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L. Navarro
ISOC.CAT
M. Roura
eReuse.org
E. Rodriguez
TAU/RAEE
V. Ambrosi
EKOA/UNLP

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Operational Practices for Digital Sovereignty and Meaningful Connectivity through Circular Management of User and Network Devices
draft-gaia-circular-device-practices-00

Abstract

This document systematizes operational practices observed across multiple community-centred deployments that aim to improve meaningful connectivity and digital sovereignty through the circular management of end-user and network devices. It is published as an Informational RFC on the IRTF stream and does not define Internet standards or protocol requirements.

The document addresses a foundational but often overlooked dependency of Internet access deployments: the availability, repairability, governance, and lifecycle management of network and user devices required to meaningfully use access networks. It is based on operational experience from deployments in Spain, Argentina, and Senegal宴琶ncluding eReuse.org, EKOA/UNLP, Solidanテァa, TAU/RAEE, and Hahatay. It describes practices that have demonstrated positive access, social, and environmental outcomes.

These practices are presented as descriptive guidance derived from operational experience rather than as normative requirements. They complement research within the IRTF GAIA Research Group by documenting reproducible approaches that improve the sustainability, autonomy, and long-term viability of Internet access in underserved contexts.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Copyright Notice

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1. Introduction

Note to readers: This document supersedes and replaces the earlier Internet-Draft draft-gaia-bcp-circular-device-management-00, which explored similar practices using Best Current Practice (BCP) framing. This revision reframes the work as descriptive operational guidance, consistent with IRTF Informational publications.

Extending Internet access requires more than deploying network infrastructure. Meaningful connectivity depends on the availability of functional, affordable, and maintainable end-user devices (such as laptops or smartphones) and, in many deployments, network devices (such as routers, switches, or antennas). In underserved communities, limited device availability is often a primary barrier to benefiting from existing or planned connectivity.

Circular device management寰覇ncompassing reuse, repair, refurbishment, redistribution, and responsible end-of-life handling has emerged as a practical response to this barrier. When combined with community-

centred governance and digital traceability, these practices can strengthen local capacity, improve access outcomes, and reduce environmental impact.

This document draws on operational experience from:

* eReuse.org deployments in Catalonia and Madrid (Spain), involving social enterprises and reuse circuits that coordinate donors, refurbishers, and recipient organisations;

* University-linked programmes in Argentina (EKOA/UNLP), integrating refurbishment, training, and community engagement;

* TAU/RAEE in Rosario (Argentina), where a specialised cooperative carries out device diagnostics, repair, data sanitization, refurbishment, and e-waste management, while community centres focus on access, accompaniment, and territorial programmes;

* Hahatay initiative in Senegal, combining device availability with local digital inclusion efforts in rural and peri-urban contexts.

Several initiatives apply collective access and community-ownership models in which devices are managed as shared resources rather than permanently transferred private property [Ostrom1990]. Digital lifecycle tracking supports transparency, accountability, and coordination across donors, refurbishers, and communities, an approach analysed in prior research [Roura2025].

1.1. Background and relationship to prior IRTF work

This document builds on prior IRTF work that recognizes Internet access as a socio-technical system in which protocols, infrastructure, governance, and human practices interact. In particular, [RFC8280] established the importance of systematically considering human rights impacts during protocol development, while [RFC9620] further refined practical guidance for identifying and documenting such impacts in IETF and IRTF work.

While this document does not define or modify Internet protocols, it addresses operational dependencies that directly affect whether Internet access architectures can be used in ways that respect human rights, support sustainability, and enable meaningful participation. Device availability, repairability, governance, and lifecycle management shape who can access networks, under what conditions, and with what degree of autonomy. As such, these operational practices constitute a pre-condition for realizing the rights-aware Internet architectures envisioned in prior IRTF research.

This document therefore complements protocol-level human rights considerations by documenting empirical, deployment-level practices that enable human-centred outcomes in real-world access contexts.

1.2. Meaningful Connectivity: Context and Frameworks

This document adopts a community-centred understanding of meaningful connectivity, aligned primarily with civil-society analyses such as those presented in the Global Information Society Watch [GISW2024]. A multi-dimensional concept encompassing not only technical access (infrastructure, connectivity, devices), but also social relevance, community agency, cultural and political meaningfulness, inclusive governance, and sustainable local ownership. It recognises that connectivity gains value when aligned with community practices, needs, and aspirations.

The ITU Universal Meaningful Connectivity (UMC) framework [ITU-UMC] provides an important baseline by identifying six key dimensions: quality, availability, affordability, security, device access, and skills. Civil-society work, notably by APC and GISWatch, extends this framing by placing greater emphasis on governance, rights, social relevance, and community control. The practices described in this document are informed by this broader interpretation.

1.3. Relevance to IRTF GAIA

The IRTF GAIA Research Group investigates technical and socio-technical approaches to extend Internet access to underserved populations. Device availability, repairability, and lifecycle governance form a foundational layer of access architectures and directly affect sustainability, resilience, and adoption.

This document is intended to inform GAIA research discussions, architectural exploration, and capacity-building efforts. It does not define protocol requirements and does not mandate compliance.

2. Terminology and Scope

This document is published as an Informational RFC on the IRTF stream. It does not specify Internet standards, protocol requirements, or compliance criteria.

Terms such as 寰徯hould寰 “can”, or “may” are used in their ordinary, descriptive sense to convey observed practices and lessons derived from operational experience. They indicate patterns that have been found effective in specific contexts, rather than mandatory or normative requirements.

Circular device management: Structured processes that enable reuse, repair, refurbishment, redistribution, tracking, and responsible recycling of devices.

Collective access/community ownership: A governance model in which devices are managed as shared resources, with rights of use, maintenance, and reassignment defined collectively rather than through permanent individual ownership, following a common-pool resource governance model. [Ostrom1990]

Community-centred infrastructure: Digital infrastructure (devices, facilities, local organisations, and governance) that is locally operated and aligned with community needs.

Commodatum (loan for use): A form of loan [COMMODATE] in which a device is provided to an individual or organisation *for use without transfer of ownership*, typically for a defined or renewable period, and with the obligation to return the device or allow reassignment when the agreed conditions end.

In circular device management contexts, devices provided under commodatum support collective access by enabling maintenance, replacement, traceability, and reassignment of devices over time, while preserving shared stewardship and accountability.

Device: Any Internet-capable end-user or networking device, including laptops, desktops, tablets, smartphones, routers, switches, antennas, access points, and IoT equipment.

Federated inventory/registry: A network of interoperable device registries that enables transparency, accountability, cross-organisational coordination, and scaling without requiring centralisation.

Meaningful connectivity: Internet access that is technically available, affordable, reliable, socially relevant, and supported by skills and agency [GISW2024].

This document focuses on community/local-scale, decentralised practices relevant to access networks, community/local facilities, and underserved contexts. The practices are described to inform analysis and deployment, not to mandate implementation or establish compliance requirements.

3. Problem Statement

Despite investments in access networks, many communities remain excluded from meaningful connectivity due to:

* Insufficient availability of functional end-user and network devices for households, schools, and community organisations;

* Markets dominated by non-repairable or locked-down hardware and software preventing device reuse, with short usage cycles followed by replacement;

* Limited local repair capacity, including insufficient skills, limited access to spare parts, and limited tools for diagnostics, secure data handling and refurbishment;

* Lack of interoperable systems to manage and track device lifecycle and accountability across donors, refurbishers, and recipient organisations and persons;

* Premature disposal of devices, contributing to environmental harm and e-waste;

* Organisational models that assume permanent individual ownership, which can hinder redistribution, maintenance, and re-assignment to evolving needs.

* Individual private ownership of devices, which complicates redistribution and limits scalability.

* Lack of digitalized device management/transparency tools limits trust among donors and refurbishers, obstructs environmental and social impact assessment, and prevents coordinated processing of large-volume donations.

* Network connectivity alone cannot solve digital exclusion if individuals lack adequate network and user devices.

Operational experience shows that without collective access models and digital traceability, communities struggle to pool devices, scale refurbishment, assess impact, or establish donor trust and accountability [Roura2025]. As a result, access networks alone are insufficient to close the digital divide.

Addressing device availability is therefore a foundational requirement for equitable, inclusive, and rights-preserving Internet access.

4. Principles derived from operational experience

This section synthesizes recurring patterns observed across multiple community-centred deployments involving circular device management and access provision. These principles do not constitute prescriptive requirements or normative rules. Rather, they articulate conditions, trade-offs, and enabling factors that have consistently influenced the sustainability, autonomy, and social relevance of connectivity initiatives in practice.

The principles are interdependent and should be interpreted holistically, as they mutually reinforce (or undermine) one another depending on local context, governance arrangements, and resource constraints.

4.1. Device availability as a foundational layer of access

Operational experience consistently shows that device availability functions as a foundational layer of access, rather than as a peripheral or downstream concern. Even where connectivity infrastructure exists, the absence of adequate end-user or network devices significantly constrains effective use, adoption, and long-term impact.

In practice, access initiatives that explicitly plan for device availability—across initial deployment, maintenance, replacement, and reassignment—are better able to sustain connectivity over time and adapt to changing community needs. Treating devices as part of the access system, rather than as a one-off input, reduces the risk of stranded infrastructure and uneven access outcomes.

5. Local capacity, repairability, and digital sovereignty

Across deployments, local capacity to diagnose, repair, reconfigure, and manage devices has emerged as a critical determinant of sustainability. Dependence on external vendors, proprietary restrictions, or non-repairable hardware often introduces long-term fragility, cost escalation, and loss of local agency.

Operationally, initiatives that invest in repair skills, access to spare parts, and locally understandable software stacks are better positioned to maintain continuity of service and adapt technologies to local conditions. These practices contribute directly to digital sovereignty by enabling communities to exercise meaningful control over the material and technical components of their connectivity.

5.1. Collective access models and commons-oriented governance

In many underserved contexts, individual private ownership of devices has proven insufficient to address issues of scarcity, affordability, and unequal access. By contrast, collective access arrangements, where devices are treated as shared resources governed through community-defined rules. have enabled higher reuse rates, more equitable allocation, and greater resilience to changing demand.

Operational experience indicates that commons-oriented governance models are most effective when accompanied by clear rules for use, maintenance, reassignment, and accountability. Such models shift emphasis from ownership to stewardship, enabling devices to circulate over time while remaining embedded in local social and institutional structures.

These governance models directly address power asymmetries between vendors, buyers, donors, and communities by relocating control over devices, maintenance, and lifecycle decisions.

5.2. Transparency, traceability, and trust across the lifecycle

Trust among donors, refurbishers, community organisations, and users has repeatedly emerged as a prerequisite for scalable and sustainable reuse ecosystems. In practice, this trust is strengthened through transparent and traceable device lifecycle management, including documented diagnostics, data sanitization, refurbishment steps, and transfer histories.

Digital traceability systems, particularly when open and interoperable, support accountability, enable impact assessment, and reduce friction among participating actors. They also allow communities and institutions to demonstrate responsible handling of devices, which in turn facilitates continued donations and institutional support.

5.3. Repairability and lifecycle extension as environmental and social strategy

Repair, refurbishment, and refunctionalization are not merely technical activities, but strategic interventions with both environmental and social implications. Extending device lifecycles reduces e-waste, lowers demand for new hardware production, and mitigates environmental harm associated with extraction and disposal.

At the same time, these activities create opportunities for skill development, employment, and local value creation. Operational experience suggests that prioritizing reuse over premature recycling

or destruction yields the greatest combined environmental and social benefits, provided that data protection and safety requirements are adequately addressed.

5.4. Privacy and security embedded in reuse workflows

Reuse workflows introduce specific privacy and security risks, particularly related to residual data, firmware integrity, and unauthorized access to device inventories. Deployments that treat privacy and security as integral components of refurbishment processes, rather than as afterthoughts, are more successful in maintaining trust and protecting users.

In practice, this includes systematic data sanitization, clear chain-of-custody procedures, controlled access to lifecycle records, and, where appropriate, mechanisms to detect tampering or misconfiguration. Embedding these considerations early reduces downstream risks and reinforces the legitimacy of and trust on reuse initiatives.

5.5. Environmental responsibility across the full device lifecycle

Environmental responsibility in circular device management extends beyond end-of-life recycling. Operational experience highlights the importance of considering environmental impacts across the entire lifecycle, including procurement decisions, refurbishment practices, logistics, and final disposal.

Initiatives that integrate environmental considerations throughout the lifecycle—rather than focusing solely on waste management—are better aligned with broader sustainability goals and regulatory frameworks. This integrated perspective also supports more accurate assessment of environmental benefits, such as avoided emissions and reduced material extraction.

5.6. Community-rooted governance and social relevance

Finally, sustained impact depends on grounding device management and connectivity initiatives in local governance structures and social priorities. Deployments that involve communities in decision-making, regarding allocation, acceptable use, maintenance responsibilities, and future evolution, are more likely to produce socially relevant and durable outcomes.

Operational experience underscores that “meaningful connectivity” is context-dependent: its value emerges from alignment with local practices, cultural norms, and collective aspirations. Community-rooted governance enables initiatives to adapt over time, respond to feedback, and remain relevant beyond initial deployment phases.

6. Operational practices

6.1. Digitalized circular device management

Observed circular device management systems typically include:

* Unique device identification (e.g., labels/QR codes) and lifecycle records;

* Structured triage, diagnostics, and condition grading;

* Secure data sanitization steps recorded in device logs;

* Chain-of-custody tracking across donors, refurbishers, and recipient organisations and end-user persons;

* Interoperability with other inventory and infrastructure systems (e.g., ERP, network registries) where beneficial;

* Support for processing large-volume device donations or procurement across multiple refurbishers to improve throughput, quality control, and traceability;

* Optional tamper-evident or cryptographically verifiable logging mechanisms for accountability in multi-stakeholder ecosystems.

These capabilities enable transparency and coordinated reuse circuits where donors, refurbishers, community and formal local organisations, and beneficiary programmes can operate with shared visibility and responsibilities.

6.2. Repair, training, and capacity building

Effective programmes typically:

* Distinguish between specialised refurbishing tasks (diagnosis, repair, sanitization, refurbishment) and community-level access/ accompaniment functions;

* Provide training that combines basic hardware diagnostics and repair (electronics), locally sourced spare parts, operating system and application installation and configuration (software), and practical repair and maintenance tasks;

* Use accessible pedagogies that reduce barriers for youth, women, and marginalised populations;

* Integrate digital literacy and social inclusion objectives (education, employability, access to services);

* Provide pathways for income generation or employment (e.g., social enterprises, cooperatives, paid refurbishment);

* Use digital traceability systems to compute environmental indicators (e.g., avoided e-waste, estimated CO savings) and social indicators (e.g., beneficiary counts, institutions served), reinforcing accountability for donors, policymakers, and communities.

6.2.1. Role of GAIA in capacity building

Operational experience indicates that sustainable connectivity depends not only on technology deployment, but also on long-term capacity building. Training programmes that integrate device repair, refurbishment, software installation, data sanitization, and governance practices are critical enablers of meaningful connectivity.

GAIA can contribute by facilitating knowledge exchange, documenting reusable operational patterns, and supporting training materials and workshops that link access architectures with sustainability and repairability considerations.

Such capacity-building efforts complement GAIA's architectural research by ensuring that access solutions remain operable, adaptable, and rights-respecting over time.

6.3. Alignment with access networks

Device reuse is most effective when coordinated with access-network deployments by:

* Including network equipment (routers, switches, antennas, access points) in lifecycle tracking where relevant;

* Aligning device availability with connectivity provision (so devices reach users and institutions that can connect);

* Supporting local repair and reconfiguration of networking equipment where feasible;

* Tracking performance and replacement cycles to reduce downtime and avoid stranded access infrastructure.

This document does not assume the presence of a specific access infrastructure. The practices described apply to contexts where connectivity is provided through a variety of access models, including commercial, community-driven, institutional, or any other access facilities.

6.4. Community-centred meaningful connectivity

Connectivity initiatives may:

* Engage communities in defining meaningful use for them (education, work, health, services, civic participation, cultural expression, etc.);

* Combine devices, skills development, and governance to build holistic digital ecosystems;

* Support shared facilities (community centres, libraries, schools) and collective access models where appropriate, rather than assuming all access is under individual ownership;

* Design for social inclusion: enable participation of underrepresented groups (women, minorities, youth, adults), account for cultural and linguistic diversity, and empower communities to use connectivity for their own goals (education, civic engagement, small-scale enterprises, local content creation, environmental monitoring, etc.);

* Respect local agency and context, enabling adaptation of workflows and priorities over time;

* Include feedback loops and governance mechanisms to evolve deployments according to expressed community needs.

6.5. Collective access and commons-based device governance

Where appropriate, communities may treat devices as a shared commons. Implementations of collective access typically include:

* Assigning use-rights instead of permanent ownership to individuals or organisations;

* Allowing devices to circulate across multiple users and community spaces over time;

* Establishing clear governance rules for allocation, maintenance responsibilities, reassignment, and end-of-life decisions;

* Using open-source digital tools to track device history, condition, transfers, and responsible recycling;

* Embedding accountability mechanisms so actors (donors, refurbishers, community managers) can verify device provenance and lifecycle steps.

This model has been validated operationally in reuse ecosystems and formalised in prior research [Roura2025].

6.6. Federated registries and cross-community coordination

Federated device registries may be used to coordinate reuse across organisations and regions while preserving local governance. Such registries can support:

* Distributed metadata sharing and device lookup;

* Cross-organisational coordination for batches and surplus devices;

* Shared accountability while avoiding centralised control;

* Federation across communities with different legal, operational, or cultural contexts.

* Multi-stakeholder governance.

Federation is essential when devices flow across regions, institutions, and countries.

6.7. Secure data sanitization

When devices are refurbished for reuse, data sanitization follow recognised good data sanitization practices such as ITU-T L.1081 [ITU-T-L1081]. Implementers select and apply appropriate methods (e.g., clear, purge, or destruct) depending on media type and sensitivity, before reuse or redistribution.

Implementations maintain documented chain-of-custody logs and sanitization records (preferably digitally linked to device lifecycle entries) to provide verifiable proof of data erasure, increase donor trust, and protect privacy.

Where feasible, refunctionalization (refurbishment and reuse) is preferred over destruction, consistent with circular economy and environmental sustainability goals [ITU-T-L1081].

6.8. Architectural considerations for access networks

The practices described in this document imply architectural considerations relevant to GAIA research, including:

* Device availability and repairability as part of the access architecture, not an external dependency.

* Federated registries as a decentralised control-plane component for device lifecycle management and accountability (verifiability).

* Alignment between network deployment lifecycles and device deployment and lifecycles.

* Reduction of centralised/remote dependencies through local maintenance and governance.

These considerations may inform future research on access network architectures, operational sustainability, and resilience.

7. Human rights, security, privacy, and sustainability considerations

Consistent with [RFC8280] and [RFC9620], this section identifies how the operational practices described here can be understood as affecting human rights outcomes through their influence on access, agency, sustainability, and autonomy at the device and infrastructure layer.

7.1. Human rights

Device availability and governance affect:

* The ability of individuals and communities to access and benefit from the Internet;

* Autonomy and self-determination through repairability, reuse, and local capacity;

* The right to privacy and data protection in shared or reused devices;

* Environmental justice in communities impacted by resource extraction and e-waste.

Device availability and governance affect rights-related outcomes through operational risk vectors, including:

* Limited availability of functional devices leading to constrained access and informational agency;

* Inadequate data sanitization creating exposure to unauthorized data disclosure;

* Non-repairable or vendor-locked devices reducing autonomy and local self-determination;

* Inequitable disposal practices contributing to environmental harm for vulnerable groups.

Circular device management practices mitigate risks associated with:

* Data leaks resulting from inadequate data sanitization;

* Surveillance risks arising from persistent identifiers, firmware, or misconfigured software;

* Exclusion caused by vendor lock-in or non-repairable hardware;

* Unsafe, informal, or inequitable disposal of electronic waste.

By documenting operational practices that address these dimensions, this document contributes deployment-based evidence to ongoing IRTF efforts to integrate human rights considerations into Internet-related research and practice.

7.2. Security

Security risks include compromised devices, malicious firmware, insufficient data erasure, unauthorised access to inventories, and forged device histories. These risks can undermine trust in reuse and reduce access sustainability.

Security risks include:

* Tampered with or compromised devices;

* Malicious firmware;

* Insufficient data erasure;

* Unauthorized access to device details in inventories and registries;

* Forged or altered device histories.

These risks can undermine trust in reuse ecosystems and shared devices, and directly reduce access sustainability.

Recommended mitigations include:

* Verified testing and refurbishment workflows;

* Secure firmware reinstallation and configuration baselines;

* Cryptographic or tamper-evident logging where appropriate;

* Role-based access control for lifecycle systems;

* Periodic auditing and peer-review among participating organisations.

7.3. Privacy

Reuse systems should apply:

* Data minimization and least-privilege access;

* Local-first and decentralized architectures;

* Strong sanitization and verification practices;

* Transparent documentation of data handling;

* Encryption for sensitive metadata where stored or transferred.

Device identifiers should be abstracted or scoped appropriately when feasible to reduce long-term cross-context correlation risks.

7.4. Environmental and sustainability

Circular device management reduces [Roura2026]:

* Demand for new hardware;

* Raw material extraction;

* CO emissions, land and water polution from manufacturing;

* e-waste in vulnerable communities;

while increasing economic inclusion: build financial opportunities, increase economic independence, and create sustainable income sources.

Reuse and refurbishment (after secure sanitization) SHOULD be given priority over disposal. By enabling safe refunctionalization of devices that would otherwise be discarded, communities reduce e-waste and environmental harm, consistent with circular economy principles and L.1081 guidance that supports reconditioning over destruction [ITU-T-L1081].

8. Deployment case studies (Informative)

This section describes deployments by [EREUSE] in Spain, [EKOA-UNLP] and [TAU-RAEE] in Argentina, and [HAHATAY] in Senegal, that illustrate how these practices are applied in diverse contexts.

8.1. Catalonia and Madrid (Spain): eReuse.org ecosystem and social enterprises

The eReuse.org ecosystem coordinates reuse circuits that connect donors (public and private organisations), social refurbishers, recyclers, community organisations, and beneficiaries [EREUSE]. Typical operational characteristics include:

* Intake of unused devices through institutional donation channels;
* Structured diagnostics, refurbishment, and grading by social enterprises;
* Digital lifecycle traceability through open-source inventory tooling, supporting transparency and accountability;
* Allocation of refurbished devices to individuals and organisations through models that may include subsidised pricing, sponsorship, and collective access arrangements;
* Measurement approaches that support reporting of environmental and social outcomes (e.g., devices reused, avoided e-waste, beneficiary reach).

eReuse deployments also experiment with collective access and ownership: devices may remain part of a shared pool and be redistributed as needs evolve, rather than being permanently assigned to individuals, increasing reuse cycles and long-term availability [Roura2025].

8.2. La Plata (Argentina): EKOA/UNLP programmes integrating refurbishment, training, and outreach

EKOA at the National University of La Plata (UNLP) operates university-linked initiatives that integrate refurbishment, training, and outreach [EKOA-UNLP]. EKOA manages its own production plant for refurbished technological equipment. Observed characteristics include:

* Involves students, faculty, non-teaching staff, researchers, and extension practitioners linked to university ecosystems, who perform activities within and outside the e-waste management and refurbishment plant, including diagnostics, repair, refunctionalization, and data sanitization.

* Refurbished devices are distributed to schools at all levels, community kitchens and food distribution centres, NGOs, hospitals, health centres, fire brigades, social organisations, university students, Indigenous communities, migrants, older adults, and other vulnerable communities. Devices are typically delivered under loan-for-use (commodate) or chain-of-custody arrangements.

* The plant serves as a reception and training site for students from technical secondary schools and university students, who engage in training activities, work-based learning experiences, and student’s projects.

* The plant is also a training space for cooperatives of urban recyclers, empowering youth and adults with practical skills across the device and WEEE management chain.

* Training activities are organised with equitable participation across genders.

* Environmental responsibility is integrated through secure channels across the WEEE management chain and promoted to donors and beneficiaries of refunctionalized devices.

* Device reuse is generally linked to digital literacy programmes and territorial initiatives that provide benefits to the wider community (e.g., hospitals, fire brigades, public services).

* The initiative includes environmental education projects aimed at primary and secondary schools.

8.3. Hahatay (Senegal): Device availability and inclusion in rural and peri-urban contexts

The Hahatay initiative addresses device scarcity in rural and peri-urban contexts where new hardware can be unaffordable or unavailable [HAHATAY]. Observed characteristics include:

* Sourcing and reusing devices as a practical prerequisite to meaningful connectivity;

* Integration with community programmes that support digital literacy and community benefit;

* Emphasis on locally appropriate maintenance and operational continuity.

These contexts highlight the importance of aligning access-network plans with device availability and repair capacity to avoid stranded infrastructure.

8.4. Rosario (Argentina): TAU/RAEE and territorial programmes in villas

TAU/RAEE operates a community-embedded ecosystem in and around Rosario [TAU-RAEE]. A specialised cooperative (TAU) carries out the technical processes of diagnostics, repair, data sanitization, refurbishment, and e-waste management, while community centres and territorial programmes focus on access, accompaniment, and local participation.

Observed characteristics include:

* A cooperative of young workers (TAU) manages the e-waste and refurbishment plant where diagnostics, repair, and data sanitization are carried out.

* Community centers do not perform the technical refurbishment themselves, but act as access and coordination points.

* Training programs empower youth and adults with practical skills.

* Refurbished devices are redistributed to schools, families, cooperatives, and social organizations, generally under cession-of-use schemes rather than as permanent donations, including maintenance and replacement, to preserve traceability.

* Inclusive pedagogical approaches prioritize women and underrepresented groups.

* Environmental responsibility is integrated through safe recycling channels.

* Device reuse is connected to digital literacy programmes.

These community-driven refurbishing and connectivity efforts embody community-centred meaningful connectivity: devices and networks are locally governed, refurbishment and reuse are collective, and infrastructure is shaped by community needs and practices, not by vendor-driven or top-down deployment. [GISW2024]

This model demonstrates how circular device management can be sustainably embedded in informal settlements and marginalized communities.

This case illustrates a division of labour model that can be replicated: specialised refurbishers/cooperatives ensure technical integrity and sanitization, while community organisations ensure access, inclusion, and community-centred governance.

9. Replication guidelines

Organisations seeking to replicate these practices should consider:

* Establishing partnerships among donors, specialised refurbishers, community organisations, and (where relevant) access-network operators;

* Deploying open-source, interoperable inventory tooling to enable traceability and accountability;

* Developing training pathways (diagnostics, software installation/ configuration, repair, sanitization, responsible e-waste handling);

* Selecting appropriate governance models, including collective access to devices where it improves equity and sustainability;

* Aligning device availability with connectivity provision and local access conditions;

* Defining privacy and security controls, including sanitization verification and role-based access to inventories;

* Establishing impact reporting for environmental and social outcomes to maintain trust and continuous improvement;

* Comply with WEEE management and re-functionalisation regulations.

10. IANA considerations

This document has no IANA actions.

11. Acknowledgements

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Authors' Addresses

Leandro Navarro
ISOC.CAT
Barcelona
Spain
Email: leandro@ereuse.org

Mireia Roura
eReuse.org
Barcelona
Spain
Email: m.roura@ereuse.org

Eduardo Rodriguez
TAU/RAEE
Rosario
Argentina
Email: eduardorodriguez@tau.org.ar

Viviana Ambrosi
EKOA/UNLP
La Plata
Argentina
Email: viviana.ambrosi@ekoa.unlp.edu.ar