

Free Software, Computer Reuse, and Digital Product Passports: Experiences from eReuse.org

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This project was made possible through
funding from the Internet Society Foundation

FOSDEM 2026

The Linear Economy Problem: Buy → Throw → Buy

[Coltan mine in Democratic Republic of the Congo](#)



[Electronic waste in Ghana](#)

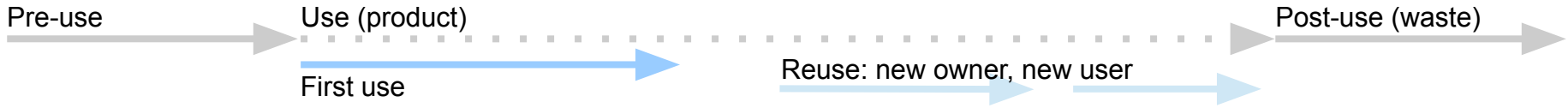
1. Too many resources:
 - a. Energy ⚡
 - b. [A 2 Kg computer may require 800 Kg of Raw Materials](#) 🪨 💻
2. Related problems:
 - a. E-waste 💻 🤮
 - b. Geopolitics conflicts 🗡️
 - c. Environmental impact 🌍
 - d. Social inequality ⚖️

e-waste, dumping of still usable devices

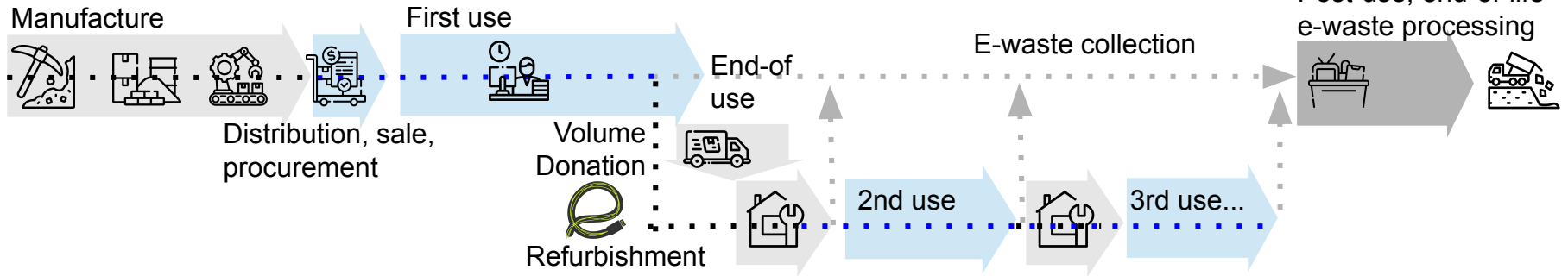


A plan to extend computer devices lifetime

Lifecycle phases



Material processes



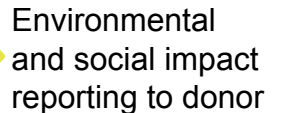
Digital data processing

Manufacture data:
product passport (model)

Donation data: B2B
Agreement, lot transfer

Hardware evidence, inventory, refurbished product
passport (item), usage hours, impact assessment

Environmental
and social impact
reporting to donor



eReuse ecosystem: device donor organizations, social refurbishers, community beneficiaries



1



2



3



4



5



6

eReuse tools for managing the circularity of computers

workbench-script Public

Shell ☆ 1 🍴 1

Logos: debian, python, docker

devicehub-django Public

Python ☆ 3 🍴 1

Logos: django, docker Compose

IdHub Public

Python ☆ 4

Logos: django, docker Compose

pyvckit Public

Python ☆ 2 🍴 1

Logos: python



<https://github.com/ereuse/>

1. **workbench-script**: Boots on a device (USB, PXE), extracts hardware details and sends them to DeviceHub server
2. **DeviceHub**: Device Inventory System focused in reusing computer devices
3. **IdHub**: Identity Provider that manages Decentralized Identifiers and Verifiable Credentials
4. **pyvckit**: Cryptographic utilities to support IdHub with VCs and DIDs

 Admin Devices Lots

Inbox

Inbound

Temporary

Outbound

 Evidences

Lot donante-orgB

Search your device

[Lot / donante-orgB / Devices](#)

Devices

[Properties](#)[Subscriptions](#)[Beneficiary](#)[Participants](#)[Environmental Impact](#)

Search devices within lot (append :field for filters)

 donante-orgB open Export All

Change state

 Assign to lot Unassign lot

Add beneficiary

<input type="checkbox"/>	Short ID	Current State	Type	Manufacturer	Model	Cpu	Evidence last updated
<input checked="" type="checkbox"/>	BC814A	DONATION	 Laptop	Dell	Latitude E7240	Intel Core i7-4600U	2026-01-27 15:26
<input checked="" type="checkbox"/>	769620	DONATION	 Laptop	Dell Inc.	Latitude E7240	Intel(R) Core(TM) i7-4600U CPU @ 2.10GHz	2026-01-27 15:26
<input type="checkbox"/>	50D703	REPAIR	 Hp Probook 650 G1	Hewlett-Packard	Hp Probook 650 G1	Intel Core I5-4200m Cpu @ 2.50ghz	2026-01-27 15:26

 3 Device/s

Show

10



devices

48a50b7601fd6e11d5673a7c657b56879f263b83 2026-01-27 17:14:54 +0100

english


 Dashboard My information

- My personal information
- My roles
- Data protection

 My wallet

- Identities (DIDs)
- My credentials
- Request a credential
- Present a credential

My wallet

 Credential:
OrganizationMembership(Dlt)

[Publish to DLT](#)[Download as JSON](#)

Credential Subject Properties

Id: 0x5dF700C44EB5d546B835CBA0b8AB9b221Bc786aF

Role: operator

Email: user1@example.org

Issuance date: Aug. 1, 2025, 1:09 a.m.

Status: Issued

Secrets

API_DLT_URL: http://dp :3010

API_DLT_TOKEN: VHh0v .FFmM :sZi84wWPU

Our early adopters

Solidança (Spain) <https://solidanca.cat>

EKOA/UNLP (Argentina) <https://ekoa.unlp.edu.ar>

TAU/RAEE (Argentina) <https://tau.org.ar/raee/>

Hahatay (Senegal) <https://hahatay.org/>

ISOC-CAT (Spain) <https://www.isoc.cat/>



IETF/IRTF: Operational Practices for Digital Sovereignty and Meaningful Connectivity through Circular Management of User and Network Devices (Internet-Draft)

<https://datatracker.ietf.org/doc/draft-gaia-circular-device-practices/>

Transition to the emerging Digital Product Passport (DPP)

Digital Product Passport [ITU-T L.1070]: *A structured collection of product-specific data conveyed through a unique identifier*

- Trusted product information across multiple actors
- Achieving large-scale circularity with ambitious digitalization
- Provides interoperability by open standards.



DPP is supported by regulatory initiatives and standards

- **Regulatory initiatives**

- ESPR (2024) regulation → **EU DPP** for entry to EU market (sustainability, circularity)
- eIDAS2 (2025) regulation → identity, credentials, verifiable registry

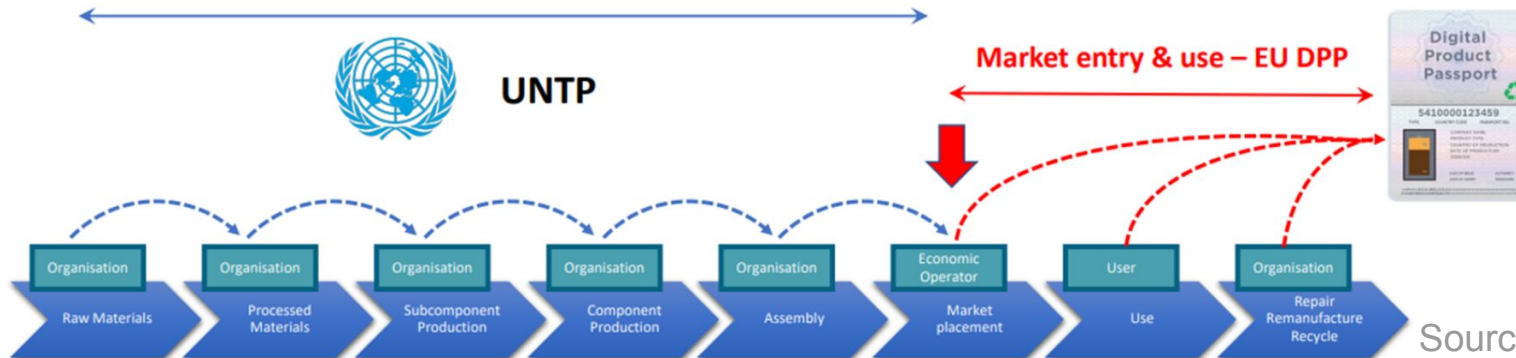
- **Standardization:**

- **W3C** (2019–2025) Standards: Verifiable Credentials (VC), Decentralized Identifiers (DID)
- **CEN-CENELEC JTC 24** (2024-2026): Standards for ESPR EU DPP System
- **ITU-T SG5 & SG20**: DPP model and DPP system for ICT goods
- **UNECE / UN-CEFACT** United Nations Transparency Protocol (UNTP) → **UNTP DPP** to facilitate global trade (B2B), sustainability, avoid greenwashing
- ...

DPP Agenda

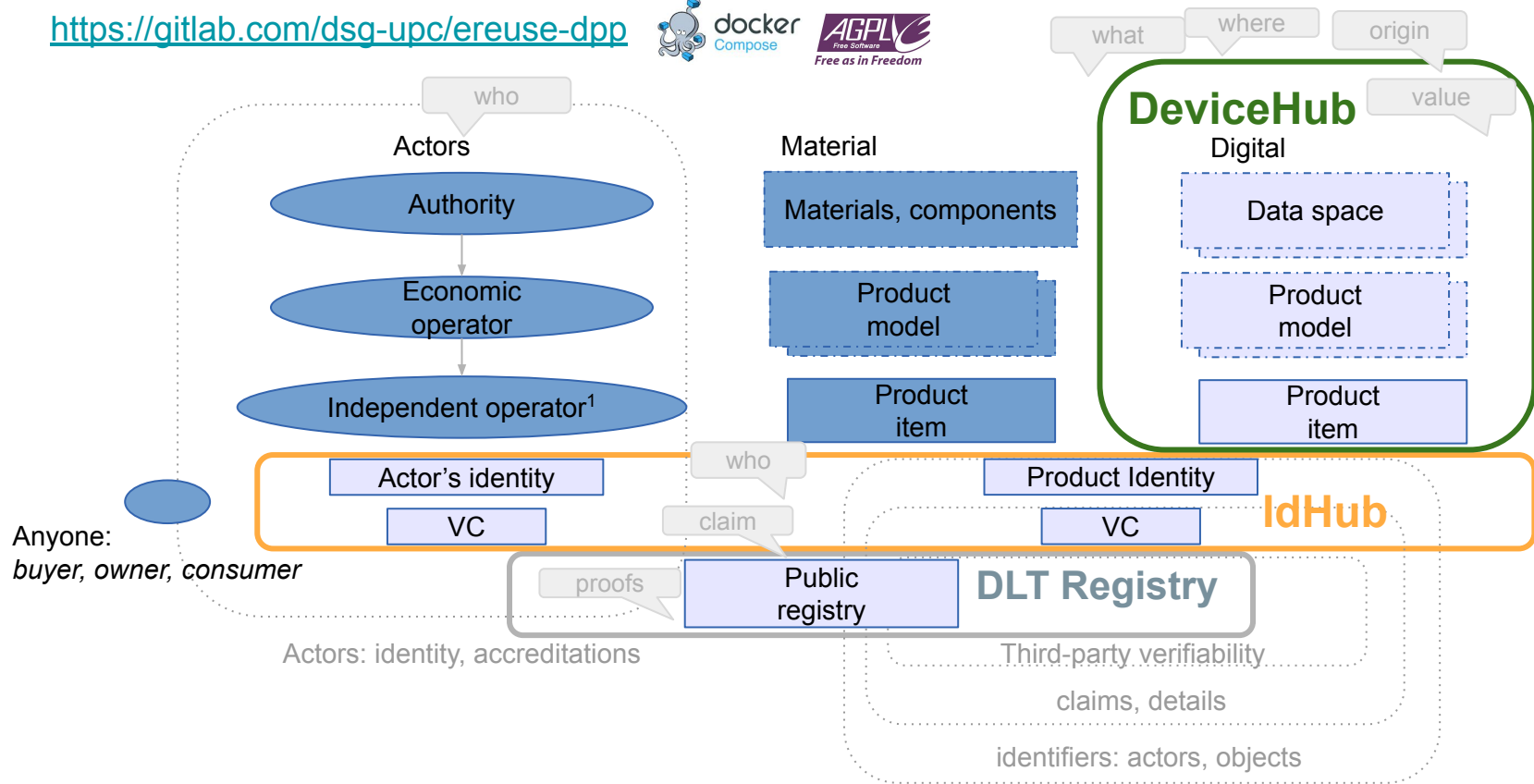
- **UN Transparency Protocol (UNTP) B2B DPP: 2025+**
 - Approved UNECE Recommendation 49, details in specification and pilot phase, active open community with prototypes
 - <https://untp.unece.org/docs/specification/DigitalProductPassport/>
- **EU DPP (EU market entry, 2027+):**
 - Awaiting standards from CEN-CENELEC JTC 24, community of practice prototypes
 - Battery DPP 2027, progressive extension to DPP for furniture, textile, electronics ...

Upstream traceability and transparency – UN DPP



eReuse DPP System Prototype for electronic devices

<https://gitlab.com/dsg-upc/ereuse-dpp>



Opportunities for contribution

Free and open-source software for DPP systems:

- **Decentralized identifiers (DIDs):** actors, products: models, batches, items
 - W3C: Decentralized Identifiers (DIDs) v1.0
- **Verifiable credentials (VCs):** credential schemas, signatures, verifications
 - W3C: Verifiable Credentials Data Model v2.0
 - Selective disclosure (e.g., ZKP)
- **Verifiable Registry** (e.g., DLT based): public records, credential issuance events

Other features:

- Tools to assemble and generate DPPs from manufacturing data systems
 - and publish, search and lookup, update, verify, compare, explore, ...
- Technological sovereignty (SME), local systems, etc.



Pangea.org < INTERNET ÈTIC I SOLIDARI >



Internet Society
Capítol Català



UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Thanks for your attention!

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This project was made possible through funding from the Internet Society Foundation



Generalitat de Catalunya



Internet Society Foundation



MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES



Cofinanciado por la Unión Europea



AGENCIA ESTATAL DE INVESTIGACIÓN

This work was funded by the Internet Society Foundation project "Beyond the Net" and by the MICIU of the Spanish Government through the State Research Agency (AEI) under project PID2023-146066OB-I00 AEI 2023 Knowledge Generation Projects financed by MICIU/AEI/10.13039/501100011033/ and by FEDER, EU, and the Horizon Europe NEO-CYCLE project (g.a. 101138058). With the support of project 2024 IMPAC 00065 of the Department of Research and Universities of the Generalitat de Catalunya and co-financing by the European Social Fund Plus.