevant questions based on the user's responses. It can be especially helpful if you need to gather different types of data from different groups of users.
3. Complex forms with logical branching: It can be used to create more complex and sophisticated forms by allowing you to create multiple branches of logic based on different responses. This can be particularly useful for creating surveys or other types of research forms.

Despite these advantages, challenges exist in implementing conditional forms. The increased complexity demands meticulous testing to ensure seamless functionality across devices and browsers. Designers must balance customization and maintaining a straightforward user interface to prevent overwhelming users.

Conditional logic is a good feature for creating smart forms, and there are many different use cases for these forms that can be useful in various contexts. Below are a few examples of the best use cases for conditional logic forms:

Quizzes

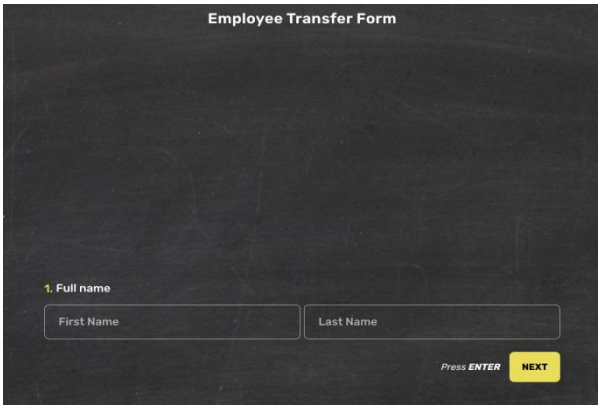
Conditional logic can be used to show personalized quiz results based on the user's answers. For example, a quiz on career options can show different career suggestions based on the user’s interests and skills.



Carbon Footprint Quiz.

Employment forms

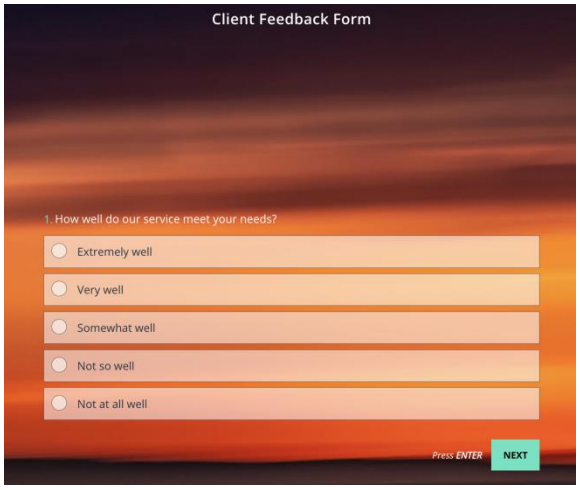
Conditional logic can be used in employment forms to tailor the form to the specific needs and requirements of the job applied for. This can help to streamline the application process and ensure that only relevant information is collected from candidates.



Employee Transfer Form

Feedback forms

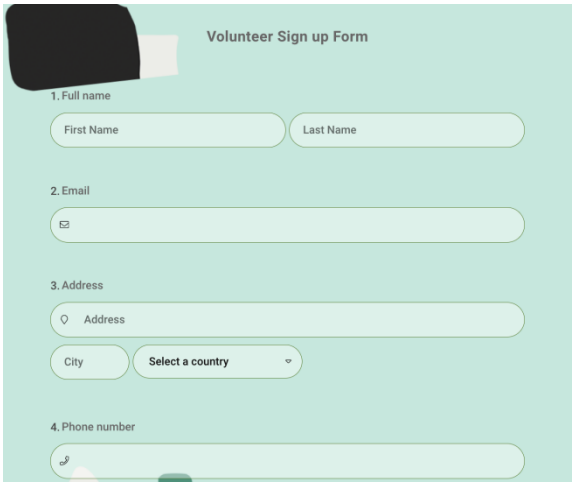
By using conditional logic in feedback forms, the form can be tailored to the specific needs and requirements of the feedback collected. This can help to streamline the feedback process and ensure that only relevant information is gathered from participants.



Client Feedback Form.

Registration and sign-up forms

Conditional logic can be used to create personalized sign-up or registration forms by asking for additional information only if required. This helps reduce the required fields and makes the form easier to fill out.



Volunteer Sign-up Form.

How does the online assessment tool work?

With the explanation of what are dynamic forms in mind, let's cover how the online assessment tool will work. This online platform will provide the user with a personalized experience, guiding him through a series of questions to tailor the assessment to the specific needs.

In this online assessment tool, the user needs to answer a series of questions first in order to receive the corresponding methodology to apply. As it has been mentioned, these questions have a dynamic nature, this meaning that depending on the answer the user gives to certain questions one question or another is shown. In other words, the questions on this form to decide the methodology is graph based, where the different questions are connected through the answers.

Upon the completion of the questionnaire, the user answers undergo a meticulous analysis. The tool then interfaces with a comprehensive database, a repository enriched with methodologies, to give the user the correct methodology to follow according to the given answers to the previous dynamic form.

Following the database consultation, the user is then seamlessly guided to a final page. This page serves as a culmination of the methodology consultation, presenting a concise yet comprehensive methodology conclusion. Here, the will find the suggested methodology to follow based on the thorough analysis of the responses together with the precise steps to carry out the selected methodology. Recognizing the importance of accessibility and reference, we extend the convenience of a downloadable PDF format. This downloadable document encapsulates the methodology conclusion, allowing the user to maintain a tangible record for future consultation and decision-making.

Requirements of the system

Creating this dynamic, user-centric online assessment tool app with conditional forms requires a comprehensive understanding of various elements, ranging from conceptualization to technical implementation. To embark on this journey, a detailed analysis of the necessary requirements is essential, ensuring a seamless development process and a robust end product.

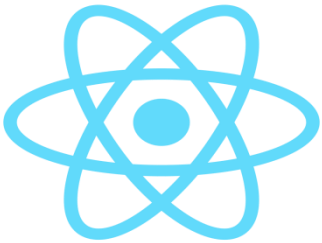
1. **Comprehensive Project Planning:**
   Before diving into the app development process, meticulous project planning is crucial. This involves defining the app's purpose, target audience, and core functionalities. Consider creating user personas to better understand the diverse needs and preferences of potential users.
2. **User Experience (UX) Design:**
   A well-thought-out UX design is paramount to the success of an app with conditional forms. Designers must create intuitive and visually appealing interfaces that facilitate easy navigation. Wireframes and prototypes help visualize the user journey and ensure that conditional logic seamlessly integrates into the overall design.
3. **User Research:**

Conduct thorough user research to identify the pain points and preferences of the target audience. Understanding user behavior is essential for designing effective conditional logic that truly caters to the needs of individual users.

4. **Conditional Logic Framework:**
   Implementing dynamic forms requires a robust conditional logic framework. This involves choosing the right technology stack and programming languages that support real-time adjustments based on user input. JavaScript, for instance, is often employed to handle dynamic interactions on the client side.
5. **Database Architecture:**
   Design a database architecture capable of storing and retrieving dynamic form data efficiently. This includes considering the relationships between different data points and ensuring that the database can handle the potentially vast amount of information generated by user interactions.
6. **Scalability Considerations:**
   Anticipate the app's growth and design it with scalability in mind. As user interactions and data volume increase, the app should be able to handle the load without compromising performance. This might involve utilizing cloud services or optimizing server-side architecture.
7. **Security Measures:**
   Given the sensitive nature of user data, implementing robust security measures is non-negotiable. Encrypting data in transit and at rest, securing APIs, and adopting secure coding practices are critical to protect user information.
8. **Testing Procedures:**
   Rigorous testing is imperative to identify and rectify any potential issues. Conduct unit testing, integration testing, and user acceptance testing to ensure that conditional logic works seamlessly across various devices, browsers, and user scenarios.
9. **Documentation:**
   Comprehensive documentation is essential for future development, maintenance, and troubleshooting. Document the logic implemented, database schemas, and any third-party integrations to provide a clear reference for developers and stakeholders.
10. **Feedback Mechanism:**
    Implement a feedback mechanism within the app to collect user input regarding the effectiveness of conditional forms. This ongoing feedback loop is invaluable for making iterative improvements and ensuring the app remains aligned with user expectations.

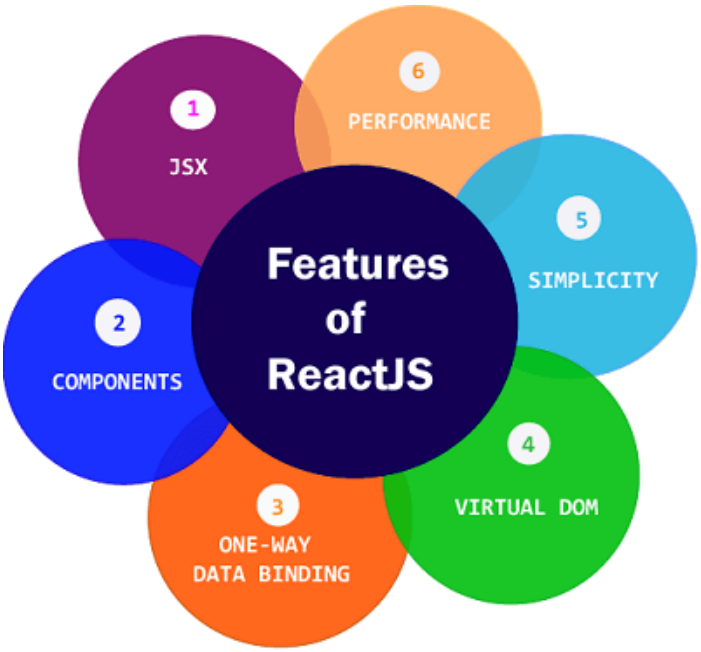
Selected technology

The chosen technology for developing this dynamic, user-centric app is React, a powerful JavaScript library known for its efficiency in creating interactive and responsive user interfaces. Developed and maintained by Facebook, React employs a declarative syntax that allows developers to describe the desired UI state, making the code more readable and maintainable.



React Logo.

Its component-based architecture is a cornerstone of React, promoting modularity and enabling the creation of reusable components. This not only streamlines the development process but also facilitates the management of complex UI structures. The ability to encapsulate each form element or logic module within a React component promotes reusability and maintainability, contributing to the overall efficiency of the app.



React Features.

As shown in the previous image, React has some interesting key features. Let's dive into them:

1. **JSX (JavaScript XML):**
   React uses JSX, a syntax extension for JavaScript, making code more readable and facilitating the integration of JavaScript logic into UI structures.
2. **Components:**
   React revolves around modular, reusable components, streamlining development, ensuring consistency, and encouraging collaboration.
3. **One-way Data Binding:**
   React follows one-way data binding, maintaining a unidirectional flow of data for predictability and robust state management.
4. **Virtual DOM:**
   React's Virtual DOM optimizes rendering by updating an in-memory representation first, enhancing performance by selectively updating the actual DOM.
5. **Simplicity:**
   React's straightforward and declarative syntax, along with a simple API, prioritizes ease of use, enabling developers to focus on building robust features.
6. **Performance:**
   With a focus on a Virtual DOM and efficient rendering, React delivers exceptional performance, resulting in faster page loads and a superior user experience.

React's use of a virtual DOM ensures efficient updates to the user interface. This approach minimizes performance bottlenecks and enhances the overall speed of the application, providing users with a smooth and responsive experience. The virtual DOM is particularly advantageous when dealing with dynamic forms that require frequent adjustments based on user input.

Additionally, React Native extends the library's capabilities to mobile app development, making it a versatile choice for projects with cross-platform requirements. The strong community support surrounding React ensures a wealth of resources, including third-party libraries and continuous updates, making it a reliable choice for projects of diverse complexities.

To access the correct methodology conclusion based on user input, the React app will seamlessly integrate with a robust database. This database will store the methodology conclusions associated to certain key values, facilitating efficient data retrieval. The integration between React and the database ensures a seamless flow of information, enhancing the overall functionality of the app.

For hosting and deployment, the React app will find its home on a Plesk hosting server with a unique domain. Plesk's user-friendly interface for server management makes it an ideal choice for hosting React applications. The unique domain not only provides a professional and branded online presence but also contributes to the app's accessibility and visibility.

As it can be seen, with React we can built the requested platform for the online assessment tool. However, to further enrich the user experience while navigating through the app, we are going to use an excellent complementary library to built and manage forms in React based apps, being this library SurveyJs. SurveyJS is an open-source JavaScript UI library used for creating surveys, polls,

quizzes, and web forms. It is MIT-licensed, meaning it is free and open-source, and it can be integrated into any web application.

SurveyJs logo.

Some of the key features that this incredible support library include are the next ones:

1. **Drag-and-Drop UI**: It comes with a no-code WYSIWYG (What You See Is What You Get) form builder that auto generates a form data model, a schema written in JSON.
2. **Variety of Input Fields**: It supports over 20 built-in question types and also allows for custom question types.
3. **Multilingual Support**: SurveyJS offers auto-localization and multi-locale surveys, supporting more than 30 languages.
4. **Backend Freedom**: All sensitive respondent data is securely stored on your own servers, giving you complete control over your data.
5. **Extensibility**: The library is extensible and allows you to change its behavior as your needs require.
6. **Customization**: SurveyJS offers straightforward and unlimited style customization for free. You can freely add custom CSS code to style your surveys and incorporate your brand identity.
7. **Security**: SurveyJS was developed with full integration and security in mind. It enables users to build their own self-hosted form management system and avoid third-party storage of sensitive data.

SurveyJS is considered the best library for building dynamic forms due to its wide range of features, customization options, and focus on data security. Its open-source nature allows for continuous improvements and adaptability to changing requirements. Additionally, its multilingual support and extensibility make it highly versatile for various use cases.

In summary, React's robust features, such as its declarative syntax, component-based architecture, virtual DOM and the additional SurveyJs library support, make it an ideal choice for developing an app with a dynamic form like the one we need for the online assessment tool. The integration with a database ensures data-driven methodology conclusions, while hosting on a Plesk server with a unique domain provides a reliable and branded online presence for the application. This strategic combination of technologies sets the stage for a powerful, user-friendly, and efficient app that aligns with the goals of providing a personalized and seamless user experience.

Annex 4

Stakeholder validation process for the Local Action Plans

1. Introduction

The Local Action Plan (LAP) is a dynamic and evolving document built upon the joint MED Methodology and tailored to the specificities of the local, regional, and national contexts. It seeks to identify, adapt, and implement the best solutions for the prevention and management of Waste Electrical and Electronic Equipment (WEEE). To ensure its legitimacy, feasibility, and effectiveness, the LAP must be validated through a comprehensive and inclusive stakeholder engagement process.

This document outlines the multi-phase stakeholder validation process developed to support the co-creation, testing, and finalization of the LAP from 2024 through 2026, in accordance with the eWasTER project structure (WP1–WP3).

2. Objectives of the Stakeholder Validation Process

The primary objectives of this validation process are:

- To incorporate the perspectives, knowledge, and needs of relevant actors at all governance levels.
- To enhance the alignment between proposed actions and existing policies, infrastructures, and socio-economic conditions.
- To ensure transparency, legitimacy, and ownership of the LAP across the involved sectors and communities.
- To generate actionable feedback for iterative improvement throughout the LAP's development, piloting, and finalization phases.

3. Stakeholder Identification and Mapping

The validation process begins with identifying and classifying stakeholders who have a direct or indirect role in WEEE management. These stakeholders include public authorities, industry representatives, civil society, academia, and citizens.

Stakeholder categories:

- Government and Public Sector: Local and regional authorities, national enforcement bodies, ministries of environment and waste management.
- Producers and Industry: EEE producers, Producer Responsibility Organisations (PROs), retailers, brokers, dealers, and treatment companies.
- Civil Society and NGOs: Reuse and upcycling organizations, environmental NGOs, community-based groups.
- Academic and Technical Experts: Universities, research institutes, innovation hubs.
- WEEE Generators: Households, businesses, and public sector institutions.

4. Engagement Framework and Phases

Stakeholder validation is structured across three main phases aligned with the project's work packages.

Phase I – Initial Validation of Draft LAP (2025, WP2)

Upon the development of the first complete draft of the LAP, an initial round of consultations will be conducted to validate its strategic directions, methodological coherence, and proposed actions.

Activities:

- Distribution of the LAP draft with an executive summary tailored for non-technical audiences.
- Online survey to collect individual feedback on each main section.
- Focus groups and bilateral interviews with key stakeholders.

Output: A revised LAP draft incorporating feedback, accompanied by a stakeholder feedback report.

Phase II – Validation Through Pilot Testing Feedback (2006, WP3)

Pilot tests will be conducted to assess the operational feasibility of selected LAP actions. Stakeholders involved in or affected by the pilots will provide feedback based on lived experience.

Activities:

- Interim reporting and reflection sessions.
- Analysis of pilot results against LAP objectives and KPIs.

Output: Updated LAP integrating pilot insights and contextual adjustments.

Phase III – Final Validation and Recommendations (2026, WP3)

The final validation phase ensures the LAP is aligned with national and regional priorities and reflects a broad consensus.

Activities:

- Circulation of the updated LAP and summary of changes.
- Collection of final comments and recommendations.

Output: Final stakeholder-validated LAP ready for adoption and dissemination.

5. Documentation and Transparency Measures

To ensure transparency and accountability throughout the process, all stakeholder interactions will be documented in a validation log, including:

- Stakeholder lists and roles

- Meeting and workshop minutes
- Survey and interview results
- Feedback summaries
- LAP versions and revision notes

A final annex to the LAP will provide a comprehensive overview of the validation process and evidence of stakeholder involvement.

6. Conclusion

A participatory and structured stakeholder validation process is essential for the successful design and implementation of the Local Action Plan. It ensures the LAP is not only technically sound and policy-compliant but also socially accepted and actionable. This process will empower local actors, promote cross-sectoral collaboration, and build a foundation for the long-term sustainability of WEEE management practices under the eWasTER project.

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