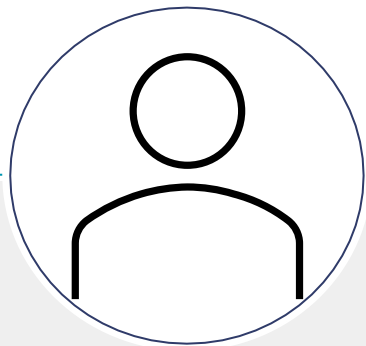


Transforming Transcript Delivery with JSON and JSON-LD

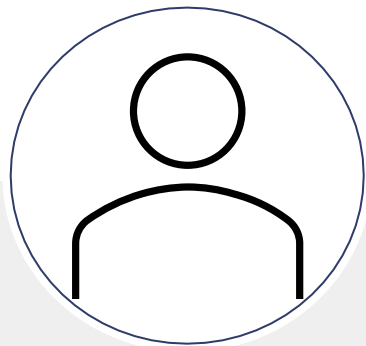
**We WANT
your input!**



SESSION PRESENTERS



Rick Skeel



**Roger
Petersen**



**John W.
Lovell**

Technology
Director, A4L



Jim Kelly

Principal, JKT
Senior PM, SUNY

K-12 to Postsecondary

An Iowa Story

Iowa Department of Education

The Use Case



JSON / JSON-LD Transcript Use Case

Early Pilot Phase

Electronic High School Transcript Delivery Platform



The Iowa SLDS Partnership

Long-running Forum for Education and Education-Related Agencies

Collaborate on Work

Align Our Goals

Supported Federal SLDS Grants

Partners in the Transcript Work

IDOE PK-12 Data and Technical
Iowa Board of Regents
Iowa State University

Cedar Labs, LLC

IDOE Community College
Iowa College Student Aid Commission
Iowa Workforce Development

Path from SIF to PESC & JSON

IDOE has a Statewide SIF Implementation

13 years of Data Collection Operations

9 Major Downstream Systems Integrations

SIF and the Value of Flexibility

Growth

Data Quality System-Wide

The Transcript Vision

Build on the Existing SIF Implementation

Realize New Value

Deliver Student Transcript Data to Higher Ed and Beyond

The Last Two Miles

Deliver a Transcript

What Form?

PDF?

Yes, For Now

Deliver Transcript Data

How?

Data Stream?

Data Transfer Technical Infrastructure

SIF just happens to have that!

SIF 3.x Infrastructure Provides Standardized Transmission of Data
Security

Protect Privacy

Flexibility to Carry Data Beyond SIF

Iowa already had one of those infrastructures!

Data Transfer Model

Obvious Answer

PESC High School Transcript Standard

Long History

Market Presence

Make Some Friends

Reached Out to PESC Organization

Shared Thoughts

Had Some Conversations

Next Question

Iowa wanted JSON-Formatted Data

PESC HS Transcript Standard

XML

Official PESC Translation Methodology

PESC JSON-LD Transcript Workgroup Existed

Timeline Conflict

PESC-Inspired JSON Transcript

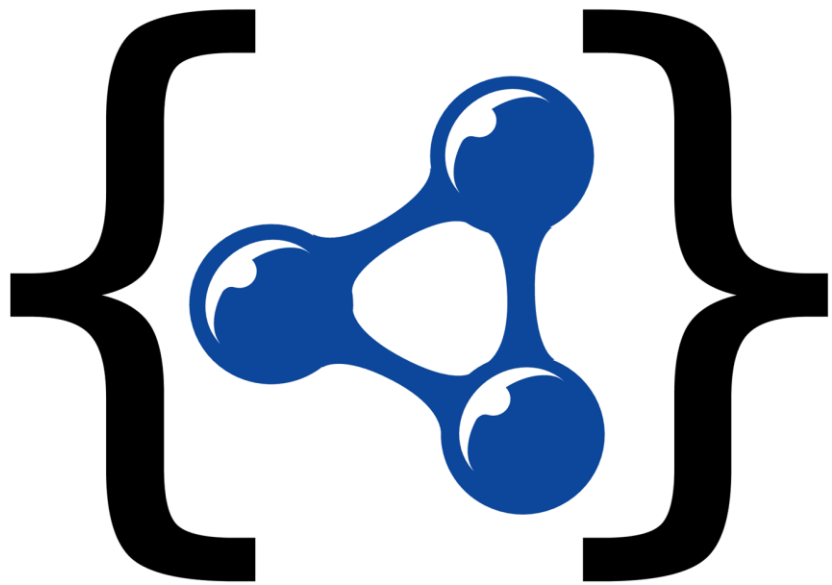
Iowa-Specific Implementation
Of What a PESC JSON HS Transcript Might Look Like

Unofficial
Mutually Agreed-Upon

Support PESC JSON-LD Workgroup

Participate while PESC Builds the Future

Meet on the Other End



JSON-LD

Benefits

Why move towards JSON-LD?

Benefits: Educational Institution

Standardization and Interoperability

Empowers different systems to understand and consume transcript data.

Machine Readability

Facilitates more efficient data analysis, transfer, and integration processes.

Improved Data Quality

Helps maintain consistency and accuracy of transcript data, reducing errors in data entry and transmission.

Linked Data Support:

Enables richer context and *semantic* relationships, allowing the connection of information in more meaningful ways.

Flexibility and Extensibility

Adapts data models to accommodate new fields without disrupting existing systems.

Global Reach and Accessibility

Supports the mobility of students and researchers across international borders.

Benefits: Learner

Admission to College

Leads to quicker processing of applications, reducing administrative burden and potential errors.

Course Catalog

Access accurate and current information about available courses, prerequisites, course descriptions.

Personalized Learning Experiences

Tailors educational content, resources, and support services to meet the unique needs and preferences of each learner.

Real-time Progress Tracking

Facilitates real-time tracking and monitoring of learners' academic progress and performance.

Transfer between Institutions

Ensures that learners' academic achievements and credits are accurately transferred, minimizing potential delays.

Ownership of Data

Empower learners to access, manage, and share their data across different platforms and services, promoting transparency and data sovereignty.

Benefits: Workforce

Streamlined Recruitment Process

Enabling employers to easily search, filter, and compare candidates based on specific criteria, such as degree programs, certifications, or relevant coursework.

Accurate Candidate Assessment

Access verified and up-to-date data on candidates' educational achievements, credentials, and competencies

Improved Talent Matching

Utilize advanced search and recommendation algorithms to identify candidates who best fit their specific job roles, culture, and business objectives.

Facilitated Onboarding and Integration

Import relevant information about candidates directly into human resource management systems, payroll systems, and learning management systems, reducing manual data entry and administrative overhead.

Continuous Learning and Development

Fosters a culture of lifelong learning and skill enhancement, enhancing employee retention and organizational competitiveness.

A JSON-LD Standard

What does it look like?

```
{
  "@context": "https://raw.githubusercontent.com/pesc-org/json-ld-transcr:
  "@graph": [
    {
      "@id": "transcripts/050330001",
      "@type": "CollegeTranscript",
      "createdDateTime": "2023-05-08T14:17:29-05:00",
      "destination": "https://example.edu/Destination#id",
      "documentID": "050330001",
      "documentTypeCode": "pescDocumentTypeCodes:RequestedRecord",
      "hasPart": [
        "achievement001"
      ],
      "source": "https://example.edu/Source#id",
      "student": "https://people.pjjk.net/test",
      "transmissionType": "pescTransmissionTypes:Original"
    },
    {
      "@type": "Person",
      "@id": "https://people.pjjk.net/test",
      "achievement": [
        "achievement001"
      ],
      "hasPersonName": {
        "@type": "PersonName",
        "nameCode": "pescNameCodes:Legal",
        "firstName": "Testy",
        "lastName": "Test"
      }
    }
  ]
}
```

JSON-LD Standard Components

- Tabular Application Profile (TAP)
- Context File
- SHACL Specification
- JSON-LD Instances/Test Cases
- Diagrams
 - Simple Overview
 - Technical Overview
 - Detailed Model
- Implementation Guide
- JSON Schema (Optional)
- JSON-LD Frame (Optional)

Tabular Application Profile

- Based on DublinCore Tabular Application Profile (DCTAP) model
- Spreadsheet converted to CSV file
- CSV used to generate Context File and SHACL specification
- Tabs
 - “namespaces” - defines prefixes
 - “tap” - ties shapes to properties
 - “shapes” - defined shapes
 - “properties” - defines properties
 - “allowed values” - defined allowed values for code sets

“namespaces” tab

rdfs	http://www.w3.org/2000/01/rdf-schema#	RDF Schema
xsd	http://www.w3.org/2001/XMLSchema#	XSD: use for data types
ex	http://example.org/	example
ceds	http://ceds.ed.gov/owl#	Common Education Data Standards
ceterms	https://purl.org/ctdl/terms/	Credential Transparency Description Language
dc	http://purl.org/dc/elements/1.1/	Dublin Core Metadata Element Set, Version 1.1
dct	http://purl.org/dc/terms/	DCMI Metadata Terms
elm	http://data.europa.eu/snb/model/elm/	European Learning Model
foaf	http://xmlns.com/foaf/0.1/	Friend of a Friend
sdo	https://schema.org/	Schema.org
skos	http://www.w3.org/2004/02/skos/core#	Simple Knowledge Organization System
pesc	https://pesc.org/terms/	DOES NOT EXIST
cred	https://www.w3.org/2018/credentials#	W3C Verifiable Credentials
pescAcademicSummaryLevels	https://pesc.org/vocabs/AcademicSummaryLevels#	DOES NOT EXIST
pescAcademicSummaryTypes	https://pesc.org/vocabs/AcademicSummaryTypes#	DOES NOT EXIST
pescAcademicProgramTypes	https://pesc.org/vocabs/AcademicProgramTypes#	DOES NOT EXIST
pescAcademicAwardLevels	https://pesc.org/vocabs/AcademicAwardLevels#	DOES NOT EXIST
pescAgencyCodes	https://pesc.org/vocabs/AgencyCodes#	DOES NOT EXIST
pescConditionsMetCodes	https://pesc.org/vocabs/ConditionsMetCodes#	DOES NOT EXIST

“tap” tab

225	AcademicAwardShape	pesc:academicCompletionIndicator	Academic Completion Indicator	FALSE	FALSE	Literal	xsd:boolean
226	AcademicAwardShape	pesc:academicCompletionDate	Academic Completion Date	FALSE	FALSE	Literal	xsd:date
227	AcademicAwardShape	pesc:academicHonors	Academic Honors	FALSE	TRUE	IRI BNODE	
277	AcademicAwardShape	pesc:academicDegreeRequirement	Academic Degree Requirement	FALSE	TRUE	IRI BNODE	
136	AcademicDegreeRequirementShape	pesc:urlAddress	URL Address	FALSE	FALSE	Literal	xsd:anyURI
278	AcademicDegreeRequirementShape	pesc:thesisDissertationTitle	Thesis Dissertation Title	FALSE	FALSE	Literal	xsd:string
279	AcademicDegreeRequirementShape	pesc:thesisDissertationAdvisor	Thesis Dissertation Advisor	FALSE	FALSE	Literal	xsd:string
280	AcademicDegreeRequirementShape	pesc:_URLAddress	URL Address 2	FALSE	FALSE	Literal	xsd:anyURI
230	AcademicHonorsShape	pesc:HonorsTitle	Honors Title	FALSE	FALSE	Literal	xsd:string
231	AcademicHonorsShape	pesc:honorsLevel	Honors Level	FALSE	FALSE	IRI	
	AcademicProgramShape	pesc:hasCourse	Has Course	FALSE	TRUE	IRI BNODE	
	AcademicProgramShape	pesc:hasSession	Has Session	FALSE	TRUE	IRI BNODE	
	AcademicProgramShape	pesc:offeredBy	Offered By	TRUE	FALSE	IRI BNODE	
233	AcademicProgramShape	pesc:programSecondarySchoolCode	Program Secondary School Code	FALSE	FALSE	IRI	
235	AcademicProgramShape	pesc:programCIPCode	Program CIP Code	FALSE	FALSE	Literal	xsd:string

Context File

- Generated from TAP
- Ensures semantic clarity and interoperability
- Provides mappings between JSON keys and IRIs (Internationalized Resource Identifiers) to link data to standardized vocabularies (schemas)
- Schema hierarchy
 - PESC
 - CEDS
 - Credential Engine
 - Schema.org

```
@context": {  
  "@vocab": "https://pesc.org/terms/",  
  "sh": "http://www.w3.org/ns/shacl#",  
  "rdf": "http://www.w3.org/1999/02/22-rdf-syntax-ns#",  
  "rdfs": "http://www.w3.org/2000/01/rdf-schema#",  
  "xsd": "http://www.w3.org/2001/XMLSchema#",  
  "ex": "http://example.org/",  
  "ceds": "http://ceds.ed.gov/owl#",  
  "ceterms": "https://purl.org/ctdl/terms/",  
  "dc": "http://purl.org/dc/elements/1.1/",  
  "dct": "http://purl.org/dc/terms/",  
  "elm": "http://data.europa.eu/snb/model/elm/",  
  "foaf": "http://xmlns.com/foaf/0.1/",  
  "sdo": "https://schema.org/",  
  "skos": "http://www.w3.org/2004/02/skos/core#",  
  "pesc": "https://pesc.org/terms/",  
  "cred": "https://www.w3.org/2018/credentials#",  
  "pescAcademicSummaryLevels": "https://pesc.org/vocabs/AcademicSummaryLevels#",  
  "pescAcademicSummaryTypes": "https://pesc.org/vocabs/AcademicSummaryTypes#",  
  "pescAcademicProgramTypes": "https://pesc.org/vocabs/AcademicProgramTypes#",  
  "pescAcademicAwardLevels": "https://pesc.org/vocabs/AcademicAwardLevels#",  
  "pescAgencyCodes": "https://pesc.org/vocabs/AgencyCodes#",  
  "pescConditionsMetCodes": "https://pesc.org/vocabs/ConditionsMetCodes#",  
}
```

SHACL Specification

- Generated from TAP
- Shapes Constraint Language (SHACL) file helps validate, constrain, and describe the structure and semantics of the JSON-LD data
- Captured in Terse RDF Triple Language (Turtle)
- Turtle favored for readability and ease of use when defining RDF triples

```
<AcademicAwardShape> a sh:NodeShape ;  
  sh:closed false ;  
  sh:name "Academic Award"@en ;  
  sh:property <academicawardshapeAcademicAwardDate>,  
    <academicawardshapeAcademicAwardLevel>,  
    <academicawardshapeAcademicAwardProgram>,  
    <academicawardshapeAcademicAwardTitle>,  
    <academicawardshapeAcademicCompletionDate>,  
    <academicawardshapeAcademicCompletionIndicator>,  
    <academicawardshapeAcademicDegreeRequirement>,  
    <academicawardshapeAcademicHonors> ;  
  sh:targetClass pesc:AcademicAward .
```

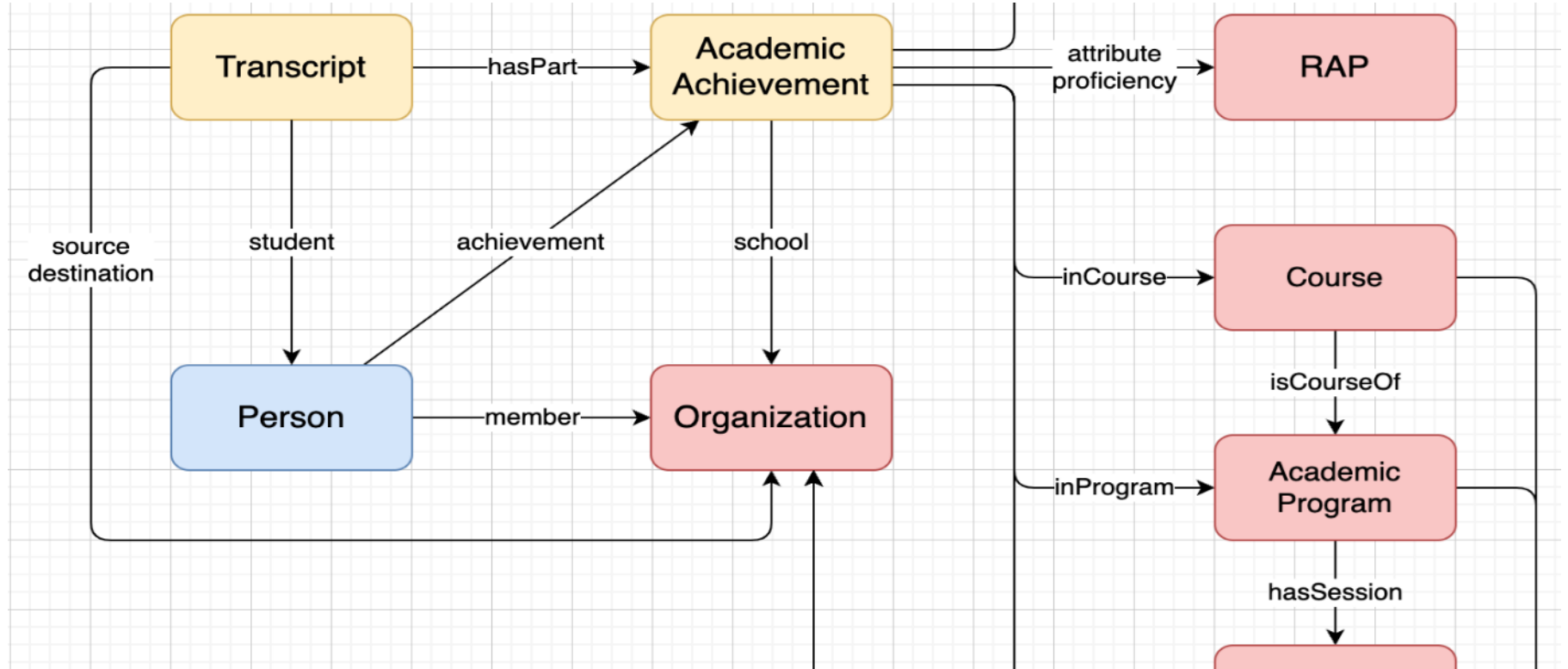
```
<AcademicRecordShape> a sh:NodeShape ;  
  sh:closed false ;  
  sh:name "Academic Record"@en ;  
  sh:targetClass pesc:AcademicRecord .
```

JSON-LD Instances/Test Cases

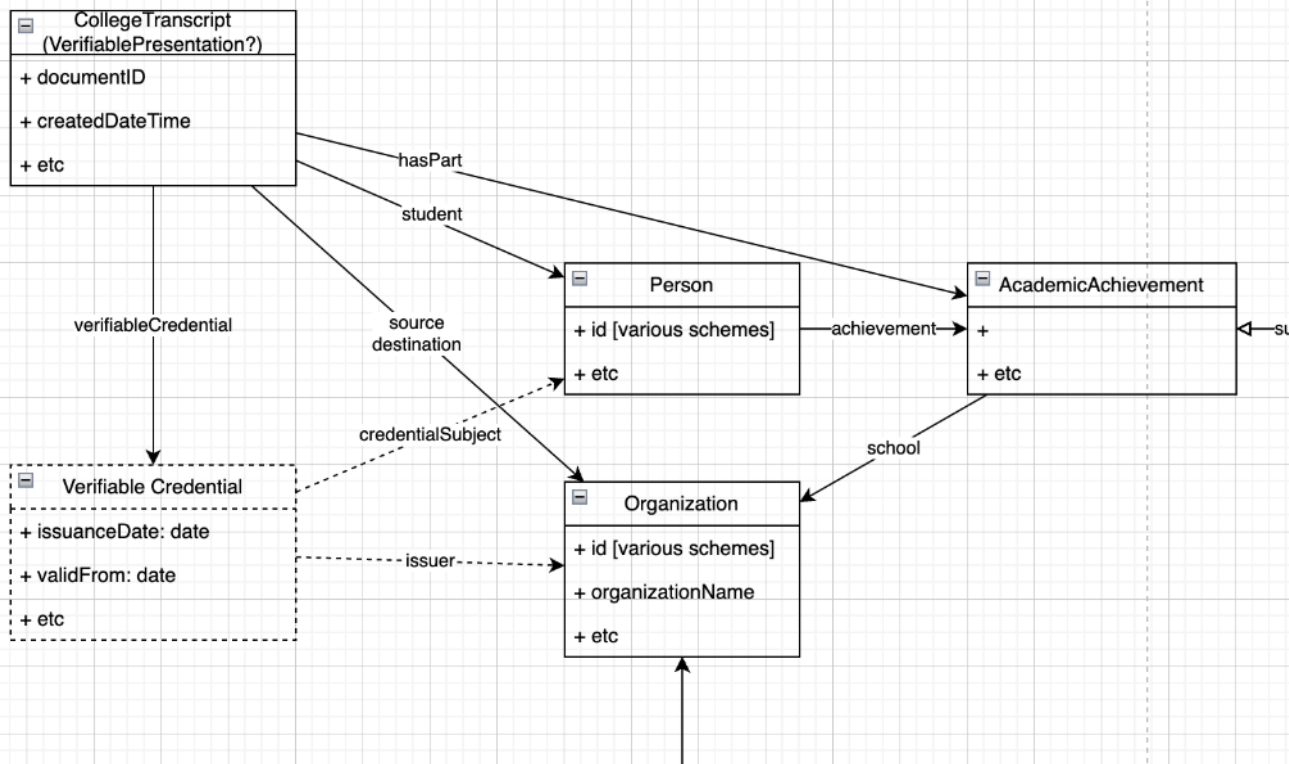
- Instance documents cover all classes and properties
- Multiple documents since some classes and properties may be incompatible
- Test cases would be seeded with errors

```
{
  "@context": "https://raw.githubusercontent.com/pesc-org/json-ld-transcr:
  "@graph": [
    {
      "@id": "transcripts/050330001",
      "@type": "CollegeTranscript",
      "createdDateTime": "2023-05-08T14:17:29-05:00",
      "destination": "https://example.edu/Destination#id",
      "documentID": "050330001",
      "documentTypeCode": "pescDocumentTypeCodes:RequestedRecord",
      "hasPart": [
        "achievement001"
      ],
      "source": "https://example.edu/Source#id",
      "student": "https://people.pjjk.net/test",
      "transmissionType": "pescTransmissionTypes:Original"
    },
    {
      "@type": "Person",
      "@id": "https://people.pjjk.net/test",
      "achievement": [
        "achievement001"
      ],
    },
  ]
}
```

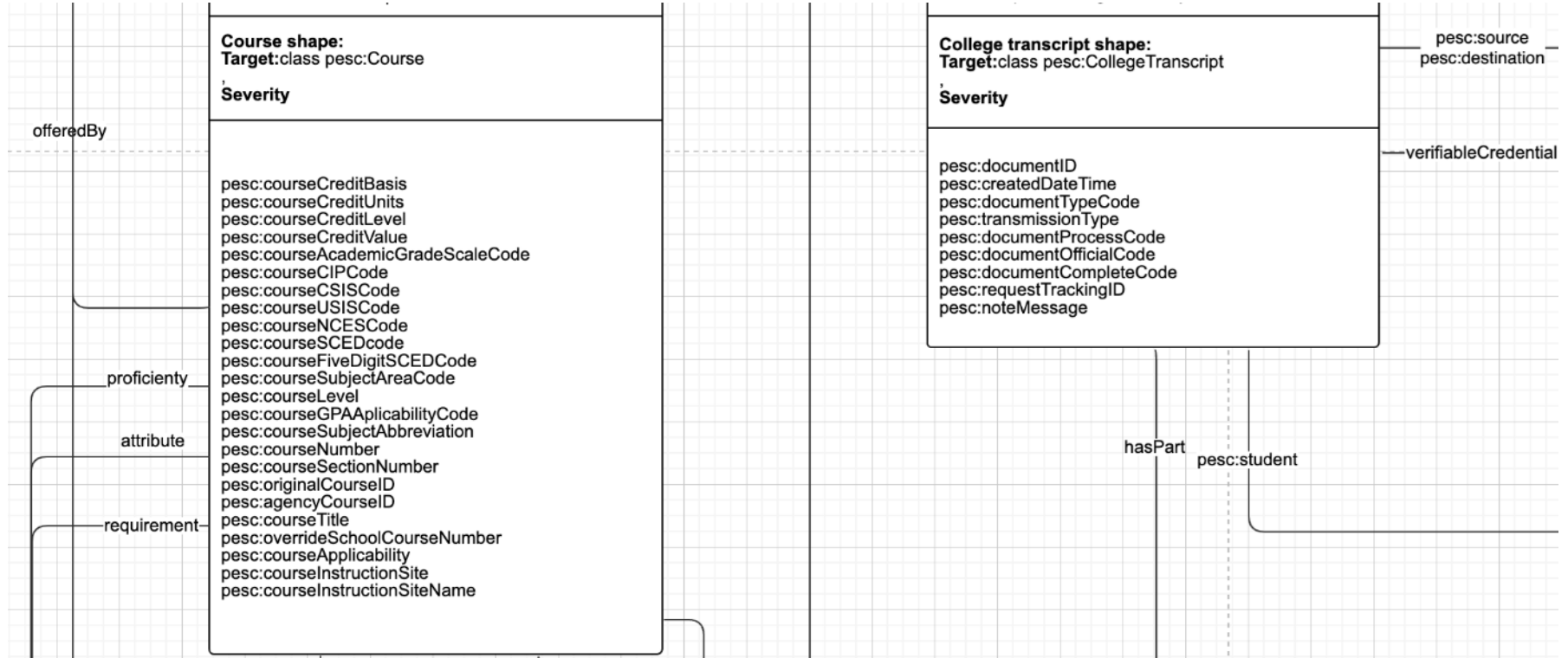
Simple Overview



Technical Overview



Detailed Model



Other Components

- Implementation Guide (Not yet written)
- JSON Schema (Optional)
- JSON-LD Frame (Optional)

Examples (if time allows)

- [PESC Transcript TAP](#)
- [Context File](#)
- [SHACL Specification](#)
- [Minimal JSON-LD Example](#)
- [Technical Overview](#)
- [Detailed Model](#)

A JSON-LD Standard: JSON Schema

PESC Position Paper:

https://docs.google.com/document/d/1AVAt5Lka23TXXEwtX9R9VRvjzzjJ_99t3P2LrLczAkA/edit?usp=sharing