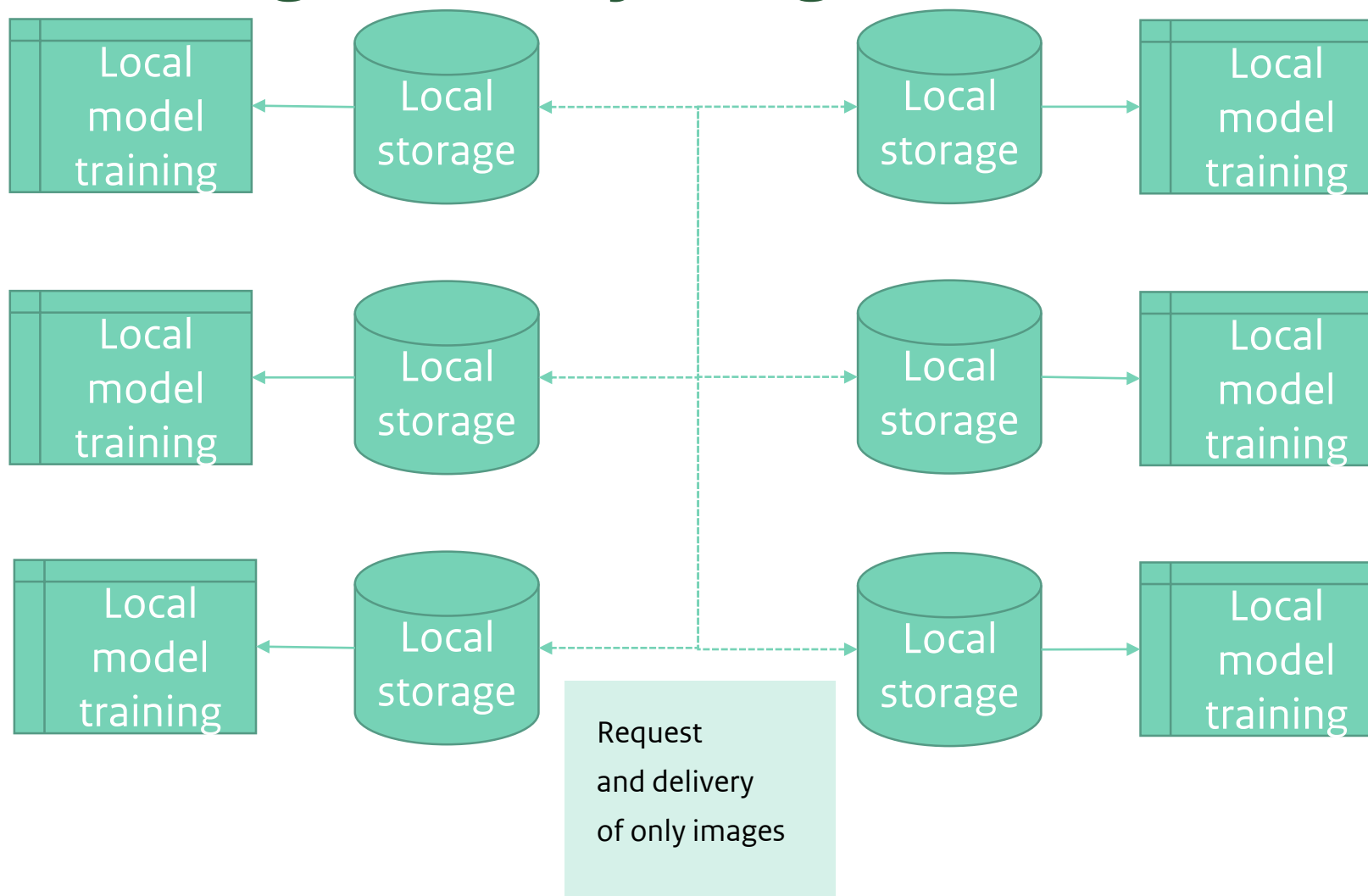# X-ray image exchange

- Employing AI models, Customs administrations may increase their productivity
    - e.g. X-ray image interpretation

- AI model development requires a lot of data
    - Images, metadata, annotations

- Required amounts of data may not be available within a single administration and characteritics may vary across administrations
    - Large variety of specific scenarios (vector, threat, concealment, sensor)

- International cooperation between Customs administrations is needed

- Requires agreements on definitions, quality, ownership, protection, tooling, transparency, etc.
    - Exchanging metadata and annotation may provide a confidentiality issue

- Is federated learning the solution?

Current exchange of X-ray images

Local model training ← Local storage ⇠ ⇢ Local storage → Local model training

Local model training ← Local storage ⇠ ⇢ Local storage → Local model training

Local model training ← Local storage ⇠ ⇢ Local storage → Local model training

Request and delivery of only images

Federated use of X-ray images, envisioned

Local storage → Local model training ← → Local model training ← Local storage

Local storage → Local model training ← → Acting central model training ← Local storage

Local storage → Local model training ← → Local model training ← Local storage

Request and delivery of locally trained models
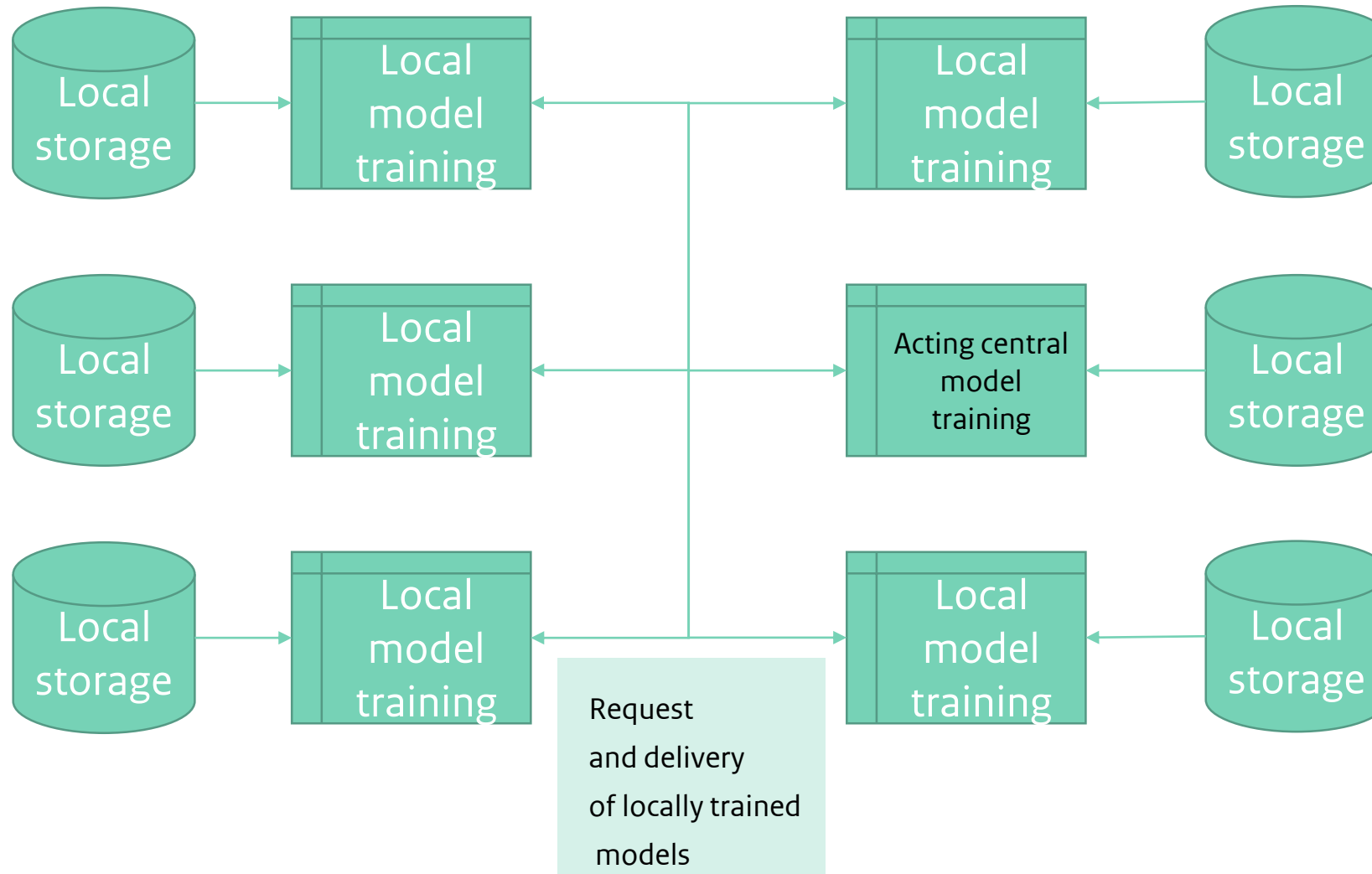
Current and federal use of X-ray images

UFF 2.0 and DICOS formats for image, metadata and annotations in place but

- Widely accepted annotation is lacking

- Agreements on exchange, ownership, protection are required

- Platform to facilitate exchange/ federated learning is essential

- Standard description of datasets, model training and maintenance promotes transparency

- Deployability across vendors (upon staged learning) is efficient

- …

➢ Federated learning may help to overcome current shortages of X-ray images, but requires the same type of needs to be taken care off

➢ All needs require cooperation between administrations, and between a group of administrations and the vendors. Much like the UFF, that is developed under guidance of the WCO