Technology Design and the e-APP

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13th International Forum on the e-APP, Astana

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Technology Design and the e-APP

- e-APP – Similar Patterns Across the Internet
- FAIR Identifier System Requirements
- A Handle System Overview
- e-APP and the Handle System

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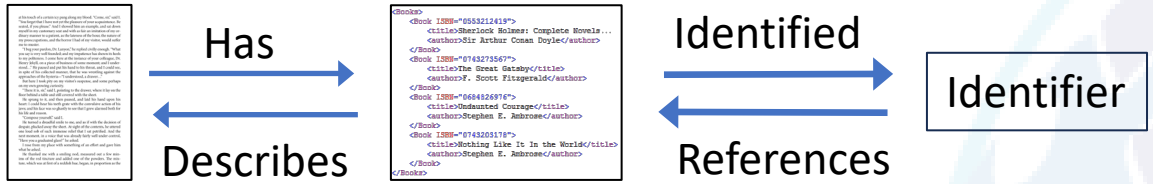
e-APPs - Similar Patterns Across the Internet

The e-APP shares many similarities with other domains:

- Scientific community: Identifying and referencing Journal articles and data.
- Consumer products: Combatting counterfeit products.
- Industry: Tracking of parts and processes.
- Media: Identification and description of movie assets.
- Financial: Tracking Financial transactions.

=> Identifiers are key to accessing digital objects on the Internet.



Existing Web URI are Brittle

- URIs are identifiers but they rarely persistent. (link decay: 45% within 7 years)
  - When organizations change names, they change their DNS name and the old URIs with the old name are discontinued.
  - URIs often include queries that depend on specific implementations: https://www.hcch.net/index.cfm?oldlang=en&act=authorities.details&aid=954 Will the query be the same from one implementation to the next?
- URIs typically point to a human readable landing page that varies from one service to the next.
- Most Web URIs do not abstract their implementations.
- URIs do not have any security features to validate the information they point to.

Growing Interest in Making Information FAIR

- The lack of findability, accessibility, interoperability and reusability of information on the Internet is costing billions in duplication, missed opportunity, and wasted efforts.
- It is critical to be able simplify the task of accessing information on the Internet.
- The **FAIR Principles** have emerged as a way to address these issues.
  - **F**indable: Information is described in a consistent manner to help its discovery.
  - **A**ccessible: Information is accessible in a consistent manner.
  - **I**nteroperable: Information is structured in a predictable manner.
  - **R**eusable: Information is typed and described to make it understandable.
- The FAIR principles have been adopted by Europe Open Science Cloud (EOSC) and are gathering much attention in academia and industry.
- A robust global Identifier System is a core requirement of FAIR.

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FAIR Global Identifier Requirements

- Each identifier needs to be **globally unique**.
- Identifiers need to be **globally resolvable** into an **identifier record**.
  - A successful resolution confirms the uniqueness of the identifier.
  - The identifier record provides information about its digital object.
    - Where.
    - What.
    - Integrity information.
    - Authentication information.
    - The identifier record is extensible.
- The identifier record enables a client to determine if the digital object is of interest before reading it.

FAIR Identifier Resolution Service Requirements

- An **Identifier Resolution Service** is responsible for resolving an identifier and returning the identifier's associated identifier record.
- The identifier resolution needs to be secure and trusted.
- The Identifier resolution needs to be based on free open standards.
  - Clients interact with the Identifier Resolution Service using an standard Identifier Resolution Protocol.
- The Identifier resolution service need to be highly network distributed and scale in the trillions of identifiers.
- The identifier resolution service should whenever possible accommodate existing identifiers and their systems.

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DONA Foundation

- Based in Geneva Switzerland for neutrality purposes.
- Maintains the operations of the Global Handle Registry, collaboratively with its MPAs.
- Provide coordination, software, and other strategic services for the technical development, evolution, application, and other uses in the public interest around the world of the Digital Object Architecture (DOA) and its open standards with a mission to promote interoperability across heterogeneous information systems.
- Make the developed DOA, DOIP, DO-IRP standards and/or software accessible to the community to further their development and adoption.
- Enables the development of relevant standards, and software for purposes of reference models and in connection with the GHR

The Handle System® Overview

- The Handle System provide a globally accessible and secure identifier administration and resolution infrastructure for the Internet.
- Resolves a digital object's identifier to that object's current state information.
- Associates to each identifier one or more typed values, such as IP addresses, public keys, URLs, metadata.
- Has an integrated PKI capability for authentication and non-repudiation.
- Highly scalable (Trillions of identifiers) , optimized for speed and reliability.
- Open, well-defined protocol, data model and namespace.
- Currently used across a wide wide of application domain, such as: Digital libraries, publishing, e-research, identity management, tracking and tracing of products and assets, combatting counterfeit, IoT, supply chains, etc...

Handle Identifier

55.1234/0101.ABCD.5678-#3

Handle Prefix **Handle Suffix**

- A Handle Identifier is globally resolvable using DO-IRP(V3.0) and verified to be unique.
  - Prefixes are allotted to local handle service providers and one delimiter (“.”) prefix handle records are currently stored in the **Global Handle Registry** (GHR).
  - A **handle prefix** is typically resolved by the GHR into an IP address for a handle resolution service such as at a **Local Handle Service**.
  - A handle is resolvable by the **Handle Resolution Service** into a **Handle Record** consisting of. set of type-value pairs.

Handle Record

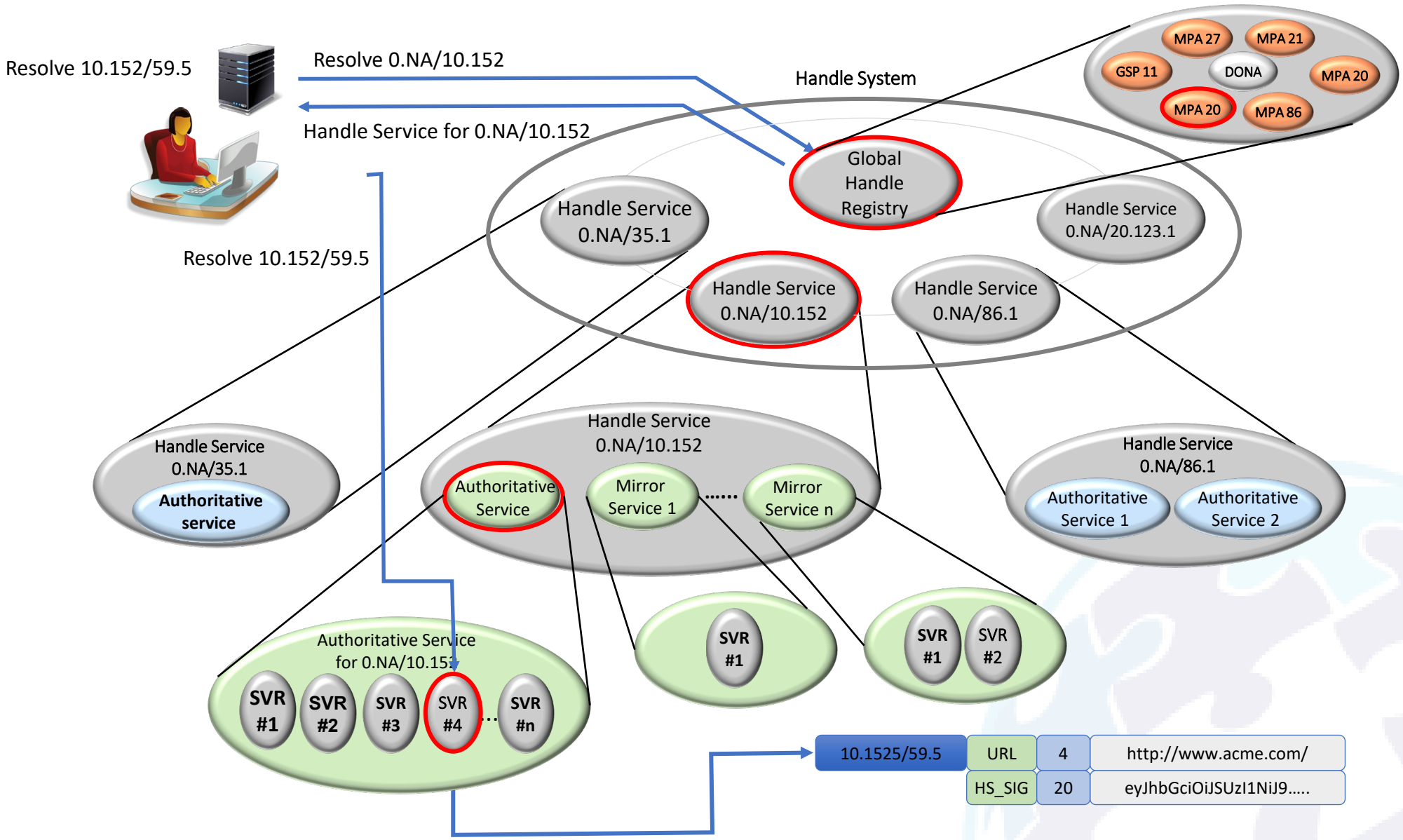
- A **Handle Identifier** resolves to a **Handle Record** using the Handle Protocol (DO-IRPV3.0).

- A **Handle Record** consists of 0 to n **Handle Values**.

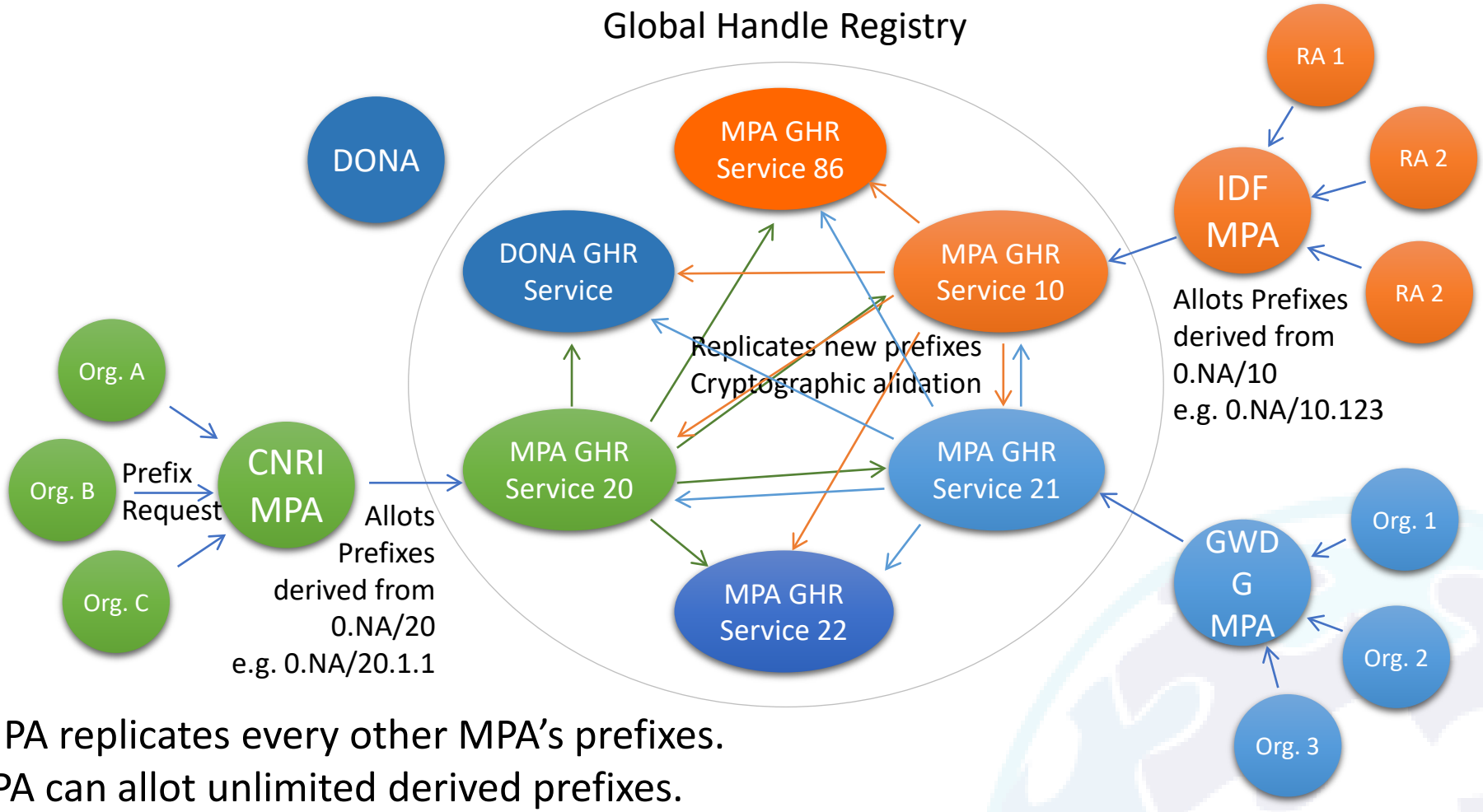
- Each **Handle Value** includes:
  - A **Type-Value** pair. The type describes the value.

    Examples of types: URL, HS_ADMIN, HS_SIGNATURE,0.TYPE/TYPE
  - An index (differentiates between multiple instance of the same type)
  - Administrative rights (Each handle Identifier of the entity that can administer the Handle Record)
  - Time last updated.
  - Caching Period.

Handle Service Topography – Scaling Resolution



Global Handle Registry – A Multistake Holder Service



- Every MPA replicates every other MPA's prefixes.
- Each MPA can allot unlimited derived prefixes.
- An MPA can only allot derived prefixes from its allotted prefix.
- Only prefixes with 0 or 1 delimiter are replicated within the GHR.

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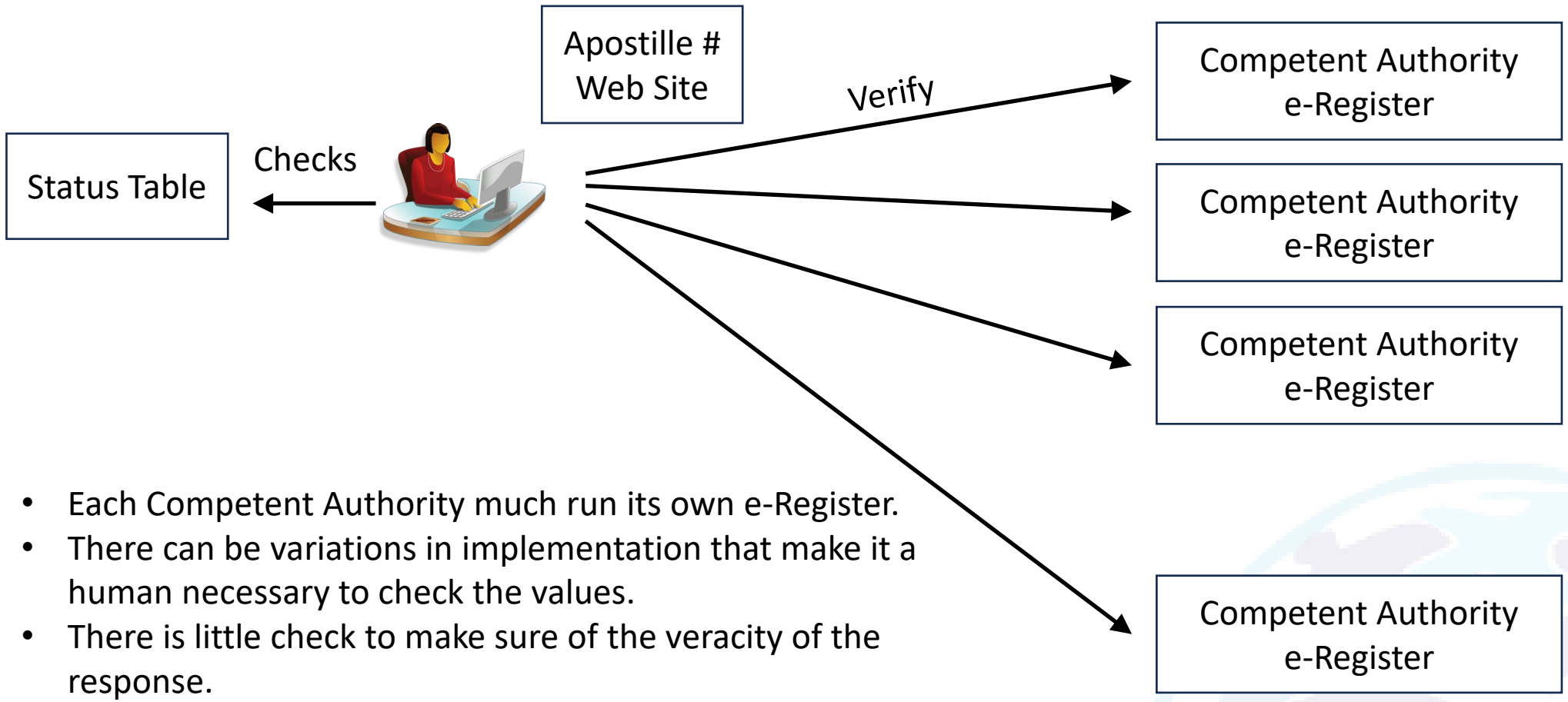
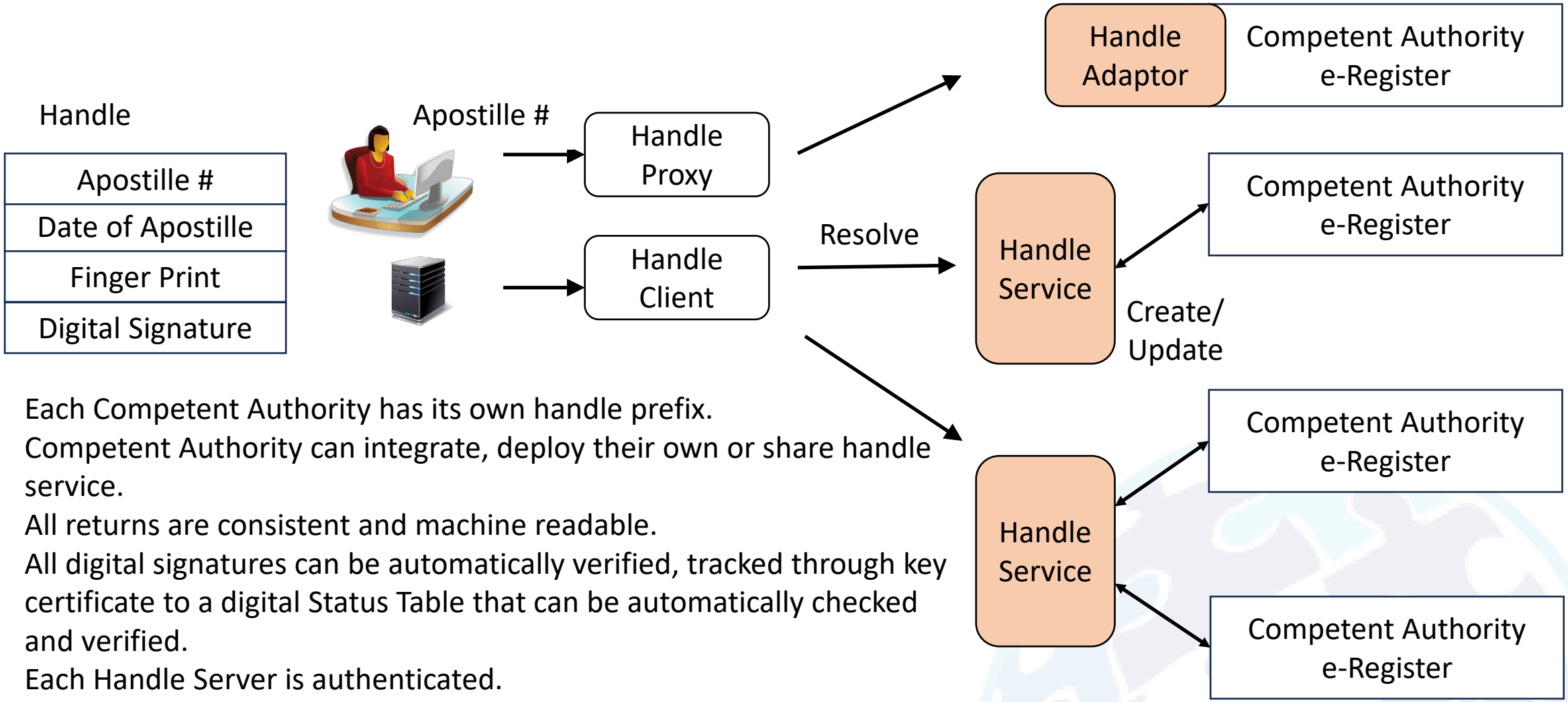
Current e-APP Verification



- Each Competent Authority much run its own e-Register.
- There can be variations in implementation that make it a human necessary to check the values.
- There is little check to make sure of the veracity of the response.

Handle Record based e-APP Verification



- Each Competent Authority has its own handle prefix.
- Competent Authority can integrate, deploy their own or share handle service.
- All returns are consistent and machine readable.
- All digital signatures can be automatically verified, tracked through key certificate to a digital Status Table that can be automatically checked and verified.
- Each Handle Server is authenticated.
- Proxys are generic (can be branded) and can be quickly and automatically deployed based on load.

Handle System and e-APP

- The Handle System Protocol can easily be integrated with existing e-Register service.
- The handle system software is free and has built in scaling and has proven performance capabilities.
- Handle Web Proxys can provide an easy way to provide a user access to a single interface that can be dynamically scaled.
- The Handle System is intrinsically machine readable facilitating the machine validation of Apostille.
- e-Register can use the Handle System build it PKI system to build cryptographic chains of trusts between he HCCH, Competent Authorities, and its representatives..
- New features can be easily added by adding new values in the handles.

Thank You!

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