

# Digital Product Passports in Fab City OS

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# EU DPP Framework & FabCity OS

At the heart of the European Commission's European Green Deal, the Ecodesign for Sustainable Products Regulation (ESPR) defines Digital Product Passports as the technical keystone for achieving its aims, briefly summarised:

Over the complete life-cycle of a product - from its design and making to its usage, disuse and recycling, a DPP is a means to:

- increase sustainability by addressing consumers' needs more effectively for longer, with less primary resources and energy required and less waste disposed of throughout the product's life-cycle.
- achieve an circular economy by enabling the identification of opportunities to reuse, repurpose and recycle product components and wastes, as well as minimising energy & primary resource consumption throughout its life-cycle.
- provide sufficient product locality information to assess manufacture, repair, and reuse transport and distribution energy use across the product life-cycle.
- provide sufficient insights to producers to assess mass production models against less resource & waste-intensive business models (e.g. service-oriented sustainable models).

The FabCity OS DPP implementation has been developed not only to remain compatible with the aims laid out by the EU ESPR, but also to facilitate distributed and collaborative design and manufacturing across Fab City participants and facilities – specifically through providing verifiability of contributions made by participants contributing to a product.

# What are the parts of a DPP?

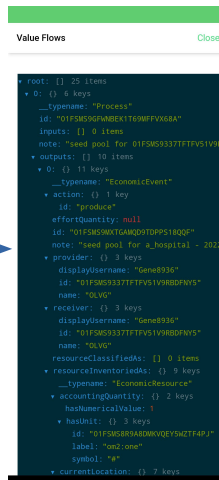


## Digital Product Passport

defining a new EU standard for the circular and green economies



DPP Data Carrier  
(QR Code example)

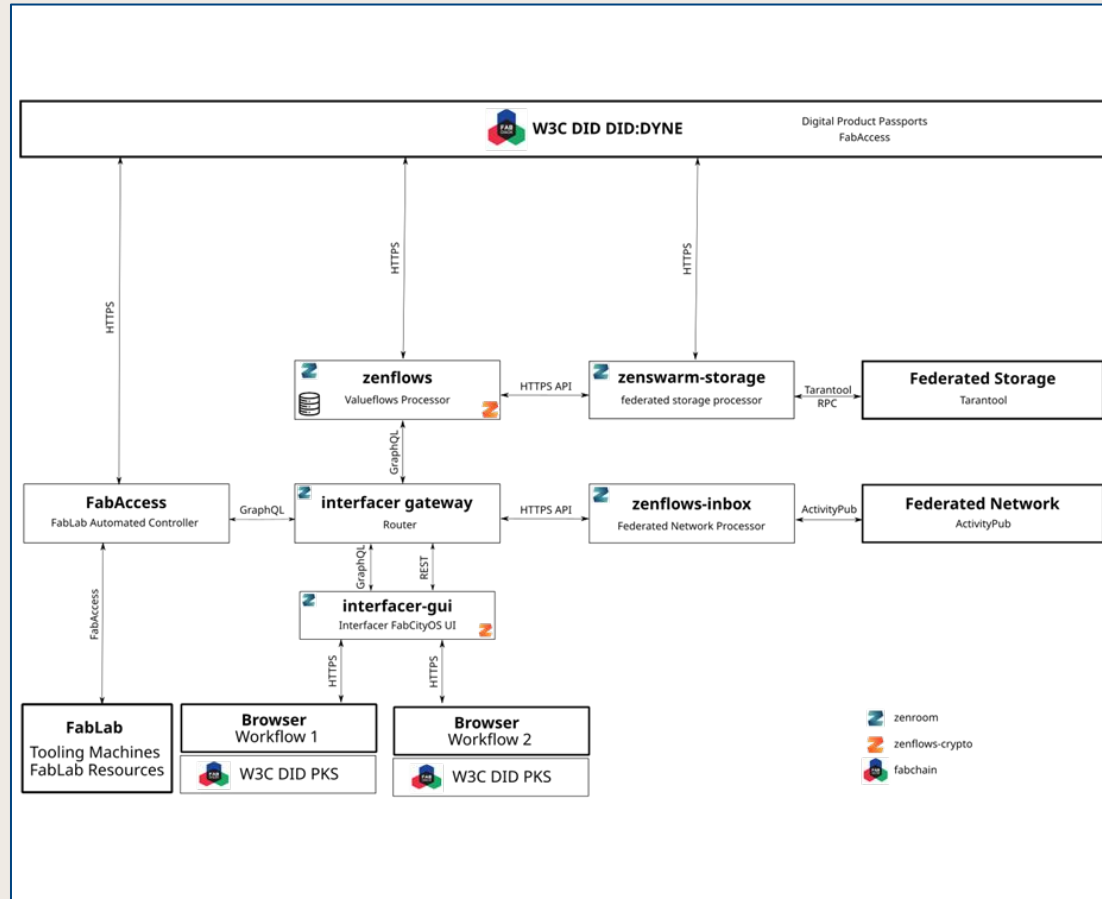


DPP linked data  
(Zenflows linked data)

What is a DPP made of?

- A Data Carrier, machine readable that contains:
  - Product Identifier Code
  - Location Reference to Linked Data
  - Verifiable cryptographic authenticity & integrity data
- Linked Data, including:
  - Identifier codes for:
    - source components & materials
    - manufacturers & manufacturing facilities
  - (dis)assembly instructions
  - Safety & use instructions & more ...  
(see ESRP Annexes for full list)
  - voluntary sharing of further data encouraged

# What is FabCity OS?



*FabCityOS at core is an operating system – a set of tools - designed to empower autonomous FabCity communities to create & collaborate in distributed design and manufacturing value chains.*

*FabCityOS uses a standard vocabulary **Valueflows** to describe the nature and relationships of these collaborative creations.*

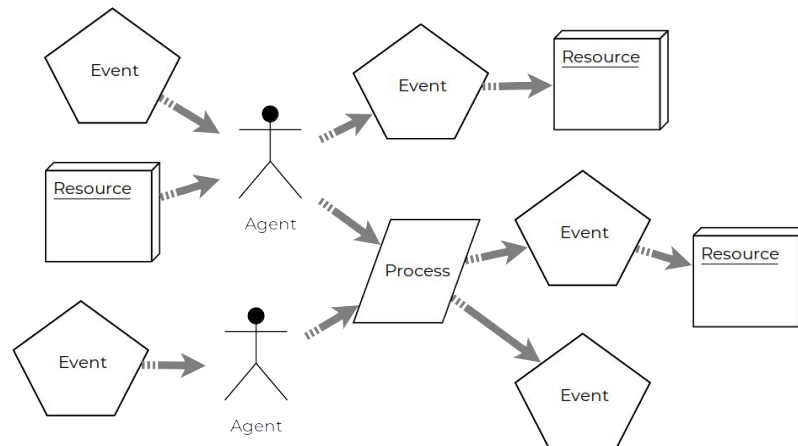
# What is Valueflows?



Valueflows

a REA standard for economic flows

<https://www.valueflo.ws/>



*ValueFlows is a standard set of common vocabularies to describe flows of economic resources within distributed economic ecosystems.*

*Valueflows is based on a **REA** (**R**esources, **E**vents, & **A**gents) Economic Model, and flows define a casual graph relationship of these elements.*

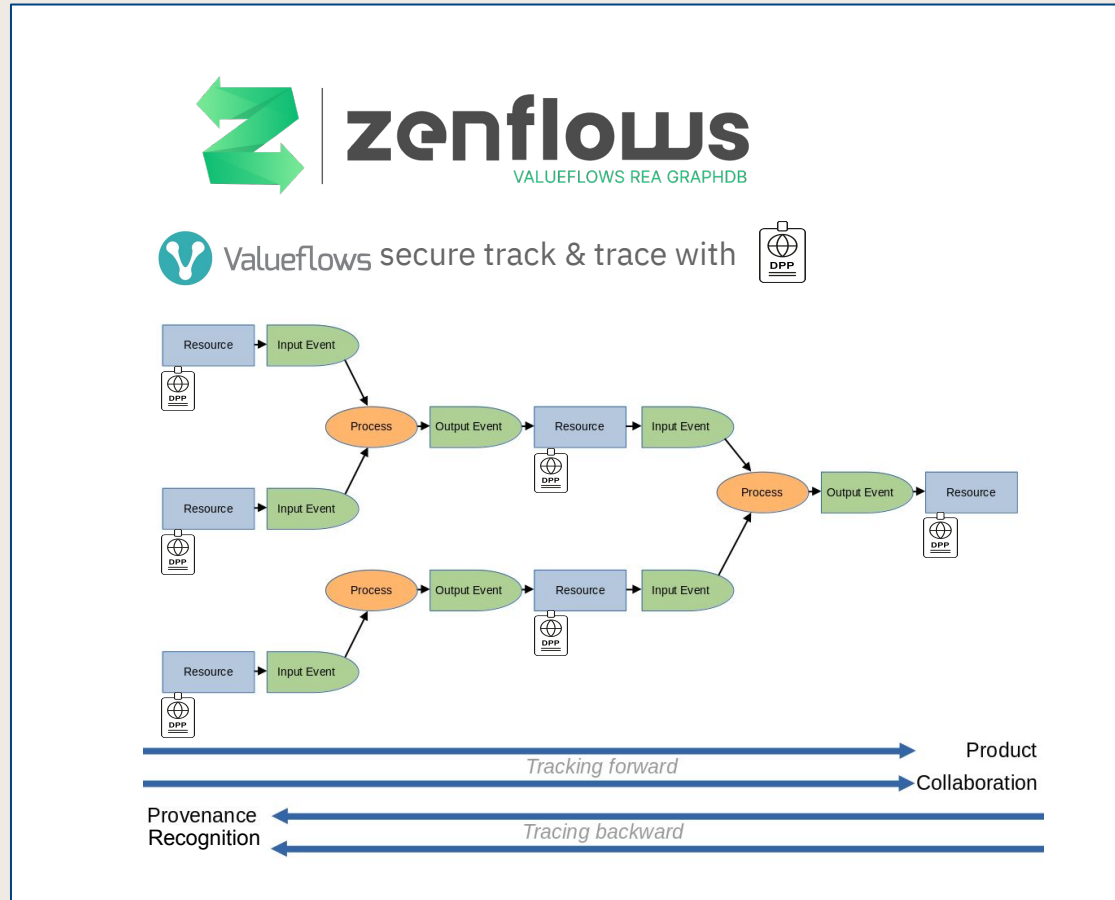
*Economic **Resources** can include digital designs, physical products, money or tokens, or work & specialised skills.*

*Economic **Events** are actions that have occurred in the past to Resources; such as to create, modify, consume, use, or to transfer from one Agent to another, or from one location to another.*

***Processes** are containers for further Events and Resources.*

***Agents** are individual persons or organizations who perform roles in Economic Events affecting Economic Resources.*

# What is track and trace?

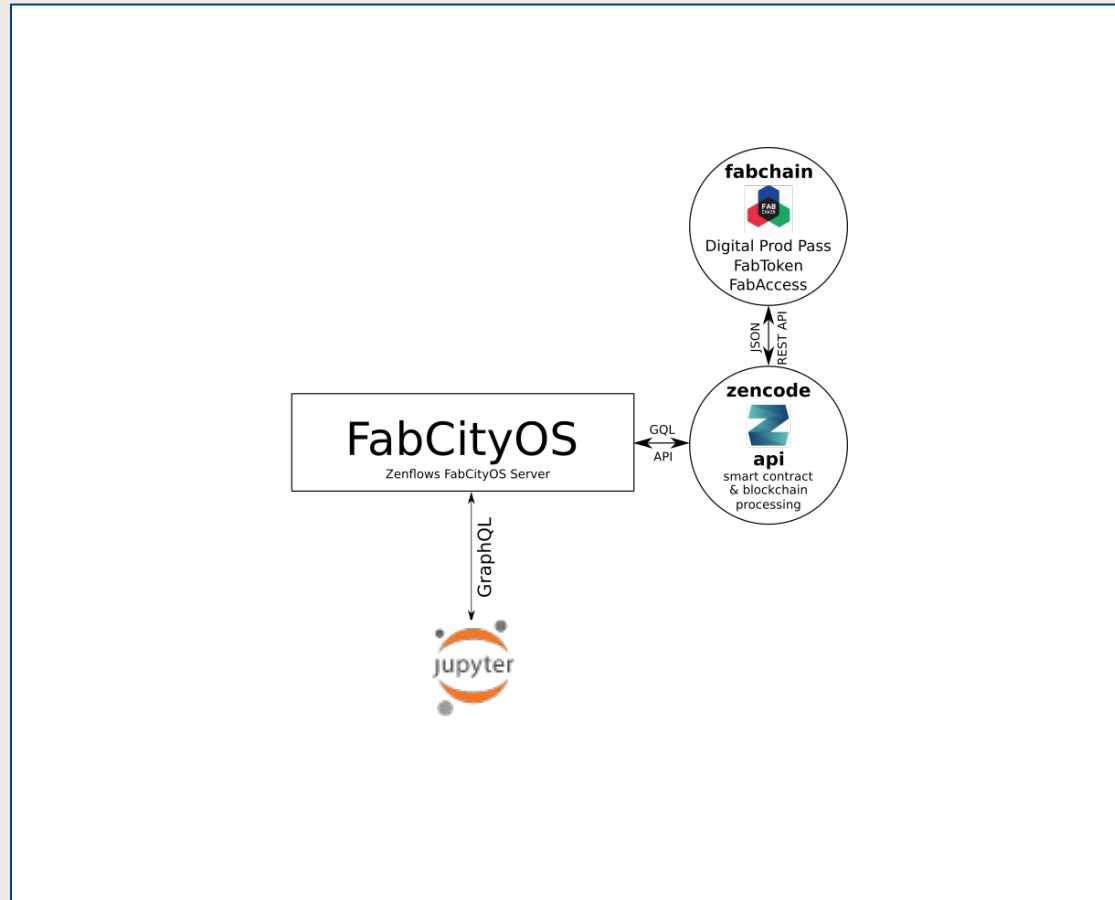


Zenflows, the FabCityOS Server, integrates multi-party signature cryptography with a ValueFlows REA database to produce Digital Product Passports that record the graph of all resources, agents and events over the entire product life-cycle.

An **Agent** is linked to every **Resource, Event & Process** allowing a cryptographically generated Digital Product Passport to be a verifiable record of the contributions made by each participant across the product life-cycle, across design, manufacturing and distribution flows.

A Valueflows resource trace forms the **linked data** component of the **FabCity OS Digital Product Passport**.

# FabCityOS DPP notebook tool



*Jupyter Notebook is an open source web-based interactive development environment for notebooks, code, and data.*

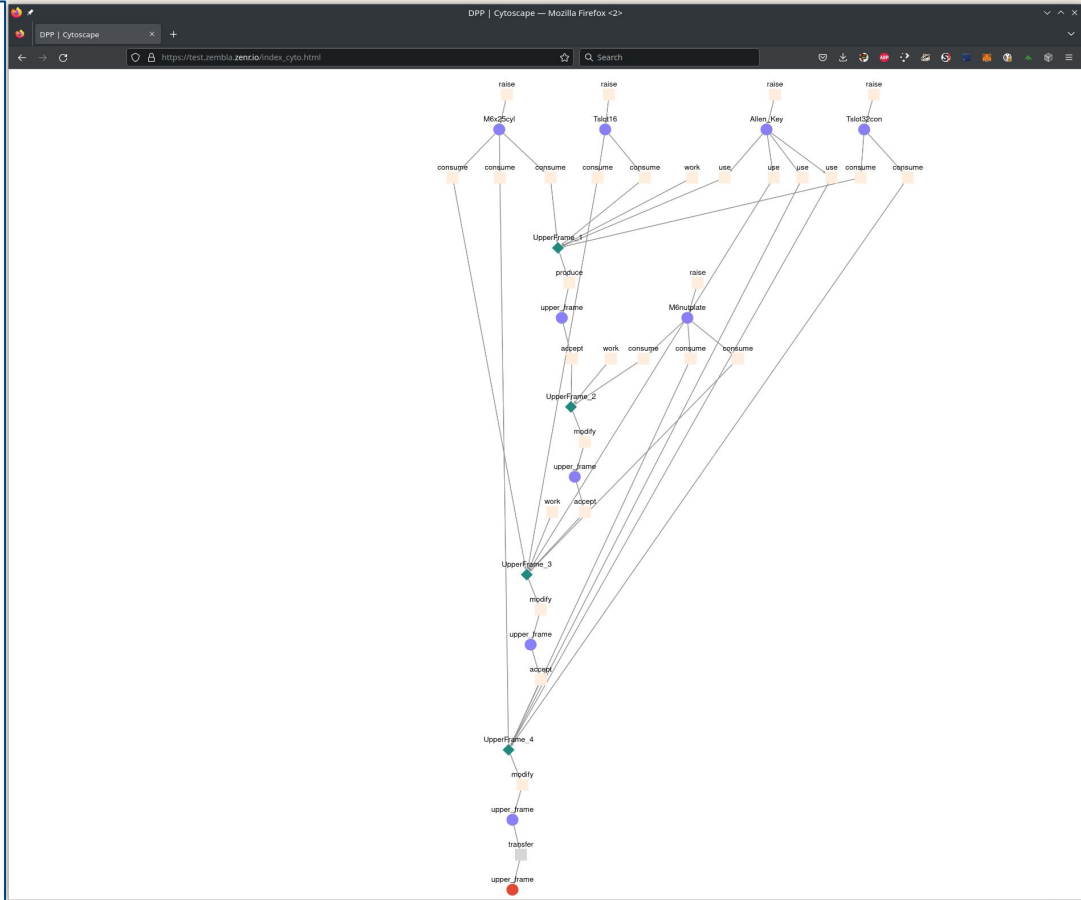
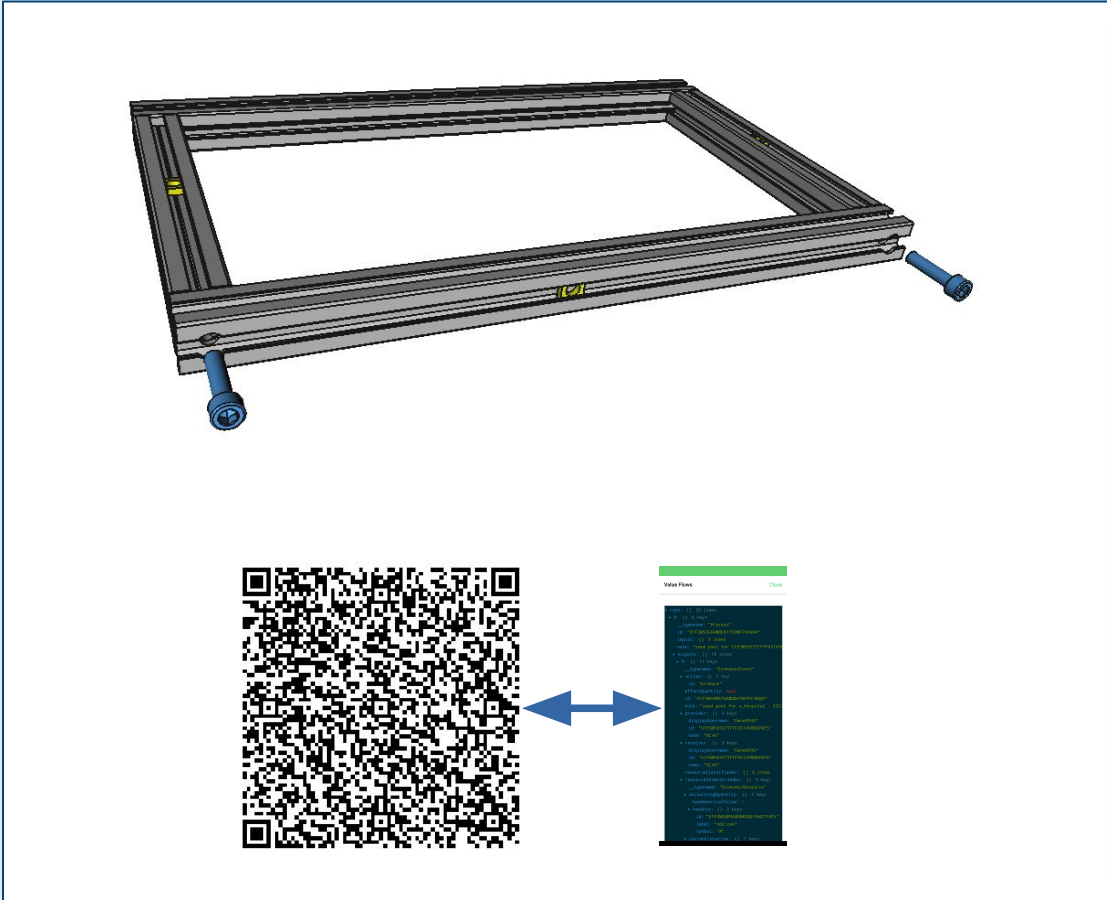
*A Notebook client for Zenflows has been developed to communicate with a FabCityOS Server to create and verify Valueflows object trace data and create cryptographically verifiable Digital Product Passport linked data.*

*Using this tool, Interfacier project assembly documentation is translated & codified into Valueflows events, then ingested directly into a FabCityOS server.*

*The tool also enables graph visualisation of the product assembly.*

*Once imported, the creation and validation of Digital Product Passports with trace graph linked data is enabled.*

# DPP Visualisation Demo/Workshop





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