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

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FOSDEM 2026

The Linear Economy Problem: Buy → Throw → Buy

Coltan mine in Democratic Republic of the Congo

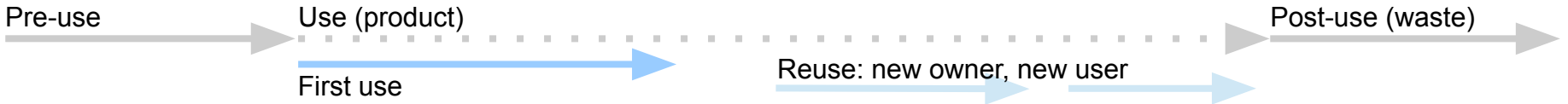
Electronic waste in Ghana

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 ⚖️

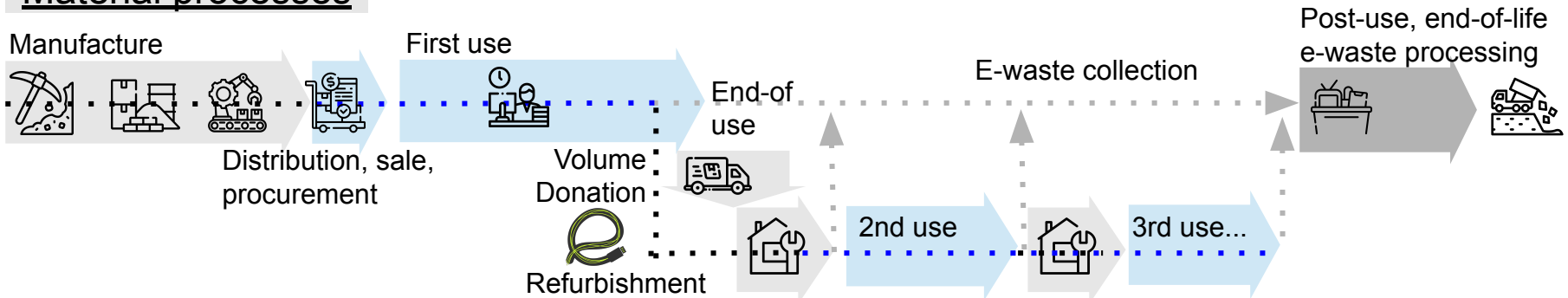
e-waste, dumping of still usable devices

A plan to extend computer devices lifetime

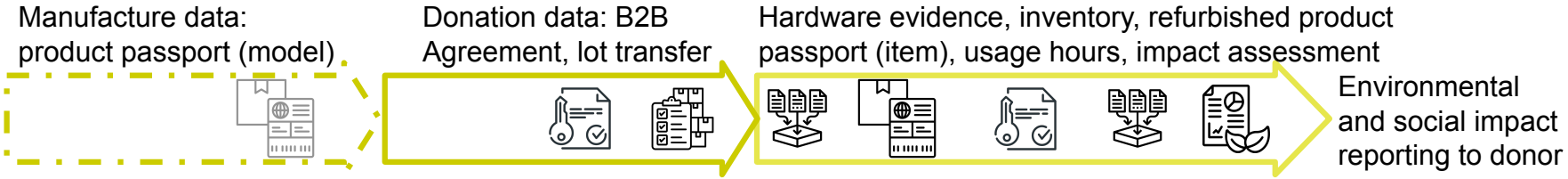
Lifecycle phases



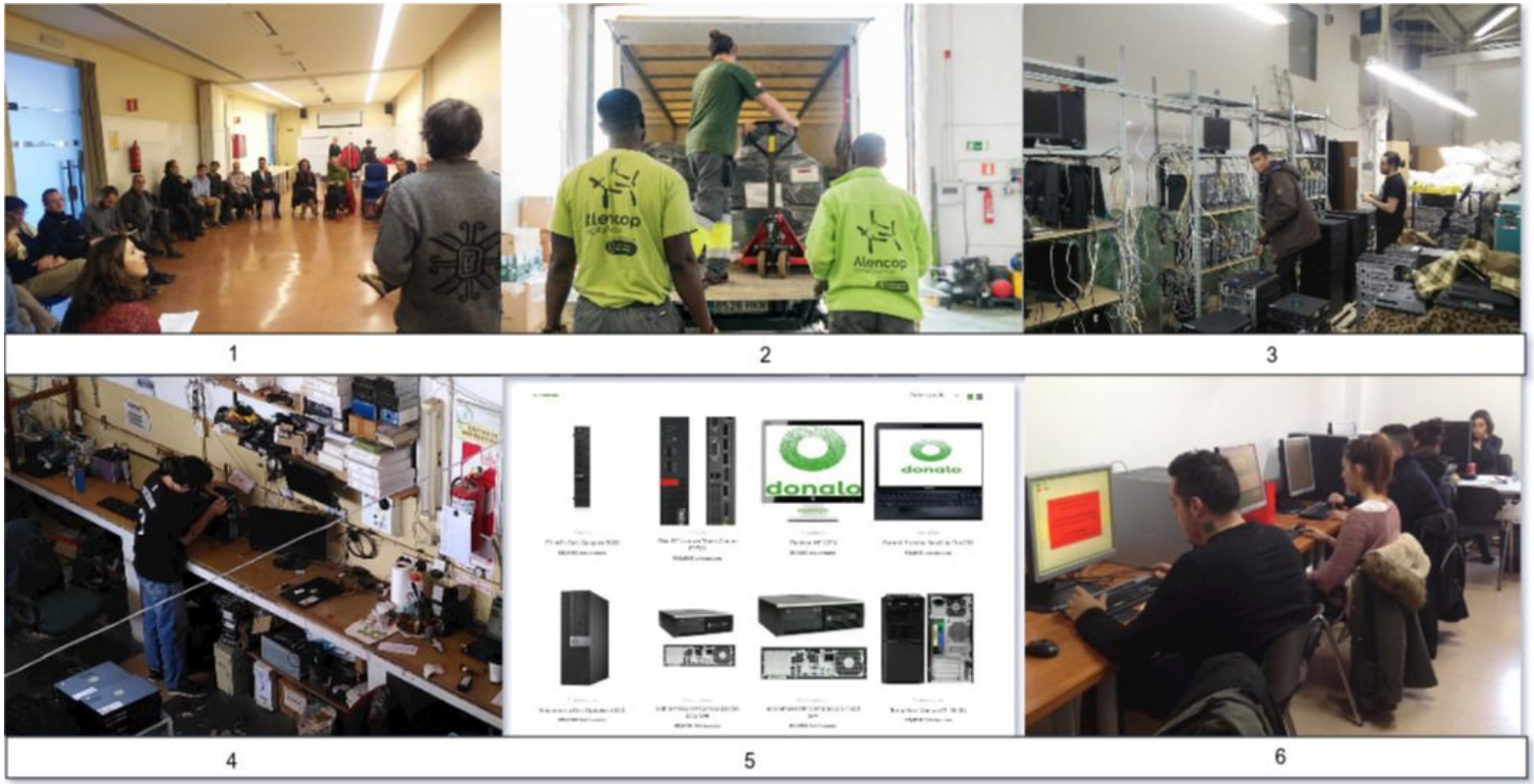
Material processes



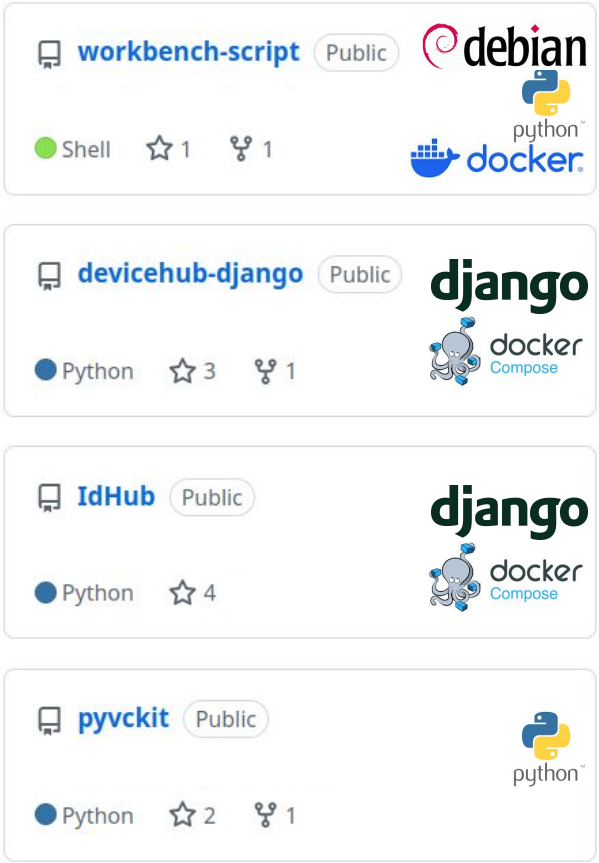
Digital data processing



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



eReuse tools for managing the circularity of computers



AGPL Free Software
Free as in Freedom

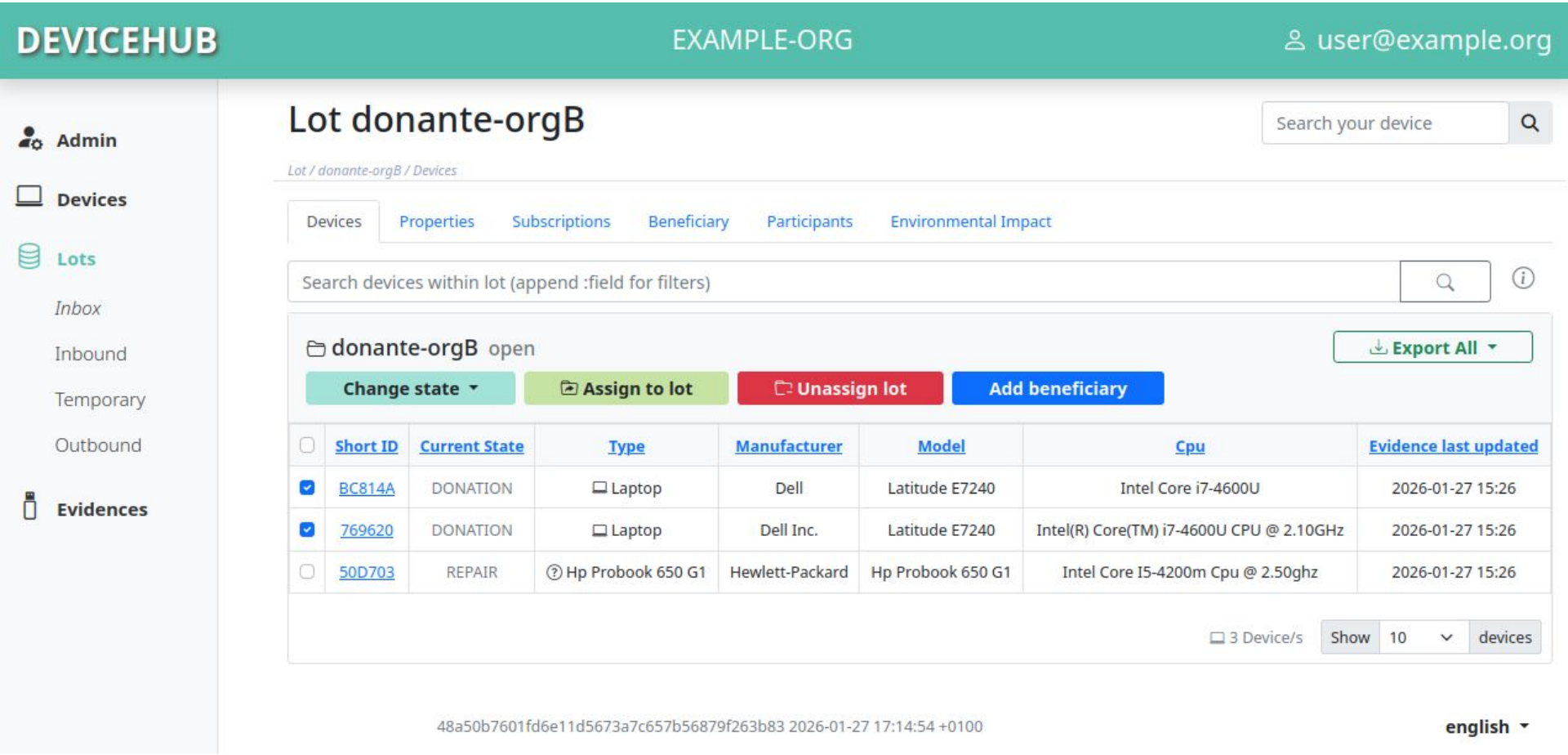
https://github.com/ereuse/

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


DEVICEHUB
EXAMPLE-ORG
user@example.org
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
Short ID
Current State
Type
Manufacturer
Model
Cpu
Evidence last updated
BC814A DONATION Laptop Dell Latitude E7240 Intel Core i7-4600U 2026-01-27 15:26
769620 DONATION Laptop Dell Inc. Latitude E7240 Intel(R) Core(TM) i7-4600U CPU @ 2.10GHz 2026-01-27 15:26
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 t:3010
API_DLT_TOKEN:	VHhoV .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.

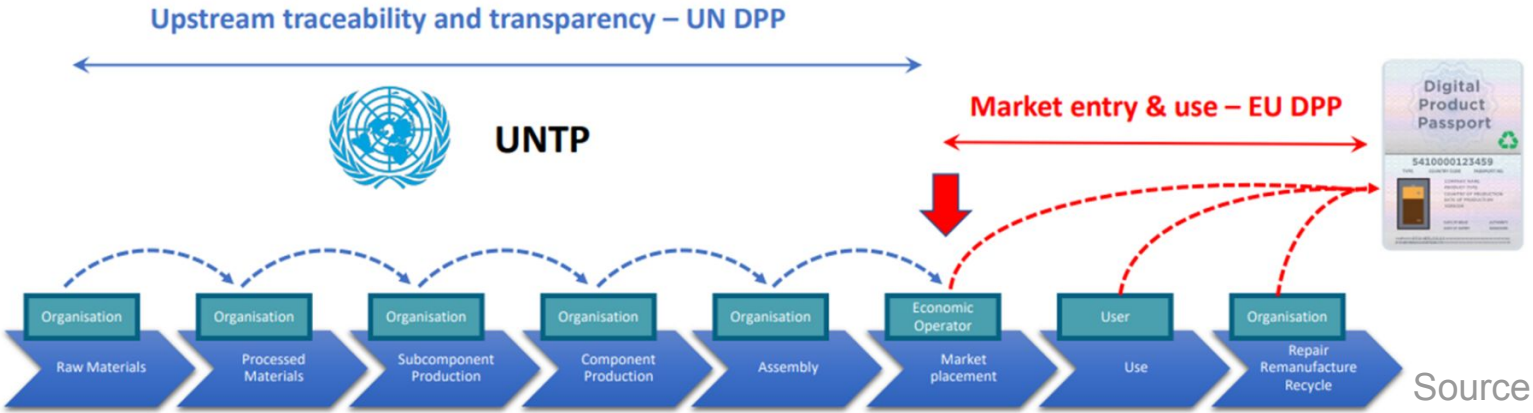
DPP is supported by regulatory initiatives and standards

- **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

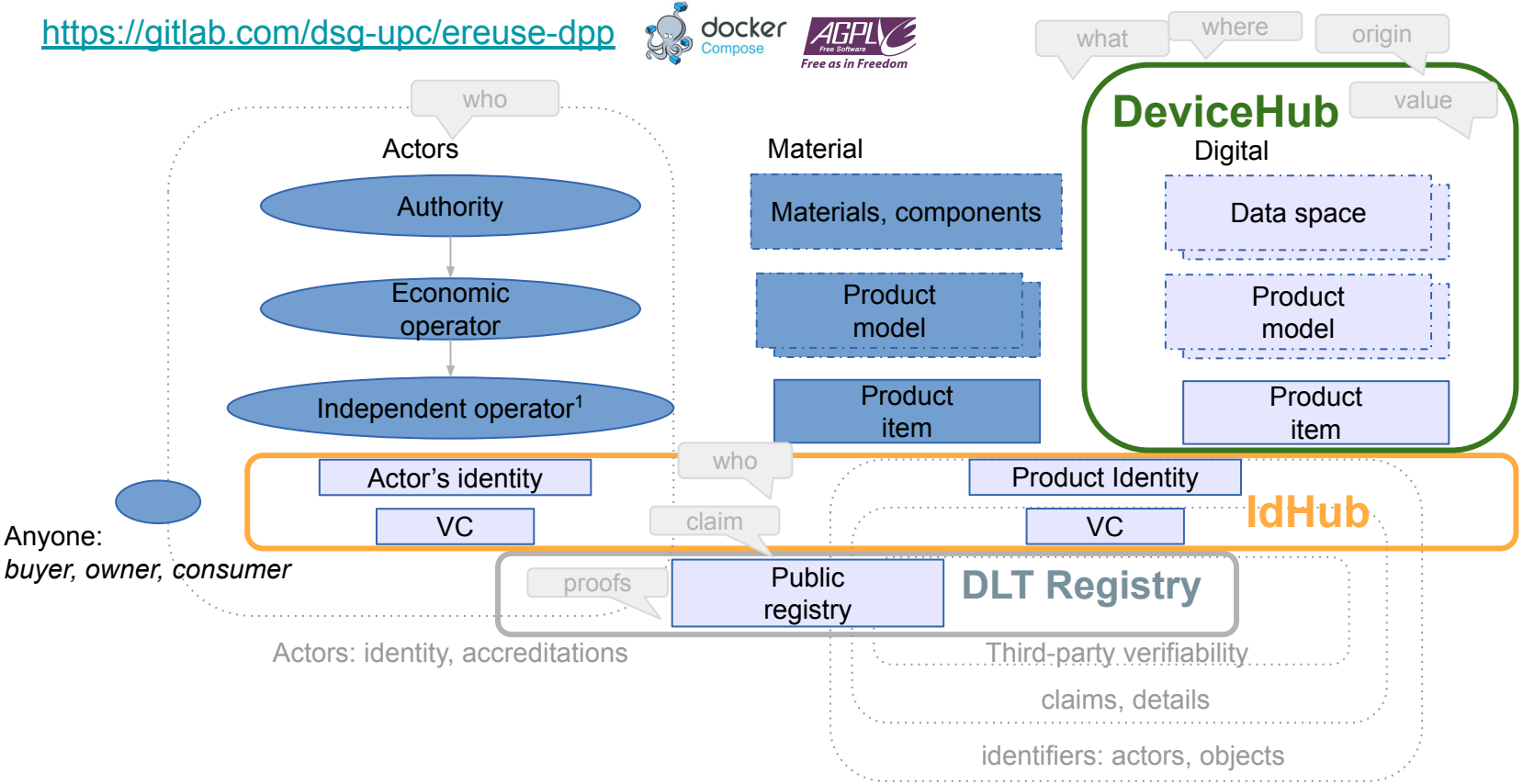
- **UN Transparency Protocol (UNTP) B2B DPP**: 2025+
  - Approved UNECE Recommendation 49, details in specification and pilot phase, active open community with prototypes
  - https://untp.unece.org/docs/specification/DigitalProductPassport/
- **EU DPP (EU market entry, 2027+)**:
  - Awaiting standards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



Source: CIRPASS-2

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.

Thanks for your attention!

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