**Integrating the Healthcare Enterprise**



**IHE Quality, Research and Public Health**

**Technical Framework Supplement**

**Aggregate Data Exchange HIV Content**

**(ADX-HIV)**

**Draft in preparation for Public Comment**

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**Please verify you have the most recent version of this document.** See [here](http://ihe.net/Technical_Frameworks/) for Trial Implementation and Final Text versions and [here](http://ihe.net/Public_Comment/) for Public Comment versions.

**Foreword**

This is a supplement to the IHE Quality, Research and Public Health (QRPH) Technical Framework V1.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on May XX, 2018 for public comment. Comments are invited and may be submitted at [http://www.ihe.net/QRPH\_Public\_Comments](http://www.ihe.net/QRPH_Public_Comments/). In order to be considered in development of the trial implementation version of the supplement, comments must be received by June XX, 2018.

“Boxed” instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

Amend Section X.X by the following:

Where the amendment adds text, make the added text bold underline. Where the amendment removes text, make the removed text bold strikethrough. When entire new sections are added, introduce with editor’s instructions to “add new text” or similar, which for readability are not bolded or underlined.

General information about IHE can be found at: [www.ihe.net](http://www.ihe.net).

Information about the IHE QRPH domain can be found at: [http://www.ihe.net/IHE\_Domains](http://www.ihe.net/IHE_Domains/).

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: [http://www.ihe.net/IHE\_Process](http://www.ihe.net/IHE_Process/) and [http://www.ihe.net/Profiles](http://www.ihe.net/Profiles/).

The current version of the IHE QRPH Technical Framework can be found at: [http://www.ihe.net/Technical\_Frameworks](http://www.ihe.net/Technical_Frameworks/).

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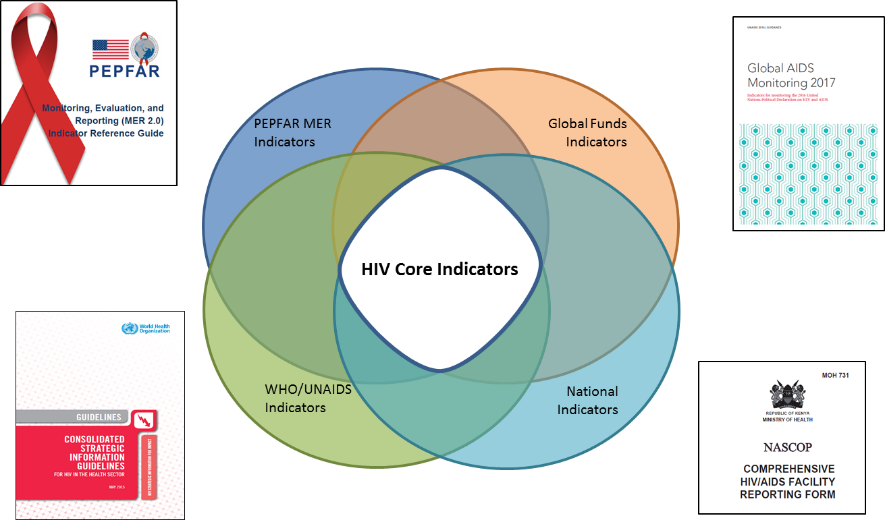
# Introduction to this Supplement

The Aggregate Data Exchange-HIV (ADX-HIV) Content Profile supports interoperable reporting of HIV aggregate data. Typically, this entails submission of routine HIV reports from a health facility to an administrative jurisdiction such as a health district and eventually to the national level as well as international reporting on the HIV response.

The motivating context for this content profile originates in the ongoing efforts to address the HIV epidemic in limited resource environments though its potential use is not restricted to these environments. The health information system that enjoys national coverage in such diverse settings is often the routine reporting system. This is the national health management information system (HMIS) which gathers aggregate data from all health facilities so that HIV and other health indicators can be generated, compared and analyzed to produce information to facilitate decision making on relevant course of action and interventions.

The ADX profile provides a way to define a Data structure Definition (DSD) and the normative schema of the aggregate data message to be exchange between systems for a particular indicator report. However, the lack of a common DSD with core structural metadata (codelists with data elements and associated disaggregation) to represent core HIV indicators that could be readily used in existing systems to report HIV indicator data that are similar across different jurisdictions. This may affect ADX uptake because each organization is required to create their HIV schema for reporting these core HIV indicators and it may not ensure that indicator data reported from the same source to different jurisdictions is comparable.

An ADX profile that defines a common DSD for HIV core indicators with data elements and associated disaggregation that can be readily used by several jurisdictions such as Ministries of health, WHO, and health initiatives such as, the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR), Global Fund or UNAIDS (see figure 1).



**Figure 1: A Venn diagram of core HIV care and treatment indicators from different jurisdictions**

This ADX-based Profile describes a DSD and associated schemas for producing a HIV ADX conformant message with core HIV indicator data that satisfies reporting requirements for diverse jurisdictions. A jurisdiction can extend the HIV DSD and validation schemas to meet additional HIV reporting requirements specific to their context.

**Approach**

This

## Open Issues and Questions

There is no standard or coding systems for the age groups.

The age groups from the existing indicators published by different jurisdictions or organizations are not harmonized.

## Closed Issues

There is no standard or coding systems for the age groups.

**RESOLUTION**: Adopted the ISO8601 to create codes for age groups.

The age groups from the existing indicators published by different jurisdictions or organizations are not harmonized.

**RESOLUTION:** Map the age groups across the jurisdictions. For ADX-HIV Profile the age group selected shall be fine enough to allow computation of the age groups from the other jurisdictions.

# General Introduction

Update the following appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.

# Appendix A – Actor Summary Definitions

Add the following actors to the IHE Technical Frameworks General Introduction list of actors:

| Actor | Definition |
| --- | --- |
| Content Data Structure Creator | The Content Data Structure Creator creates a message structure definition that may be employed by a Content Creator to develop profile-conformant messages for exchange with a Content Consumer. |
| Content Data Structure Consumer | The Content Data Structure Consumer consumes a message structure definition that may be employed by a Content Creator to develop profile-conformant messages for exchange with a Content Consumer. |

# Appendix B – Transaction Summary Definitions

Add the following transactions to the IHE Technical Frameworks General Introduction list of Transactions:

|  |  |  |
| --- | --- | --- |
| Transaction | Code | Definition |
| ADX POST Content | QRPH-53 | The POST Content transaction is used by the Content Creator to perform an HTTP POST request on the Content Consumer. |

Glossary

Add the following glossary terms to the IHE Technical Frameworks General Introduction Glossary:

No new glossary terms.

Volume 1 – Profiles

## Copyright Licenses

NA

Add the following to the IHE Technical Frameworks General Introduction Copyright section:

## Domain-specific additions

NA

Add Section X …

# X Aggregate Data Exchange-HIV (ADX-HIV) Profile

The Aggregate Data Exchange –HIV (ADX-HIV) Profile specifies how to create and consume ADX messages for core HIV care and treatment indicators. ADX-HIV leverages the actors and transactions defined in the ADX profile to enables interoperable reporting of routine HIV indicator data.

ADX-HIV is a Content Profile that defines a common Data Structure Definition (DSD) with structural metadata (codelists with data elements and associated disaggregation) to represent HIV core indicators that could be readily used in existing systems for reporting. Additionally, it specifies how to create and extend HIV care and treatment normative schema for producing, validating and processing aggregate data by diverse Content Creators and Content Consumer of these core HIV indicators.

Presently, several information systems used to monitor progress towards achieving epidemic control and 90-90-90 global goals: 90 percent of people with HIV diagnosed, 90 percent of them on ART and 90 percent of them virally suppressed by 2020, are coded to accept inbound ADX message as long as it has the ADX 3 mandatory data elements. In practice, indicator metadata used for reporting HIV care and treatment indicators are dependent on organization or jurisdiction publishing them. ADX-HIV Profile will help govern and enforce interoperability between HIV point of care (source) systems and HMIS (receiver) systems, which will reduce the burden within jurisdictions for developing HIV core indicators schema, foster harmonization of HIV core indicator metadata across jurisdictions as well as increase the ability to compare results between health facilities, subnational levels and even countries.

## X.1 ADX-HIV Actors, Transactions, and Content Modules

This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A at [http://ihe.net/Technical\_Frameworks](http://ihe.net/Technical_Frameworks/).

Figure X.1-1 shows the actors directly involved in the ADX-HIV Profile and the direction that the content is transmitted. Although the Content Creator employs the Data Structure Definition created by the Content Data Structure Creator, there is not a message exchange transaction, per se, between these actors.

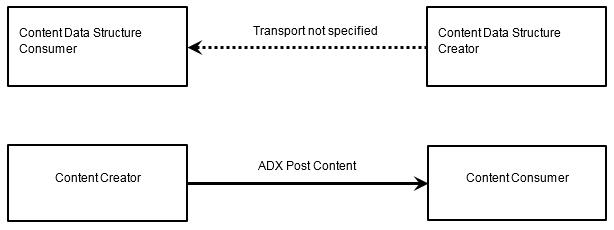


Figure X.1-1: ADX-HIV Actor Diagram

Table X.1-1 lists the content module(s) defined in the ADX-HIV Profile. To claim support for this profile, an actor shall support all required content modules (labeled “R”) and may support optional content modules (labeled “O”).

Table X.1-1: ADX-HIV Profile - Actors and Content Modules

| Actors | Content Modules | Optionality | Reference |
| --- | --- | --- | --- |
| Content Data Structure Creator | HIV ADX/DSD | R |  |
| HIV ADX/XSD | R |  |
| Content Data Structure Consumer | HIV ADX/DSD | R |  |
| Content Creator | HIV ADX/XML | R |  |
| Content Consumer | HIV ADX/XML | R |  |

### X.1.1 Actor Descriptions and Actor Profile Requirements

#### X.1.1.1 Content Data Structure Creator

A Content Data Structure Creator defines the structure of XML data to be exchanged between a Content Creator and Content Consumer.

A Content Data Structure Creator shall create two normative message structure definition files.

1. A HIV Data Structure Definition (DSD) file conformant to the normative ADX schematron specification.
2. a W3C-conformant XML Schema Definition (XSD) file matching the result generated by the normative XSLT transform from HIV DSD to XSD.

#### X.1.1.2 Content Data Structure Consumer

A Content Data Structure Consumer consumes an HIV ADX DSD file produced by a Content Data Structure Creator. Typically the system implementing this actor role will also be a Content Creator. The HIV DSD can be used to configure the Content Creator to produce valid content.

#### X.1.1.3 Content Creator

A Content Creator shall be able to generate an XML file that is conformant to the schema defined by the DSD and XSD files produced by the Content Data Structure Creator.

#### X.1.1.4 Content Consumer

A Content Consumer shall be able to process an XML stream that is conformant to the schema defined by the HIV DSD and XSD files produced by the Content Data Structure Creator. What it means to process the xml stream depends on the nature of the processor. For example, it might persist the individual data tuples, or it might format them for display or perform further aggregation on the data.

## X.2 Actor Options

Table X.2-1: ADX - Actors and Options

| Actor | Option Name | Reference |
| --- | --- | --- |
| Content Data Structure Creator | No options defined | -- |
| Content Data Structure Consumer | No options defined | -- |
| Content Creator | POST Content | X 2.1 |
| Content Consumer | No options defined | -- |

### X.2.1 ADX POST Content

A Content Creator may support the action to post content to a Content Consumer using the ADX POST Content transaction. This is an option rather than a mandatory conformance requirement to support use cases where a Content Creator produces a conformant ADX-HIV data message but may have to transport it by other means (for example USB memory stick or email).

## X.3 ADX-HIV Required Actor Groupings

There are no Required Actor Groupings defined.

## X.4 ADX-HIV Overview

In many countries, several jurisdictions/organizations are involved in providing or monitoring HIV services. In practice, indicator metadata used for reporting HIV care and treatment is dependent on organization or jurisdiction publishing them. ADX-HIV defines the normative schemas used for producing, validating and processing messages for core HIV indicators by diverse Content Creators and Content Consumers to satisfy HIV reporting requirements for several jurisdictions.

The core indicators used for monitoring HIV towards achieving UNAIDS 90-90-90 goal of 90 percent of people with HIV diagnosed, 90 percent of them on ART and 90 percent of them virally suppressed are required by several jurisdictions including ministries of health, WHO, PEPFAR, Global Fund and UNAIDS for HIV reporting. In practice, the metadata, such as data elements and associated disaggregations, used for reporting these HIV care and treatment indicators are dependent on organization or jurisdiction publishing them. This requires each organization implementing ADX Profile to create their ADX schema for reporting these HIV core indicators.

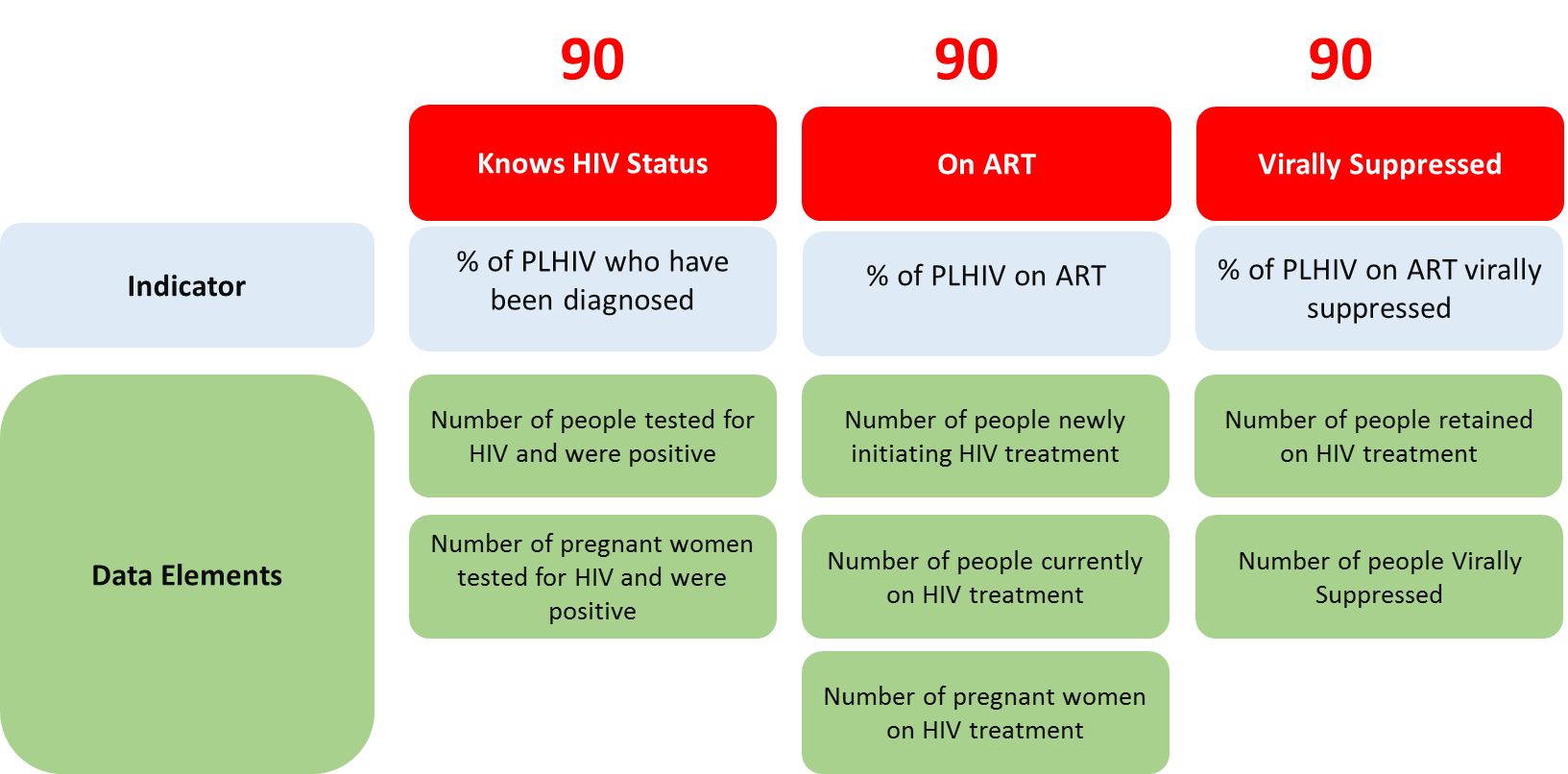


Figure X.4-1: Core HIV indicators for monitoring and evaluation of the 90-90-90 goals

The ADX-HIV is based on QRPH Aggregate Data Exchange (ADX) Profile. It defines an ADX-conformant DSD consisting of data elements for the core indicators used for monitoring HIV 90-90-90 goal with associated disaggregation that can be readily used by different jurisdictions. An XML schema definition (XSD) generated from the DSD is also provided for validating the messages exchanged. Additional data elements and their disaggregations may be defined as necessary within the context of use - for example, within a particular country or implementing jurisdiction to meet the established reporting requirements. The inputs and process for creating and using ADX-HIV message schema is illustrated by Figure X.4-2.

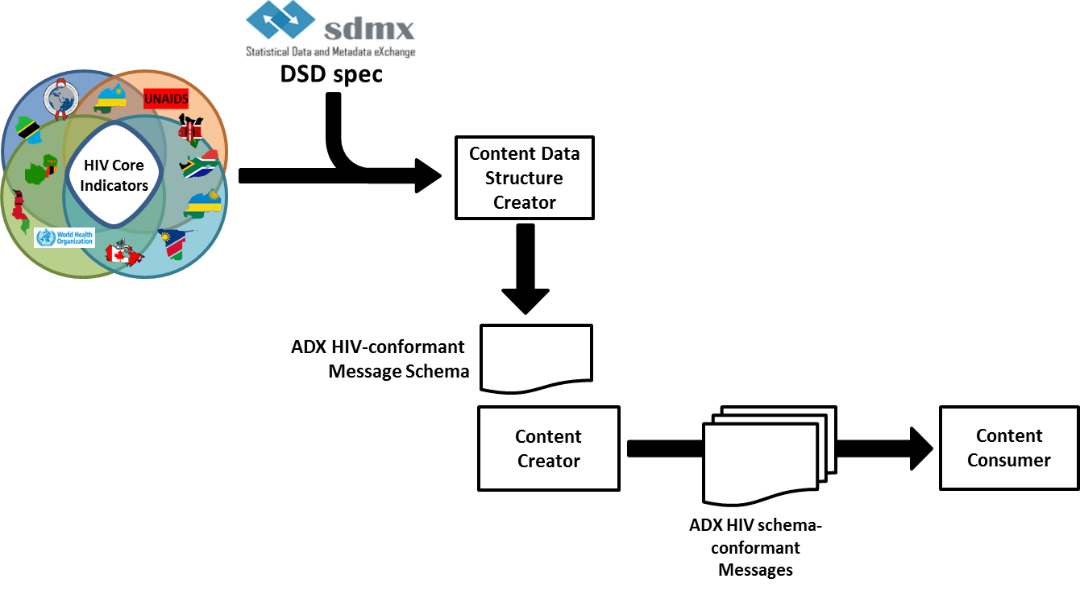


Figure X.4-2: An illustration of ADX-HIV Profile inputs and outputs

### X.4.1 Concepts

The following concepts are used in this profile:

**Data Structure Definition (DSD):** a formal SDMX v2.1 definition of the structural metadata of an ADX message.

**Data value:** a reported value with its associated keys

**Data Value Set:** a collection of data values conforming to the ADX DSD.

**Data element:** the atomic subject of data collection such as “number of bed nets distributed”, “number of confirmed malaria cases”, “number of midwives”. This concept is required for the construction of public health indicators, but is not in itself an indicator.

**Organization Unit:** the spatial dimension of the data value tuple. It can identify a single health facility or a geographic/administrative area such as district, province or country. Within a national reporting structure, an organization unit represents a single node in a reporting hierarchy.

**Time:** the temporal dimension of the data value tuple. For routine data this would represent a time period such as the month of January 2015, the ISO8601 week number 3 of 2015, or the year 2015.

**Value:** the recorded value which is keyed in the data value tuple.

### X.4.2 Use Cases

#### X.4.2.1 Use Case #1: Routine reporting of HIV indicator data from EMR

This use case describes reporting of aggregate data from patient level information systems such as EMRs to an aggregate data system such as a national Health Management Information System (HMIS).

##### X.4.2.1.1 Routine reporting from EMR: Use Case Description

To deal with the challenge of continuity of care, most HIV treatment centers at health facilities have acquired an EMR system to manage patients. In most cases, patient data is captured on paper encounters or registers during visits and later entered into the EMRs. Typically, HIV indicator data is aggregated every month at the health facilities providing HIV care and treatment services and submitted into the national aggregate information system. The reports demanded of the facility are complex, so there are considerable benefits in terms of reducing reporting burden as well as increasing accuracy to extracting reports from the EMR.

Using ADX-HIV Profile will provide HIV indicator structural metadata that can be readily used to generate ADX-conformant messages from EMRs at health facilities. The ADX-conformant message is sent by the facility EMR (acting as a Content Creator) to the aggregate data system (acting as a Content Consumer) at the national level as illustrated by Figure X.4.2.3.1-2. Such a message exchange improves the timeliness and efficiency of the HMIS data reporting workflow.

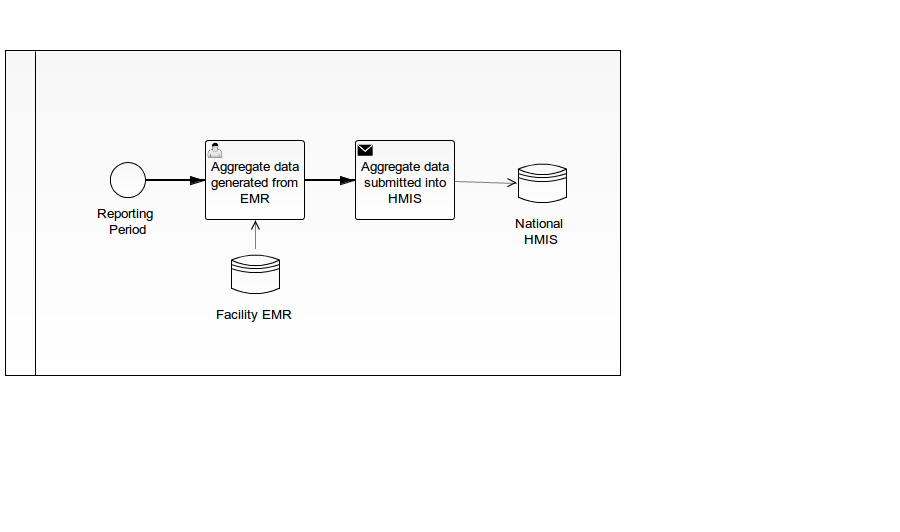


Figure X.4.2.3.1-2: Routine reporting of HIV aggregate data from Facility to National system

This use case could also be used for reporting indicator data from a national patient level data repository to a national HMIS.

#### X.4.2.2 Use Case #2: Reporting data from HMIS to Other Aggregate Data Repositories

This use case describes ADX-HIV profile enabling the reporting of aggregate data from an aggregate data system to another aggregate data system. For example, global reporting of HIV indicators from a national HMIS and to a global aggregate data repository.

##### X.4.2.2.1 Reporting national data from HMIS: Use Case Description

To facilitate routine reporting of HIV indicator data from countries, country offices may generate aggregate data from national HMIS for submission to regional or global organizations. In this case, the national HMIS is the Content Creator that generates HIV core indicator data to be consumed by global aggregate data repositories or observatories, such as UNAIDS Global AIDS Response Progress Reporting (GARPR) online tool and PEPFAR information system, Data for Accountability, Transparency and Impact (DATIM), for monitoring health goals. This could also include reporting from a sub-national M&E system to the national HMIS.

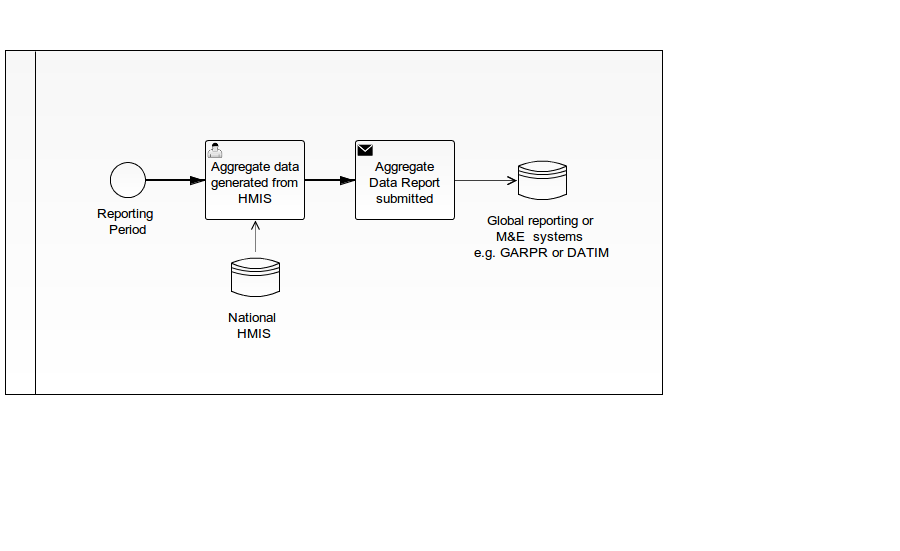


Figure X.4.2.4.1-1: Global reporting to M&E Systems (e.g., DATIM)

## X.5 ADX-HIV Security Considerations

The ADX Profile does not support the exchange of person-centric health information. Therefore, this profile does not specify security mechanisms, such as the ITI Audit Trail and Node Authentication (ATNA) Profile, that would be required were that the case. Implementers should nevertheless be sensitive to the possibility of approximate personal identification arising from aggregate data derived from small population sets. Transport of such data should be safeguarded according to jurisdictional guidelines.

## X.6 ADX-HIV Cross Profile Considerations

There are no Cross Profile considerations.

Appendices

None

Volume 2 – Transactions

There are no new transactions identified by this profile.

Appendices

Volume 2 Namespace Additions

There are no new Volume 2 Namespace additions

Volume 3 – Content Modules

# 5 Namespaces and Vocabularies

The following are namespaces referred to in ADX profile together with the prefix which is used to refer to that namespace within this document.

|  |  |  |
| --- | --- | --- |
| Namespace | Prefix | Description |
| http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/message | Mes | SDMX 2.1 message |
| http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/structure | Str | SDMX 2.1 structure definitions |
| http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common | Com | SDMX 2.1 common elements |
| <http://www.w3.org/2001/XMLSchema> | Xs | W3C Schema |
| urn:ihe:qrph:adx:2015 |  | ADX data payload |

# 6 Content Modules

CDA®[[1]](#footnote-1) Content Modules *-* Not applicable

# 7 Content Modules

DICOM®[[2]](#footnote-2) Content Modules -Not applicable

# 8 ADX Content Modules

This section defines Content Modules for the Aggregate Data Exchange (ADX) Profile.

## 8.1 ADX-HIV Content Module

This content Profile define an ADX DSD and the associated normative schema of the data message for core HIV indicators published by global organizations and ministries of health on reportable indicators for monitoring HIV 90-90-90 goal.

## 8.2 The ADX-HIV profile

The ADX-HIV Content Profile Content Data Structure Creator creates ADX-conformant DSD and XSD files for HIV core indicators. The ADX-HIV Content Data Structure Creator will use harmonized metadata (codelists with data elements and associated disaggregation) to represent HIV core indicators published by several implementing jurisdictions globally.

* An ADX-HIV compliant DSD based on ADX profile specification as described in Section 8.2.1 and formally expressed as a Schematron rule set in Appendix 8A.
* An ADX-HIV compliant schema is a compliant W3C XML schema (XSD). It can be derived from an ADX\_HIV compliant Data Structure Definition (DSD), as described in Section 8.2.2. The generation of an ADX-HIV schema from an ADX-HIV DSD makes use of a normative XSLT stylesheet provided in Appendix 8B. A sample ADX-HIV compliant schema is provided in the informative Appendix 8G.

Content Creators and Content Consumers use the HIV DSD and XSD and exchange a data payload that conforms to an ADX compliant schema. A sample ADX-HIV compliant data payload is provided in the informative Appendix 8I.

Additional (informative) message constraints for interoperability of ADX-HIV data exchange which are outside of the scope of this profile are described in Section 8.4.

### 8.2.1 ADX-HIV Data Structure Definition (DSD)

The purpose of this DSD is to provide a common structural metadata (codelists with data elements and associated disaggregation) to represent HIV core indicators that could be readily used in existing systems. An ADX-HIV compliant DSD shall be compliant with a well-formed ADX DSD document. This Section 8.2.1 provides a description of the HIV ADX DSD content.

#### 8.2.1.1 ADX-HIV DSD Data elements

Text to be added once we finalize selecting data elements to be used

#### 8.2.1.2 ADX-HIV DSD Disaggregations

Text to be added once we finalize selecting disaggregation and codes to be used

### 8.2.2 ADX-HIV Schemas

The schemas shall be used for validating HIV aggregate data produced by the Content Creator.

Additional details to be added when the samples are finalized.

## 8.3 Generating the schema for an ADX data payload

ADX data within a particular jurisdiction shall be constrained by a schema which is generated from the ADX DSD. That schema shall be generated by applying the XSLT transformation given in Appendix 8B to the ADX compliant DSD file.

This transformation assumes that all structure elements appear inline in the DSD XML document. Where external references are used, the DSD may be pre-processed, for example using the transformation provided in Appendix 8C.

## 8.4 ADX Message Exchange Constraints (Informative)

There are implicit assumptions regarding the sharing of additional metadata between Content Creators and Content Consumers which are not covered within the scope of the ADX Profile. In order to ensure semantic validity of the exchanged data, the constraints described below shall be specified using processes not defined by this profile:

* The data elements to be reported for particular orgUnits. For example, reporting ‘Number of lab Tests performed’ from a health facility which did not perform laboratory tests is not constrained by ADX.
* The disaggregation dimensions which are expected for particular data elements.
* The Value type (real or integer) expected for individual data elements.
* Which period types are appropriate for which data elements.

The preceding is not an exhaustive list. Other business rules that may affect interoperability may need to be established such as bounds on data values, bounds on date ranges, relationships between different data elements (e.g., the sum of these data elements cannot be greater than the sum of those data elements, etc.).

Appendices to Section 8

# Appendix 8A – (Normative) Schematron constraining ADX/DSD

Current working copy available at <https://github.com/dhis2/adx/blob/master/IHE2017/schema/dsd_validation.sch>.

<?xml version="1.0" encoding="UTF-8"?>

<schema xmlns="http://purl.oclc.org/dsdl/schematron"

queryBinding="xslt"

xmlns:h="http://www.w3.org/1999/xhtml">

<title>Validation of ADX Data Structure Definition</title>

<p>An ADX profiled Data Structure Definition (DSD) is

(i) a well formed XML document and

(ii) a valid SDMX 2.1 Strucure message and

(iii) is further subject to additional constraints expressed in

this schematron schema.

</p>

<p>The following are namespaces defined in SDMX 2.1 which are used in

an ADX profiled DSD</p>

<ns prefix="mes" uri="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/message" />

<ns prefix="str" uri="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/structure" />

<ns prefix="com" uri="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common" />

<pattern >

<title>Testing that Structures are all present</title>

<rule context="mes:Structure">

<assert test="count(mes:Structures)=1">

There shall be a single mes:Structures element in the message.

</assert>

</rule>

<rule context="mes:Structures" >

<assert test="count(str:Codelists)=1">

There shall be a single Codelists element.

</assert>

<assert test="count(str:Concepts)=1">

There shall be a single Concepts element.

</assert>

<assert test="count(str:DataStructures/str:DataStructure)=1">

There shall be a single DataStructure element.

</assert>

<let name="ADX\_Concepts" value="str:Concepts/str:ConceptScheme[

@id='ADX\_MANDATORY\_CONCEPTS' and @agencyID='IHE\_QRPH']"/>

<assert

test="count($ADX\_Concepts)=1">

There shall be a ConceptScheme with @id='ADX\_MANDATORY\_CONCEPTS' and

@agencyID='IHE\_QRPH'.

</assert>

</rule>

</pattern>

<pattern>

<title>Testing DataStructureComponents</title>

<let name="components" value="str:DataStructureComponents" />

<let name="dimensions" value="$components/str:DimensionList"/>

<rule context="str:DataStructure/str:DataStructureComponents">

<assert test="count(str:Group[@id='OUTER\_DIMENSIONS'])=1">

There shall be a Group with @id='OUTER\_DIMENSIONS'

</assert>

</rule>

<p>The dimension list shall include the mandatory dimensions</p>

<rule context="str:DimensionList">

<let name="dataElementDimension" value="str:Dimension[@id='dataElement']" />

<let name="orgUnitDimension" value="str:Dimension[@id='orgUnit']" />

<let name="periodDimension" value="str:TimeDimension[@id='TIME\_PERIOD']" />

<assert test="count($dataElementDimension)=1">

There shall be a dimension with @id='dataElement'.

</assert>

<assert test="count($orgUnitDimension)=1">

There shall be a dimension with @id='orgUnit'.

</assert>

<assert test="count($periodDimension)=1">

There shall be a TimeDimension with @id='TIME\_PERIOD'.

</assert>

</rule>

<p>

The dataElement dimension must be linked to the mandatory 'dataElement' concept and

provide a LocalRepresentation.

</p>

<rule context="str:Dimension[@id='dataElement']">

<assert

test="str:ConceptIdentity/Ref/@id='dataElement'">

@id of dataElement concept reference must be 'dataElement'.

</assert>

<assert

test="str:ConceptIdentity/Ref/@maintainableParentID='ADX\_MANDATORY\_CONCEPTS'">

@maintainableParentID of dataElement dimension concept reference

must be 'ADX\_MANDATORY\_CONCEPTS'.

</assert>

<assert test="count(str:LocalRepresentation)=1">

dataElement dimension must provide LocalRepresentation.

</assert>

</rule>

<p>

The orgUnit dimension must be linked to the mandatory 'orgUnit' concept and

provide a LocalRepresentation.

</p>

<rule context="str:Dimension[@id='orgUnit']">

<assert

test="str:ConceptIdentity/Ref/@id='orgUnit'">

@id of orgUnit concept reference must be 'orgUnit'.

</assert>

<assert

test="str:ConceptIdentity/Ref/@maintainableParentID='ADX\_MANDATORY\_CONCEPTS'">

@maintainableParentID of orgUnit dimensions concept reference

must be 'ADX\_MANDATORY\_CONCEPTS'.

</assert>

<assert test="count(str:LocalRepresentation)=1">

orgUnit dimension must provide LocalRepresentation.

</assert>

</rule>

<p>

The TimeDimension must be linked to the mandatory 'period' concept and

provide a LocalRepresentation.

</p>

<rule context="str:TimeDimension">

<assert

test="str:ConceptIdentity/Ref/@id='period'">

@id of orgUnit concept reference must be 'period'.

</assert>

<assert

test="str:ConceptIdentity/Ref/@maintainableParentID='ADX\_MANDATORY\_CONCEPTS'">

@maintainableParentID of period dimension concept reference

must be 'ADX\_MANDATORY\_CONCEPTS'.

</assert>

<let name="periodFormat" value="str:LocalRepresentation/str:TextFormat/@textType"/>

<assert test="$periodFormat='TimeRange' or $periodFormat='DateTime'">

The time period format must be either 'TimeRange' or 'DateTime'.

</assert>

</rule>

<p>

The orgUnit and period dimensions must be attached to the outer group. The dataElement

dimesnion may not be in the outer group.

</p>

<rule context="str:Group[@id='OUTER\_DIMENSIONS']">

<assert test="count(str:GroupDimension/str:DimensionReference/Ref[@id='orgUnit'])=1" >

The orgUnit dimension must appear once in the 'OUTER\_DIMENSIONS' group.

</assert>

<assert test="count(str:GroupDimension/str:DimensionReference/Ref[@id='TIME\_PERIOD'])=1" >

The period dimension must appear once in the 'OUTER\_DIMENSIONS' group.

</assert>

<assert test="count(str:GroupDimension/str:DimensionReference/Ref[@id='dataElement'])=0" >

The period dimension must appear once in the 'OUTER\_DIMENSIONS' group.

</assert>

</rule>

<p>

The PrimaryMeasure must be linked to the mandatory 'value' concept.

</p>

<rule context="str:PrimaryMeasure">

<assert

test="str:ConceptIdentity/Ref/@id='value'">

@id of PrimaryMeasure concept reference must be 'value'.

</assert>

<assert

test="str:ConceptIdentity/Ref/@maintainableParentID='ADX\_MANDATORY\_CONCEPTS'">

@maintainableParentID of PrimaryMeasure concept reference

must be 'ADX\_MANDATORY\_CONCEPTS'.

</assert>

</rule>

</pattern>

</schema>

# Appendix 8B – (Normative) XSLT to generate ADX/XSD schema from DSD

Current working copy available at <https://github.com/dhis2/adx/blob/master/IHE2017/xslt/dsd2adx2.xsl>.

<?xml version="1.0" encoding="UTF-8"?>

<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"

xmlns:xs="http://www.w3.org/2001/XMLSchema"

xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/structure"

exclude-result-prefixes="xs" version="1.0">

<xsl:output encoding="UTF-8" xml:space="preserve" method="xml" indent="yes"/>

<!--

This stylesheet is a normative part of the ADX profile (urn:ihe:qrph:adx:2015)

When applied to an ADX conformant SDMX Data Structure Definition it emits

a W3C XML Schema document sutiable for validation of ADX data payloads.

-->

<!-- ===============================================================================

Variable declarations

=============================================================================== -->

<!-- Dimension nodes -->

<xsl:variable name="dimensions" select="//str:Dimension"/>

<!-- Jurisdiction specific Dimensions at group level -->

<xsl:variable name="outerDimensions"

select="$dimensions[//str:Group[@id='OUTER\_DIMENSIONS']/descendant::Ref/@id = @id

and @id != 'orgUnit']"/>

<!-- Jurisdiction specific Dimensions at dataValue level -->

<xsl:variable name="innerDimensions"

select="$dimensions[not (//str:Group[@id='OUTER\_DIMENSIONS']/descendant::Ref/@id = @id )

and str:ConceptIdentity/Ref/@id != 'dataElement']"/>

<!-- Mandatory dimensions -->

<xsl:variable name="orgUnitDimension" select="$dimensions[@id='orgUnit']" />

<xsl:variable name="dataElementDimension" select="$dimensions[@id='dataElement']" />

<!-- Reference to the orgUnit code list -->

<xsl:variable

name="orgUnitCLRef"

select="$orgUnitDimension/str:LocalRepresentation/str:Enumeration/Ref" />

<!-- Construction of the orgUnit type name -->

<xsl:variable name="orgUnitType"

select="concat($orgUnitCLRef/@id,'\_',$orgUnitCLRef/@agencyID,'\_',

$orgUnitCLRef/@version,'\_Type')" />

<!-- Reference to the dataElement code list -->

<xsl:variable

name="dataElementCLRef"

select="$dataElementDimension/str:LocalRepresentation/str:Enumeration/Ref" />

<!-- Construction of the dataElement type name -->

<xsl:variable name="dataElementType"

select="concat($dataElementCLRef/@id,'\_',

$dataElementCLRef/@agencyID,'\_',$dataElementCLRef/@version,'\_Type')" />

<!-- The dataSet identifier -->

<xsl:variable name="dataSetId"

select="//str:DataStructure/@id"/>

<!-- ===============================================================================

Root Template Match

=============================================================================== -->

<xsl:template match="/">

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"

xmlns="urn:ihe:qrph:adx:2015"

xmlns:common="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common"

targetNamespace="urn:ihe:qrph:adx:2015" elementFormDefault="qualified">

<!-- Copyright notice -->

<xs:annotation>

<xs:documentation> This is an example of a tightly constrained schema which should

validate an adx data document which has been formed in compliance with the

sample SDMX DSD. </xs:documentation>

</xs:annotation>

<xs:import namespace="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common"

schemaLocation="sdmx/SDMXCommon.xsd"/>

<!-- generate enumerated types for dimensions -->

<xsl:apply-templates select="//str:Codelist"/>

<!-- generate dateTime type -->

<xsl:apply-templates select="//str:TimeDimension" />

<!-- generate complex types -->

<xsl:call-template name="adx" />

<xsl:call-template name="group" />

<xsl:call-template name="dataValue" />

<xs:element name="adx" type="adxType"/>

</xs:schema>

</xsl:template>

<!-- ================================================================================

Complex Element types

1. ADX Root element type

================================================================================= -->

<xsl:template name="adx">

<xs:complexType name="adxType">

<xs:sequence maxOccurs="unbounded">

<xs:element name="group" type="groupType"/>

</xs:sequence>

<xs:attribute name="exported" use="required" type="xs:dateTime"/>

<xs:anyAttribute processContents="skip"/>

</xs:complexType>

</xsl:template>

<!-- ================================================================================

2. groupType

================================================================================= -->

<xsl:template name="group">

<xs:complexType name="groupType">

<xs:sequence maxOccurs="unbounded">

<xs:element name="dataValue" type="DataValueType"/>

</xs:sequence>

<xs:attribute name="dataSet" use="required" type="xs:string" fixed="{$dataSetId}"/>

<xs:attribute name="orgUnit" use="required" type="{$orgUnitType}"/>

<xs:attribute name="period" use="required" type="periodType"/>

<xsl:apply-templates select="$outerDimensions" />

<xs:anyAttribute processContents="skip"/>

</xs:complexType>

</xsl:template>

<!-- ================================================================================

3. dataValueType

================================================================================= -->

<xsl:template name="dataValue">

<xs:complexType name="DataValueType">

<xs:sequence maxOccurs="1" minOccurs="0">

<xs:element name="annotation" />

</xs:sequence>

<xs:attribute name="dataElement" use="required" type="{$dataElementType}"/>

<xs:attribute name="value" use="required" type="xs:decimal"/>

<xsl:apply-templates select="$innerDimensions" />

<xs:anyAttribute processContents="skip"/>

</xs:complexType>

</xsl:template>

<!-- ================================================================================

Type restrictions derived from SDMX DSD Codelists

================================================================================= -->

<xsl:template match="str:Codelist">

<xsl:variable name="type" select="concat(@id,'\_',@agencyID,'\_',@version,'\_Type')"/>

<xs:simpleType name="{$type}">

<xs:restriction base="xs:token">

<xsl:for-each select="str:Code">

<xs:enumeration value="{@id}"/>

</xsl:for-each>

</xs:restriction>

</xs:simpleType>

</xsl:template>

<!-- ================================================================================

Time dimension type

================================================================================= -->

<xsl:template match="str:TimeDimension">

<xsl:variable name="timeFormat" select="str:LocalRepresentation/str:TextFormat"/>

<xs:simpleType name="periodType">

<xsl:choose>

<xsl:when test="$timeFormat/@textType='DateTime'">

<xs:restriction base="xs:dateTime"/>

</xsl:when>

<xsl:when test="$timeFormat/@textType='TimeRange'">

<xs:restriction base="common:TimeRangeType"/>

</xsl:when>

<xsl:otherwise>

<xsl:message>

Only SDMX DateTime and TimeRange are supported types

</xsl:message>

</xsl:otherwise>

</xsl:choose>

</xs:simpleType>

</xsl:template>

<!-- ================================================================================

Produce attributes for dimension

================================================================================= -->

<xsl:template match="str:Dimension">

<xsl:variable name="conceptID" select="str:ConceptIdentity/Ref/@id"/>

<xsl:variable name="conceptSchemeID" select="str:ConceptIdentity/Ref/@maintainableParentID"/>

<xsl:choose>

<!-- if there is a LocalRepresentation, use that -->

<xsl:when test="str:LocalRepresentation">

<xsl:variable name="codelist" select="str:LocalRepresentation/str:Enumeration/Ref"/>

<xsl:variable name="type"

select="concat($codelist/@id,'\_',$codelist/@agencyID,'\_',$codelist/@version,'\_Type')"/>

<xs:attribute name="{$conceptID}" type="{$type}" use="optional"/>

</xsl:when>

<!-- otherwise lookup the CoreRepresentation for the Concept -->

<xsl:otherwise>

<xsl:variable name="concept"

select="//str:ConceptScheme[

@id=$conceptSchemeID]/str:Concept[@id=$conceptID]"/>

<xsl:variable name="codelist"

select="$concept/str:CoreRepresentation/str:Enumeration/Ref"/>

<xsl:variable name="type"

select="concat($codelist/@id,'\_',$codelist/@agencyID,'\_',$codelist/@version,'\_Type')"/>

<xs:attribute name="{$conceptID}" type="{$type}" use="optional"/>

</xsl:otherwise>

</xsl:choose>

</xsl:template>

</xsl:stylesheet>

# Appendix 8C – (Informative) DSD pre-processor to resolve external references

Current working copy available at <https://github.com/dhis2/adx/blob/master/IHE2017/xslt/dsd_preprocess.xsl>.

<?xml version="1.0" encoding="UTF-8"?>

<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"

xmlns:xs="http://www.w3.org/2001/XMLSchema"

xmlns:mes="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/message"

exclude-result-prefixes="xs"

version="1.0">

<!--

Stylesheet to pre-process an SDMX 2.1 DSD to pull in external references

-->

<xsl:strip-space elements="\*"/>

<xsl:output method="xml" indent="yes" />

<!-- The default action is to just copy each node to output - identity template -->

<xsl:template match="/ | @\* | node()">

<xsl:copy>

<xsl:apply-templates select="@\* | node()" />

</xsl:copy>

</xsl:template>

<!-- Copy in external references where indicated -->

<xsl:template match="\*[@isExternalReference = 'true' and @structureURL]">

<xsl:message>

External reference for <xsl:value-of select="name()"/> fetched from <xsl:value-of select="@structureURL"/>

</xsl:message>

<xsl:variable name="elementName" select="name()"/>

<xsl:variable name="id" select="@id"/>

<xsl:variable name="agencyID" select="@agencyID"/>

<xsl:variable name="version" select="@version"/>

<xsl:copy-of select="document(@structureURL)//\*[name()=$elementName

and @id=$id and @agencyID=$agencyID and @version=$version]" />

</xsl:template>

</xsl:stylesheet>

# Appendix 8D – (Normative) XSLT for generating ADX-HIV validation Schema

Current working copy available at https://github.com/dhis2/adx/blob/master/IHE2017/xslt/dsd2schematron.xsl.

<?xml version="1.0" encoding="UTF-8"?>

<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"

xmlns:xs="http://www.w3.org/2001/XMLSchema"

xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/structure"

xmlns:com="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common"

xmlns:sch="http://purl.oclc.org/dsdl/schematron"

exclude-result-prefixes="xs" version="1.0">

<xsl:output encoding="UTF-8" xml:space="preserve" method="xml" indent="yes"/>

<!--

This stylesheet is a normative part of the ADX profile (urn:ihe:qrph:adx:2015)

When applied to an ADX conformant SDMX Data Structure Definition it emits

a W3C XML Schema document suitable for validation of ADX data payloads.

-->

<!-- ===============================================================================

Variable declarations

================================================================ -->

<!-- The dataSet identifier -->

<xsl:variable name="dataSetId"

select="//str:DataStructure/@id"/>

<xsl:variable name="customConcepts"

select="//str:ConceptScheme[not(@id='ADX\_MANDATORY\_CONCEPTS')]/str:Concept/@id" />

<!-- ===============================================================================

Root Template Match

=============================================================================== -->

<xsl:template match="/">

<sch:schema >

<sch:ns uri="urn:ihe:qrph:adx:2015" prefix="adx"/>

<xsl:apply-templates select="//str:Codelist[@id='CL\_DataElements']"/>

</sch:schema>

</xsl:template>

<xsl:template match="str:Codelist">

<sch:pattern >

<sch:title>Validating ADX aggregations</sch:title>

<sch:p> The ADX xsd schema validates that correct codes are used in code lists. Applying

this set of rules in addition ensures that datavalues are reported with the correct

disaggregations. </sch:p>

<xsl:apply-templates select="str:Code"/>

</sch:pattern>

</xsl:template>

<xsl:template match="str:Code">

<xsl:variable name="apos">'</xsl:variable>

<xsl:variable name="code" select="@id"/>

<xsl:variable name="context"

select="concat('adx:dataValue[@dataElement=',$apos,$code,$apos,']')"/>

<xsl:variable name="disaggs"

select="com:Annotations/com:Annotation[@id='Disaggregation']/com:AnnotationText"/>

<sch:rule context="{$context}">

<xsl:for-each select="$customConcepts">

<xsl:choose>

<xsl:when test=".=$disaggs">

<xsl:variable name="test" select="concat('@',.)"/>

<sch:assert test="{$test}">

<xsl:value-of select="concat('@',.,' must be present on element ',$code)"/>

</sch:assert>

</xsl:when>

<xsl:otherwise>

<xsl:variable name="test" select="concat('@',.)"/>

<sch:assert test="not({$test})">

<xsl:value-of select="concat('@',.,' is not permitted on element ',$code)"/>

</sch:assert>

</xsl:otherwise>

</xsl:choose>

</xsl:for-each>

</sch:rule>

</xsl:template>

</xsl:stylesheet>

# Appendix 8E – (Normative) ADX Mandatory ConceptScheme

Current working copy available at <https://github.com/dhis2/adx/blob/master/IHE2017/samples/qrph_structures.xml>.

<?xml version="1.0" encoding="UTF-8"?>

<mes:Structure xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:schemaLocation="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/message ../schema/sdmx/SDMXMessage.xsd"

xmlns:com="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common"

xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/structure"

xmlns:mes="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/message">

<mes:Header>

<mes:ID>ADX\_STRUCTURES</mes:ID>

<mes:Test>false</mes:Test>

<mes:Prepared>2015-05-01T14:30:47.000Z</mes:Prepared>

<mes:Sender id="IHE\_QRPH">

<com:Name xml:lang="en">QRPH Technical Committee</com:Name>

</mes:Sender>

</mes:Header>

<mes:Structures>

<str:OrganisationSchemes>

<str:AgencyScheme id="AGENCIES" agencyID="IHE\_QRPH">

<com:Name>List of AGENCY identifiers maintained by IHE QRPH</com:Name>

<str:Agency id="IHE\_QRPH" >

<com:Name>IHE Quality Research and Public Health Technical Committee</com:Name>

</str:Agency>

</str:AgencyScheme>

</str:OrganisationSchemes>

<str:Concepts>

<!-- ADX Mandatory concepts -->

<str:ConceptScheme id="ADX\_MANDATORY\_CONCEPTS" agencyID="IHE\_QRPH" version="1.0">

<com:Name xml:lang="en">Mandatory concepts defined by IHE ADX profile</com:Name>

<!-- There is no default representation for these concepts. An Agency which makes

use of these to construct an ADX DataStructure has to provide a local representation -->

<str:Concept id="dataElement">

<com:Name xml:lang="en">Subject of the data measure</com:Name>

</str:Concept>

<str:Concept id="orgUnit">

<com:Name xml:lang="en">Spatial dimension of the measure</com:Name>

</str:Concept>

<str:Concept id="period">

<com:Name xml:lang="en">Temporal dimension of the measure</com:Name>

</str:Concept>

<!-- The value concept is represented by an integer or real number (xsd:decimal)-->

<str:Concept id="value">

<com:Name xml:lang="en">Value of the data measure</com:Name>

<str:CoreRepresentation>

<str:TextFormat textType="Decimal"/>

</str:CoreRepresentation>

</str:Concept>

</str:ConceptScheme>

</str:Concepts>

</mes:Structures>

</mes:Structure>

# Appendix 8F – (Informative) Sample ADX-HIV DSD

Current working copy available at

# Appendix 8G – (Informative) Generated sample ADX-HIV data schema

Current working copy available at

<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns="urn:ihe:qrph:adx:2015" xmlns:common="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common" xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/structure" targetNamespace="urn:ihe:qrph:adx:2015" elementFormDefault="qualified">

<xs:annotation>

# Appendix 8H – (Informative) ADX-HIV schema for validating disaggregation

Current working copy available at

<?xml version="1.0" encoding="UTF-8"?>

<sch:schema xmlns:sch="http://purl.oclc.org/dsdl/schematron"

xmlns:str="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/structure"

xmlns:com="http://www.sdmx.org/resources/sdmxml/schemas/v2\_1/common" >

<sch:ns uri="urn:ihe:qrph:adx:2015" prefix="adx"/>

</sch:schema>

# Appendix 8I – (Informative) Sample ADX-HIV data

Current working copy available at

<?xml version="1.0" encoding="UTF-8"?>

<adx xmlns="urn:ihe:qrph:adx:2015"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:schemaLocation="urn:ihe:qrph:adx:2015 ../schema/adx\_sample\_generated.xsd"

exported="2015-02-08T19:30:00Z">

<group orgUnit="342" period="2015-01-01/P1M" dataSet="MALARIA" mechanism="PEPFAR">

<dataValue dataElement="MAL01" value="32" />

<dataValue dataElement="MAL02" value="20" />

<dataValue dataElement="MAL04" value="10" ageGroup="under5" sex="M" />

<dataValue dataElement="MAL04" value="10" ageGroup="under5" sex="F"/>

<dataValue dataElement="MAL04" value="10" ageGroup="5andOver" sex="M"/>

<dataValue dataElement="MAL04" value="10" ageGroup="5andOver" sex="F"/>

</group>

</adx>

# Appendix 8J – (Informative) Formatting of times and time intervals in ADX

The SDMX v2.1 DSD ObservationalTimePeriod data type allows a variety of formats for specifying time periods, with the result that there are several equivalent ways of expressing the same period. In the interest of greater and easier interoperability, the normative transform in Appendix 8B restricts the available options to an SDMX ObservationalTimePeriod. This can be either a xs:dateTime, or a com:TimeRange, as specified under the str:TimeDimension element of the DSD.

xs:dateTime is formatted as yyyy-mm-ddThh:mm:sszzzzzz, where:

yyyy is the year

mm is the month (01-12)

dd is the day of the month (01-31)

T indicates the time (required)

hh is the hours

mm is the minutes

ss is the seconds optionally followed by '.' and fractional seconds

zzzzzz is the optional time zone: a '+' or '-' followed by the hh:mm (hours and minutes) offsetfrom UTC, or Z to indicate UTC.

All parts are required except the fractional seconds and the time zone.

Examples:

|  |  |
| --- | --- |
| 2016-01-01T00:00:00 | Midnight on January 1, 2016 |
| 2016-01-01T12:00:00 | Noon on January 1, 2016 |
| 2016-01-01T12:00:12.34Z | Noon and 12.34 seconds on January 1, 2016, UTC |
| 2016-01-01T12:00:00+03:00 | Noon on January 1, 2016, three hours ahead of UTC |

com:TimeRange is modelled after (xs:dateTime OR xs:date)/xs:duration.

* xs:dateTime is as described above.
* xs:date follows the same rules as xs:dateTime except that the elements Thh:mm:ss are not present.
* xs:duration is of the form P[n]Y[n]M[n]DT[n]H[n]M[n]S, where n is the number of units and the letters have the meaning:

P - Period indicator (always present for durations)

Y - Years (follows the number of years)

M - Months (follows the number of months)

D - Days (follows the number of days)

T - Time indicator (preceding any of the following):

H - Hours (follows the number of hours)

M - Minutes (follows the number of minutes)

S - Seconds (follows the number of seconds)

Examples:

|  |  |
| --- | --- |
| 2016-01-01/P1Y | One-year period starting on 2016-01-01 |
| 2016-04-01/P1Y | One-year period starting on 2016-04-01 |
| 2016-07-01/P6M | Six-month period starting on 2016-07-01 |
| 2016-03-01/P1M | One-month period starting on 2016-03-01 |
| 2016-01-03/P7D | One-week period starting on 2016-01-03 |
| 2016-01-01/P1Y6M | A year and six month period starting on 2016-01-01 |
| 2016-01-01T12:00:00/PT1H30M | A period of 1 hour and 30 minutes starting on 2016-01-01 at 12:00 noon |

Volume 3 Namespace Additions

Add the following terms to the IHE Namespace:

None

Volume 4 – National Extensions

Add appropriate Country section

Not applicable

1. CDA is the registered trademark of Health Level Seven International. [↑](#footnote-ref-1)
2. DICOM is the registered trademark of the National Electrical Manufacturers Association for its standards publications relating to digital communications of medical information. [↑](#footnote-ref-2)