Recommendation for the adoption of NIEM by PESC

Prepared by the PESC Technical Advisory Board

Revision 1.0.0

10/31/13

# Executive Summary

The Technical Advisory Board (TAB) was requested by the Postsecondary Electronic Standards Council (PESC) Chief Executive Officer to 1) determine the feasibility of adopting the National Information Exchange Model (NIEM) Naming and Design Rules (NDR) for use in PESC schemas, and 2) identify the major issues with creating an Education Domain supported by PESC, and governed by the Department of Education and PESC.

The TAB focused on the technical feasibility and to a lesser extent on the governance structure of staging this domain. The creation of the NIEM Education Domain requires additional steps. We recommend the creation of a task force to manage this effort and suggest that the PESC Board determine how to best include the entire educational community in this process. Once the Education Domain has been established, the PESC TAB will deliver NIEM compatible versions of the Core Main and Common Education Data Standards (CEDS) as reference schemas and will provide technical support for the Education Domain.

Adaption of NIEM and conversion of the PESC schemas and CEDS according to the NIEM NDR is feasible. The detailed technical analysis, indication of complexity, and required effort is documented in this report.

Contents

[Executive Summary 2](#_Toc334694808)

[Goals / Objectives 4](#_Toc334694809)

[NIEM Compliance Analysis Approach for PESC Schemas 4](#_Toc334694810)

[NIEM Conformance of PESC Schemas 4](#_Toc334694811)

[Technical Feasibility 12](#_Toc334694812)

[Recommendations 12](#_Toc334694813)

[Sample Project Plan for Establishing NIEM Education Domain 12](#_Toc334694814)

[Conclusion 13](#_Toc334694815)

# Goals / Objectives

1. Determine the feasibility of the adoption of NIEM and the creation of the NIEM education domain supported by PESC, and governed by the Department of Education, PESC, and other educational institutions
2. Evaluate the ability to align PESC data standards (XML Schemas) with the NEIM Naming and Design Rules, with the intention to build a NIEM conformant educational domain.
3. Determine the effort and steps required to accomplish the adoption of NIEM

# NIEM Compliance Analysis Approach for PESC Schemas

The PESC Technical Advisory Board (TAB) used the Content Assembly Mechanism (CAM)[[1]](#footnote-1) Processor under guidance from David Webber to evaluate and analyze the existing PESC schemas (e.g., Core Main) against the NIEM naming and design rules. The result of this analysis has been documented in the NIEM Conformance of PESC Schemas section of this document. The complete output of the CAM processor is available upon request.

# NIEM Conformance of PESC Schemas

The following table summarizes the deviations from NIEM conformance that were found for core main schema. CAM also found several other issues that should be repaired in order to promote good development practices. The NIEM rule(s) are referenced for further information with the following key structure:

|  |  |
| --- | --- |
| **Key** | **Description** |
| X | If the rule is followed, this will cause a change in schema or the processing. |
| R | If the rule is followed, this will cause a relaxation in schema constraints and may allow content that was not allowed before |
| 0 | no impact on the application |
| 1-4 | degree of application change |

Table , Key Structure

| **Change Required for Conformance** | **Impact on** | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Schema**  **doc** | | | **Schema**  **structure** | **Instance**  **processing** | **Processing**  **Application**  **Impact** |
| 1. Elements must be declared as global and referenced (using the ref attribute) in complex type definitions. This change would be required for almost all PESC elements. This change can be done through automation [Rule 6-14]. |  | | | X |  | 0 |
| BEFORE:  <xs:complexType name="EmailType">  <xs:sequence>  <xs:element name="EmailAddress" type="core:EmailAddressType"/>  <xs:element name="NoteMessage" type="core:NoteMessageType" minOccurs="0" maxOccurs="unbounded"/>  </xs:sequence>  </xs:complexType>  AFTER:  <xs:element name="EmailAddress" type="core:EmailAddressType"/>  <xs:element name="NoteMessage" type="core:NoteMessageType"/>  <xs:complexType name="EmailType">  <xs:sequence>  <xs:element name="EmailAddress" ref=”core:EmailAddress” minOccurs="0" maxOccurs="unbounded” />  <xs:element name="NoteMessage" ref=”core:NoteMessage”/>  </xs:sequence>  </xs:complexType> | | | | | | |
| 1. Schema elements, types, and enumeration declarations must have the definition included in an annotation documentation structure associated with the declaration.[Rule 5-4, Rules 7-4 to 7-9] | | X | |  |  | 0 |
| Element  BEFORE:  <xs:element name="EmailAddress" type="core:EmailAddressType"/>  After:  <xs:element name="EmailAddress" type="core:EmailAddressType">  <xs:annotation>  <xs:documentation>The numbers, letters, and symbols used to identify an electronic mail (Email) user within a network </xs:documentation>  </xs:annotation>  </xs:element> | | | | | | |
| Type  BEFORE:  <xs:complexType name="EmailType">  <xs:sequence>  <xs:element name="EmailAddress" ref=”core:EmailAddress/>  <xs:element name="NoteMessage" ref=”core:NoteMessage/>  </xs:sequence>  </xs:complexType>  AFTER:  <xs:complexType name="EmailType">  <xs:annotation>  <xs:documentation>This complex type encodes the numbers, letters, and symbols used to identify an electronic mail (Email) user within a network </xs:documentation>  </xs:annotation>  <xs:sequence>  <xs:element name="EmailAddress" ref=”core:EmailAddress/>  <xs:element name="NoteMessage" ref=”core:NoteMessage/>  </xs:sequence>  </xs:complexType> | | | | | | |
| Enumeration  BEFORE:  <xs:simpleType name="InstructionalActivityStatusCodeType">  <xs:restriction base="xs:string">  <xs:enumeration value="Regular" />  <xs:enumeration value="Correspondence" />  <xs:enumeration value="Extension" />  <xs:enumeration value="Distance" />  <xs:enumeration value="HomeSchooled" />    </xs:restriction>   </xs:simpleType>  AFTER:  <xs:simpleType name="InstructionalActivityStatusCodeType">  <xs:annotation>  <xs:documentation>A simple type defining the academic status of a student as determined by the method of instruction</xs:documentation>  </xs:annotation>  <xs:restriction base="xs:string">  <xs:enumeration value="Regular" >  <xs:annotation>  <xs:documentation>Regular Student</xs:documentation>  </xs:annotation>  </xs:enumeration>  <xs:enumeration value="Correspondence" >  <xs:annotation>  <xs:documentation>Correspondence Student</xs:documentation>  </xs:annotation>  </xs:enumeration>  <xs:enumeration value="Extension" >  <xs:annotation>  <xs:documentation>Extension Student </xs:documentation>  </xs:annotation>  </xs:enumeration>  . . . .  </xs:restriction>   </xs:simpleType> | | | | | | |
| 1. Name Groups (xs:group) cannot be used in NIEM compliant schema. PESC has several groups. These would need to become part of the structure using the group. [Rule 6-23] | | | X | X | R | 2 |
| BEFORE:  <xs:group name="CommonAddressDetailsGroup">  <xs:annotation>  <xs:documentation>This Address Group is for common items to all Addresses</xs:documentation>  </xs:annotation>  <xs:sequence>  <xs:element name="AddressLine" type="core:AddressLineType" maxOccurs="3"/>  <xs:element name="City" type="core:CityType"/>  </xs:sequence>  </xs:group>  C:\Users\Tuan\Desktop\GroupPre.png  AFTER:  <xs:complexType name="CommonAddressDetailsGroupType">  <xs:annotation>  <xs:documentation>This Address Group is for common items to all Addresses</xs:documentation>  </xs:annotation>  <xs:sequence>  <xs:element name="AddressLine" ref="core:AddressLine" maxOccurs="3"/>  <xs:element name="City" ref="core:City"/>  </xs:sequence>  </xs:complexType> | | | | | | |
| <xs:complexType name="OrganizationEntityType">  <xs:annotation>  <xs:documentation>Redefinition of OrganizationType as required by Admissions</xs:documentation>  </xs:annotation>  <xs:sequence>  <xs:group ref="core:OrganizationIDGroup" minOccurs="0" />  <xs:element name="LocalOrganizationID" type="core:LocalOrganizationIDType" minOccurs="0" />  <xs:element name="OrganizationName" type="core:OrganizationNameType" maxOccurs="unbounded" />  <xs:element name="Contacts" type="core:ContactsType" minOccurs="0" maxOccurs="unbounded" />  <xs:element name="NoteMessage" type="core:NoteMessageType" minOccurs="0" maxOccurs="unbounded" />  </xs:sequence>  </xs:complexType>  <xs:group name="OrganizationIDGroup">  <xs:annotation>  <xs:documentation>Allowable Organization IDs - Exclusive choice. As of January 2009, this CSIS and USIS are marked as deprecated and will be removed in a future release</xs:documentation>  </xs:annotation>  <xs:choice>  <xs:element name="OPEID" type="core:OPEIDType" />  <xs:element name="NCHELPID" type="core:NCHELPIDType" />  <xs:element name="IPEDS" type="core:IPEDSType" />  <xs:element name="ATP" type="core:ATPType" />  ….  </xs:choice>  </xs:group> | | | | | | |
| AFTER:  <xs:complexType name="OrganizationEntityType">  <xs:annotation>  <xs:documentation>Redefinition of OrganizationType as required by Admissions</xs:documentation>  </xs:annotation>  <xs:sequence>  <xs:element name="OPEID" ref="core:OPEID" />  <xs:element name="NCHELPID" ref="core:NCHELPID" />  <xs:element name="IPEDS" ref="core:IPEDS" />  <xs:element name="ATP" ref="core:ATP" />  ….  <xs:element name="LocalOrganizationID" ref="core:LocalOrganizationID" minOccurs="0" />  <xs:element name="OrganizationName" ref="core:OrganizationName" maxOccurs="unbounded" />  <xs:element name="Contacts" ref="core:Contacts" minOccurs="0" maxOccurs="unbounded" />  <xs:element name="NoteMessage" ref="core:NoteMessage" minOccurs="0"  maxOccurs="unbounded" />  </xs:sequence>  </xs:complexType>  Note that the choice constraint is lost from the group but all previous valid instance documents are still valid. | | | | | | |
| 1. Elements must have a type or be abstract. Several PESC elements do not have a type. [Rule 6-9] | |  | | X | X | 1 |
| Before:  <xs:element name=”SchoolName”/>  After:  <xs:element name=”SchoolName” type=”SchoolNameType”/>  or  <xs:element name=”SchoolName” abstract=”true”/> | | | | | | |
| 1. The representation term in an element name must have a type definition that is consistent with representation term: Several PESC elements have numeric representation terms and a string type. [Rules 9-12, 9-19]. | |  | | X | X | 1 |
| Before:  <xs:element name=”BoxBarcodeNumber type=”xs:string”/>.  After:  <xs:element name=”BoxBarCodeNumber” type=”xs:long”/> | | | | | | |
| 1. Elements must not use the representation term “Type”. This must be reserved for type definition names. Several elements will need to be changed. [Rule 9-19, Rule 9-23] |  | | | X | X | 1 |
| Before:  <xs:element name=AdmissionType type=”AdmissionTypeType:/>  After:  <xs:element name = “AdmissionTypeCode” type=”AdmissionTypeCodeType” /> | | | | | | |

Table , Changes Required for Conformance

Other schema issues identified:

| **Change Required for Interoperability** | **Impact on** | | | |
| --- | --- | --- | --- | --- |
| **Schema**  **doc** | **Schema**  **structure** | **Instance**  **processing** | **Processing**  **Application**  **Impact** |
| 1. For non-string elements that contain nillable=”true”, there should be a rationale for how the nil value will be used. If not, then the element should not be nillable. | X | X | X | 0 |
| 1. For text elements that have a xs:maxLength, it should be determined if this limit will affect interoperability. |  | X | R | 2 |

Table , Change Required for Interoperability

# Technical Feasibility

There are no major technical impediments for PESC and the U.S. Department of Education to modify the current schemas to produce NIEM conformant schemas and Information Exchange Package Documentation (IEPD). As a result, it is feasible that PESC schemas and CEDS could be the starting point for an Education Domain.

Preliminary schedules and task analysis indicates that the conversion process would take at least 6 months to complete using existing CCB, TAB, and ERUG resources. The TAB recommends that a special task force should be established to expedite this process.

# Recommendations

1. Regardless of the adoption of the full NIEM Conformance, the recommended schema changes are in best interest of the PESC Schemas, and PESC should proceed with implementing the recommendations immediately or scheduled for adoption as part of the next version of Core Main.
2. Convert PESC Schemas to become NIEM conformant and the basis for the Education Domain. Note: For complete NIEM conformance, we may lose some backward compatibility with previous instance documents.
3. Charter a Task Force that will create and shepherd the value proposition for the NIEM education domain through the various NIEM boards. This NIEM Stewardship Task Force will then act as the Steward and governance body for the Education Domain.
4. Develop a Common Education Data Standard (CEDS) NIEM conformant schema as part of the NIEM Education Domain, and encourage NCES to join the community of interest as part of this effort. This would solidify support of the domain by Education community.

# Sample Project Plan for Establishing NIEM Education Domain

The following example schedule shows the steps that would be needed for FSA and PESC to complete the creation of the Education Domain:

|  |  |  |  |
| --- | --- | --- | --- |
| **Task Name** | **Resource** | **Duration** | **Status** |
| TAB Recommendation | TAB | 5 weeks | Completed |
| PESC Board Approval | PESC Board | 2 weeks |  |
| Form NIEM Steward Task Force | PESC Board | 2 weeks |  |
| Gain Approval of Education Domain | NIEM Steward TF | 60 days |  |
| Complete Value Proposition | NIEM Steward TF | 6 weeks |  |
| Complete Value Proposition Presentation | NIEM Steward TF | 2 weeks |  |
| Present Value Proposition to NIEM PMO | NIEM Steward TF | 2 weeks |  |
| Present Value Proposition to NIEM Business Architecture Committee | NIEM Steward TF | 2 weeks |  |
| Present Value Proposition to NIEM Executive Steering Council | NIEM Steward TF | 2 weeks |  |
| Executive Steering Council Approval | NIEM | 1 days |  |
| Put Definitions for Elements and Codes in Workbook | PESC CCB | 4 weeks | Completed |
| Determine Element Changes for NIEM Compliance | PESC TAB | 84 days | Completed |
| Determine Representation Terms for Elements | PESC CCB | 3 weeks |  |
| Run CAM Tool on PESC/FSA schemas | PESC TAB | 4 weeks | In Progress |
| Evaluate non-compliant Simple Elements Representation Terms | PESC CCB | 14 days |  |
| Evaluate non-compliant no type Simple Elements | PESC CCB | 7 days |  |
| Evaluate non-compliant Numeric Representation Elements | PESC CCB | 7 days |  |
| Evaluate nillable elements for meaning | PESC CCB | 7 days |  |
| Evaluate non-compliant Character Length Constraint | PESC CCB | 14 days |  |
| Generate NIEM Compliant Schemas | PESC TAB | 28 days |  |
| Create College Transcript IEPD | PESC ERUG | 6 weeks |  |
| Users Guide on producing IEPD | PESC TAB | 6 weeks |  |

Table , Sample Project Plan for establishing NIEM Domain

# Conclusion

NIEM compliance and conformance presents the best opportunity PESC has seen in its history for alignment not only with the Department of Education, but with larger communities – the Federal, state, and local governments, and national and international education institutions. Alignment between PESC and the U.S. Department of Education has been a long-time goal. The schemas used by the Department are deemed PESC-compliant, but an over-arching entity over the Department and PESC does not exist. Many, if not all, Federal agencies have had the goal of a common Federal XML dialect for some time now. Creation of a NIEM Education Domain governed by the Department and PESC is another step towards that goal, and will encourage further adoption of PESC and NIEM.

1. Cam Editor: <http://sourceforge.net/projects/camprocessor/> [↑](#footnote-ref-1)