Overlays 101:

Establishing Schema Definitions within the Self-Sovereign Identity Ecosystem

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What is a Schema?

Schema. *A machine-readable definition of the semantics of a data structure. Schemas are used to define the Attributes used in one or more Credential Definitions.*

- Sovrin Glossary (version 2)

What is an Overlay?

***Overlay**. A data structure that provides an extra layer of contextual and/or conditional information to a Schema. This extra context can be used by an Agent to transform how information is displayed to a viewer or to guide the Agent in how to apply a custom process to Schema data.*

- Sovrin Glossary (version 2)

Why are Overlays useful?

- Overlays allow an Agent to add extra layers of conditional or contextual information to a Schema;
- Overlays allow an Agent to update contextual data without having to reissue a new Schema;
- Overlays ensure that Schema can remain generic thus allowing diverse use cases per schema;
- Overlays ensure that Schema definitions can remain in their simplest form thus providing a standard base from which to decentralise data;
- The Overlay design has very little impact on the existing Hyperledger Indy solution.

Initial Implementation

International non-profit global public utility for self-sovereign identity

sovrin
identity for all

HYPERLEDGER
INDY

Open source code for SSI contributed by Sovrin to Linux Foundation

Types of Overlay

- **Entry Overlay ->** to add pre-defined field values and conditional programming to a Schema;

- **Label Overlay ->** to define and label categories and add attribute labels to Schema attributes (incl. language translations);

- **Information Overlay ->** to add a layer of contextual information to a Schema (incl. procedural and/or legal prose) to better define it's expected use and/or associated terms;

- **Subset Overlay -** to create a Schema subset;

- **BIT Overlay -** to flag *personally identifiable information (PII)* attributes that could unblind the identity of a person, an organization or a thing with reference to the *Blinding Identity Taxonomy (BIT)*.

GDPR :
Deficiencies from a tech implementation perspective

- The need for a common standard to help protect the privacy of *personally identifiable information (PII)* about people, organizations, or things

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- Introducing the …

Blinding Identity Taxonomy (BIT)

Blinding Identity Taxonomy *(BIT)*

- Names (incl. First Names, Last Names, Full Names, Entity Names)
- Physical Addresses
- E-mail Addresses
- Telephone Numbers
- Postal Codes
- Personal Software Application Handles (e.g. Skype, Slack, Hyperledger Chat, etc.)
- Profile Pages
- Passport Numbers
- Social Security Numbers
- National Insurance Numbers
- Driving License Numbers
- Vehicle Registration Numbers
- Bank Account Numbers
- Credit (or Debit) Card Numbers
- Personal Identification Numbers (PIN)
- Self-sovereign Key Identifiers
- Decentralised Identifiers (DIDs)
- Employee Identifiers
- Account Identifiers
- Governmental Identifiers
- Membership Identifiers (e.g. Trade Union Membership, etc.)
- Institutional Identifiers (e.g. Private Health Care Identifiers, etc.)
- Case Identifiers (e.g. Case ID Numbers, Benefit Plan Participation Identifiers, etc.)
- User Identifiers (e.g. User IDs, Logins, etc.)
- Passwords
- Signatures
- Digital Certificates
- Photos
- Videos
- Images
- Vocal Sound Bites
- Dates (e.g. Date of Birth, etc.)*
- Genetic Identifiers (incl. chromosomal, deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) data)
- Biometric Identifiers (incl. voiceprints, iris scans, facial imaging and dactyloscopic (fingerprint) data)
- Internet Protocol (IP) Addresses
- Media Access Control (MAC) Addresses
- GPS Locational Information
- Cookie Browser Identifiers
- Radio Frequency Identifiers
- IoT Identifiers (incl. smart meter data)
- Social media interactive elements, posts and comments (incl. likes, emojis and polling results)
- Free-Form Text Fields / Unstructured Data**

* Not all captured dates will reveal identity but some will so, if in doubt, encrypt.

** Defn.: Text which does not have a given structure, nor which is entered in any specific format. Note: All free-form text fields should be encrypted.

Creating a Schema with linked Overlays

“Demographics” Schema

```
{
  "attr_names": {
    "brthd": "Date",
    "ageic": "Integer",
    "ageu": "String",
    "sex": "String",
    "ethnic": "String",
    "indalk": "TrueClass",
    "asian": "TrueClass",
    "racesp": "String",
    "black": "TrueClass",
    "island": "TrueClass",
    "white": "TrueClass",
    "raceunk": "TrueClass"
  },
  "bit_attributes": [
    {
      "brthd": "sensitive"
    }
  ],
  "did": "did:sov:3214abcd",
  "name": "Demographics",
  "description": "Created by MEDIDATA",
  "version": "1.0",
  "frmsrc": "DEM"
}
```

attribute names & types

Schema

BIT Schema Object

The Schema attribute *“brthd” [Date of Birth]* has been flagged by the Issuer as “*Dates (e.g. Date of Birth, etc.)*” is one of the 42 listed elements in the *Blinding Identity Taxonomy (BIT)*

Schema metadata

Entry Overlay

ENTRY_OVERLAY

```
{
  "did": "did:sov:1234abcd",
  "type": "spec/overlay/1.0/entry",
  "name": "Demographics",
  "schemaDID": "did:sov:3214abcd",
  "schemaVersion": "1.0",
  "default_values": {
    "ageu": [
      "YEAR"
    ],
    "sex": [
      "MALE",
      "FEMALE"
    ],
    "ethnic": [
      "HISPANIC OR LATINO",
      "NOT HISPANIC OR LATINO",
      "NOT REPORTED",
      "UNKNOWN"
    ],
    "racesp": [
      "CHINESE",
      "TAIWANESE",
      "ASIAN INDIAN",
      "KOREAN",
      "MALAYSIAN",
      "VIETNAMESE",
      "OTHER ASIAN"
    ]
  },
```

Overlay metadata

Schema reference

pre-defined field values

```
"conditional": {
  "hidden_attributes": [
    {
      "racesp": ":asian == false"
    }
  ],
  "required_attributes": [
    {
      "brthd": true,
      "sex": true,
      "ageu": ":ageic != null"
    }
  ]
}
```

conditional programming

Label Overlay

LABEL_OVERLAY


```
{
  "did": "did:sov:59248239",
  "type": "spec/overlay/1.0/label",
  "name": "Demographics English Label",
  "schemaDID": "did:sov:3214abcd",
  "schemaVersion": "1.0",
  "language": "en_US",
  "attr_labels": {
    "brthd": "Date of Birth",
    "ageic": "Age",
    "ageu": "Age unit",
    "sex": "Sex",
    "ethnic": "Ethnicity",
    "indalk": "American Indian or Alaska Native",
    "asian": "Asian",
    "racesp": "If race is Asian, specify origin",
    "black": "Black or African American",
    "island": "Native Hawaiian or Other Pacific Islander",
    "white": "White",
    "raceunk": "Race Unknown"
  },
```


Overlay metadata

Schema reference

Language definition

attribute labels


```
  "attr_categories": {
    "race": [
      "indalk",
      "asian",
      "racesp",
      "black",
      "island",
      "white",
      "raceunk"
    ]
  },
  "category_labels": {
    "race": "Race"
  }
}
```


defining and labelling categories

Information Overlay

INFORMATION_OVERLAY

```
{
  "did": "did:sov:58kosf0239",
  "type": "spec/overlay/1.0/information",
  "name": "Demographics",
  "schemaDID": "did:sov:3214abcd",
  "schemaVersion": "1.0",
  "language": "en_US",
  "attr_informations": {
    "brthd": "Fill your Date of Birth",
    "ageic": "Fill your Age",
    "sex": "Choose your Sex",
    "ethnic": "Choose your Ethnicity",
    "indalk": "Select if you are American Indian or Alaska Native",
    "racesp": "If race is Asian, select origin",
    "black": "Select if you are Black or African American",
    "island": "Select if you are Native Hawaiian or Other Pacific Islander",
    "white": "Select if you are White"
  },
  "category_information": {
    "race": "Select all that apply"
  }
}
```

Overlay metadata

Schema reference

informational text

Subset Overlay

SUBSET_OVERLAY

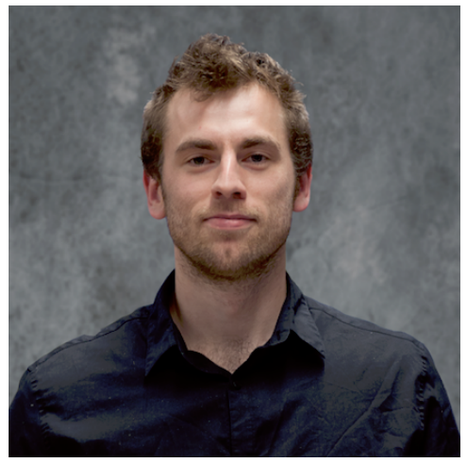
```
{
  "did": "did:sov:1123414abcd",
  "type": "spec/overlay/1.0/subset",
  "name": "Demographics",
  "schemaDID": "did:sov:3214abcd",
  "schemaVersion": "1.0",
  "attributes": [
    "brthd",
    "ageic",
    "ageu",
    "sex"
  ]
}
```

Overlay metadata

Schema reference

defining attributes for a schema subset

Overlays: Demo



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