

# **Meeting the Twin Challenges of Open Data for DATA Act compliance and Delivering next generation Industry Services**

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August 2014

# DATA Act 2014 (Financial Reporting)

## Digital Accountability and Transparency Act



The screenshot shows the homepage of the Data Transparency Coalition (DTC). The header features the DTC logo on the left and the text "Data Transparency Coalition" on the right. Below the header is a navigation bar with links: Home, About, What is Data Transparency?, News, Issues, Events, Data Transparency in Action, Blog, and Contact. The main content area has a large banner image of the U.S. Capitol dome under a cloudy sky. To the right of the image is a text box titled "Holding Government Accountable." with the text: "If more federal data were published online in machine-readable formats, citizens and watchdog groups could keep closer tabs on what their government is doing." Below the banner are three columns of content. The first column is titled "Federal Data Reform" and discusses the DTC's advocacy for standardized, machine-readable data and the Digital Accountability and Transparency Act (DATA Act). The second column is titled "Current Campaign" and mentions SEC open data enforcement, the Data Transparency Breakfast, and the signing of the DATA Act. The third column is titled "Advocating Open Data" and features a video player showing a map of the U.S. with the text "U.S. DATA REFORM SPENDING \$762 B TRACKING \$762 B".

**DTC** Data Transparency Coalition

Home | About | What is Data Transparency? | News | Issues | Events | Data Transparency in Action | Blog | Contact

**Holding Government Accountable.**  
If more federal data were published online in machine-readable formats, citizens and watchdog groups could keep closer tabs on what their government is doing.

**Federal Data Reform**  
The Data Transparency Coalition advocates on behalf of the private sector and the public interest for the publication of government information as standardized, machine-readable data. Data transparency strengthens democratic accountability, enhances government management, reduces compliance costs, and stimulates innovation.  
Federal data reform starts with the Digital Accountability and Transparency Act ([DATA Act](#)), which will open the government's spending information to illuminate waste and fraud. But it won't end there. [Other types of federal information need reform, too.](#)  
Use our [contact form](#) to get in touch about joining the Coalition or for any general inquiries you may have. Click [here](#) to learn more about our various membership options.

**Current Campaign**  
SEC [open data enforcement](#) began on July 7.  
The third [Data Transparency Breakfast](#), presented by PwC, will be held on July 29. Our topic: [Transforming Government Reporting Around the World](#)  
On May 9, President Obama [signed](#) the DATA Act into law. Congress [passed the DATA Act](#) unanimously through both chambers in April 2014.  
Follow us on our [blog](#), [Twitter](#) and [Facebook](#) for all the [latest news](#) and information.

**Advocating Open Data**  
DATA Act and federal data reform  
U.S. DATA REFORM  
SPENDING \$762 B  
TRACKING \$762 B

Questions:

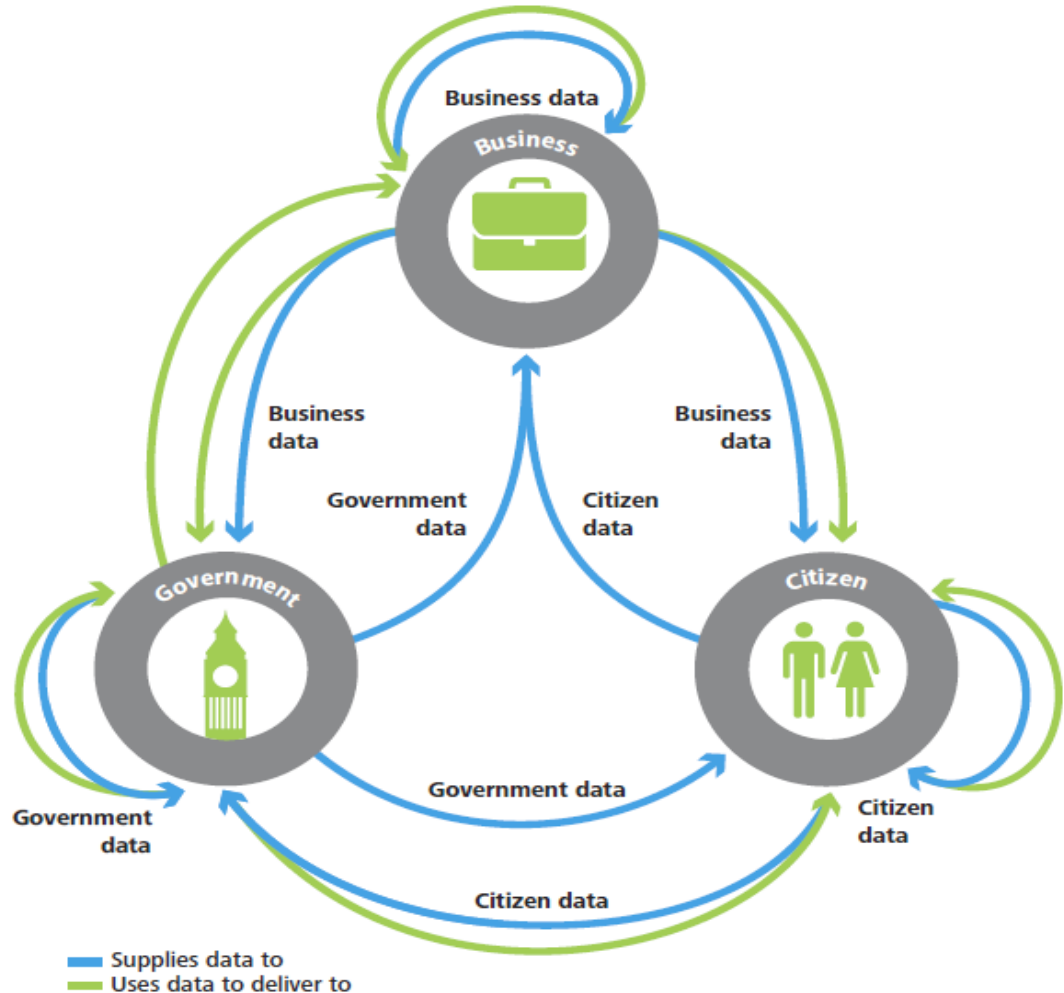
What data standards will be selected / developed?

How will government publish data (where, when, who)?

How will coordination work to share resources and technology?

# The Open Data Ecosystem

*Challenge:  
managing the  
Who, What,  
Why, Where and  
How*



Source: Deloitte LLP

# **Delivering Next Generation Industry Services**

- **Open Data Vision**
  - Citizen-centric Services Delivery
  - Tourism and Travel facilitation
  - Industry Services facilitation
  - Business Opportunity Enabling
  - Emergency Services
  - Disaster Recovery
  - Government Transparency
  - Government Participation
- **Open Data Semantics and Vocabulary**
  - Alignment at Municipal, State and Federal and International levels
  - Mobile application enabling

# Existing Coordination Work

- NIEM for Federal, State, Local, Tribal information exchanges around JPS (Justice and Public Safety)
- Open Data initiatives – Municipal 311
- EU Joinup initiative
- Data.gov
- Schema.org

# Of tadpoles and data...

- Tadpole – large fat head – long thin tail
- EDI taught us that 95% of exchange content use just 5% of the components
- For EDI 50% of content is in code values
- Once implemented 5% of the data cause 90% of the edits and changes
- Domain specialization components account for the 95% “long thin tail”
- Lessons learned - information and processes coalesce around core content and exchanges; most of ongoing components definition and maintenance work are on edge conditions and extensions.

# Financial Reporting - XBRL

- Pros
  - Mature existing implementations
  - Widely available
  - Well understood by accounting professionals
- Cons
  - Consortium specification
  - Complexity
  - Expense
  - Public accessibility
  - Requires special XBRL-aware software

# National Information Exchange Model (NIEM)

- Pros
  - Has concept of common “core components”
  - Widely adopted for JPS applications
  - Mature methods and techniques
  - Well aligned to government needs
- Cons
  - Based on XSD schema technologies
  - Learning curve is significant
  - Complexity of components library
  - Narrowly focused on JPS applications
  - Hardwired Context and Role
  - Not really a model; schema objects collections

# OASIS ebXML / UBL

- Pros
  - Core Components conceptual design and abstract representation (CCTS)
  - First to formalize concepts of Context and Role
  - Registry/Repository technology
  - Business Process technology (BPSS)
  - Aligned with ISO 11179 work
- Cons
  - Not widely adopted
  - UBL suffers same complexity issues as NIEM and limitations of W3C XSD schema

# Education Industry Consortium - PESC

- Pros
  - Mature adoption in Higher Education community
  - Exchange schema well aligned with college business processes
  - Core Components approach for schema
  - Consistent Naming and Design Rules
- Cons
  - Alignment with NIEM components for similar entities
  - Consistency of implementation approach
  - Leveraging of development tools
  - Lack of dictionary definitions

# Supporting New Technologies / Platforms

- Mobile devices
- JSON / RESTful APIs
- NoSQL repositories
- Open Data
- Folksonomies (socially grown)
- Linked Data
- International delivery

# Moving Forward: Semantic Interoperability

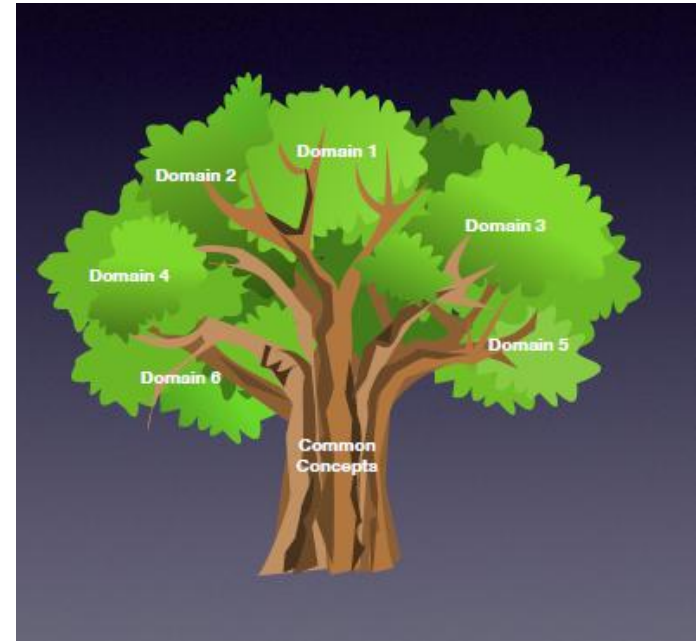
Next Generation Approach

# XML and Information Semantics

- Replaced EDI separators with “tags”
- Tags are “human readable” but not always “human understandable!”
- No formal mechanism to support the declaration of semantic integrity constraints.
- No means of validating object semantics even if these are declared formally.
- XML thus formally governs syntax only

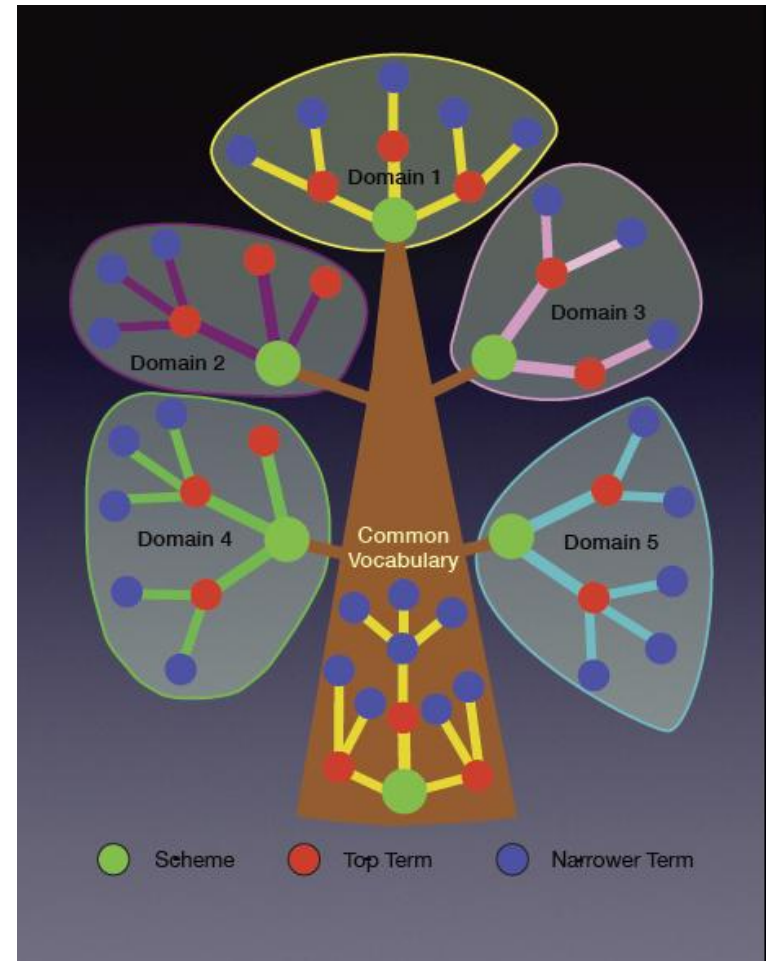
# Toward Semantic Interoperability

- No changes to domain specific names and definitions
- Create a new central system with:
  - Multi-lingual shared common vocabulary and concepts expressed in “everyday” natural language
  - Semantic hierarchical and nonhierarchical relations to other concepts
  - Collections, set of concepts that have something in common
  - Concept mappings back to the domain specific concepts indicating the level of equality matching

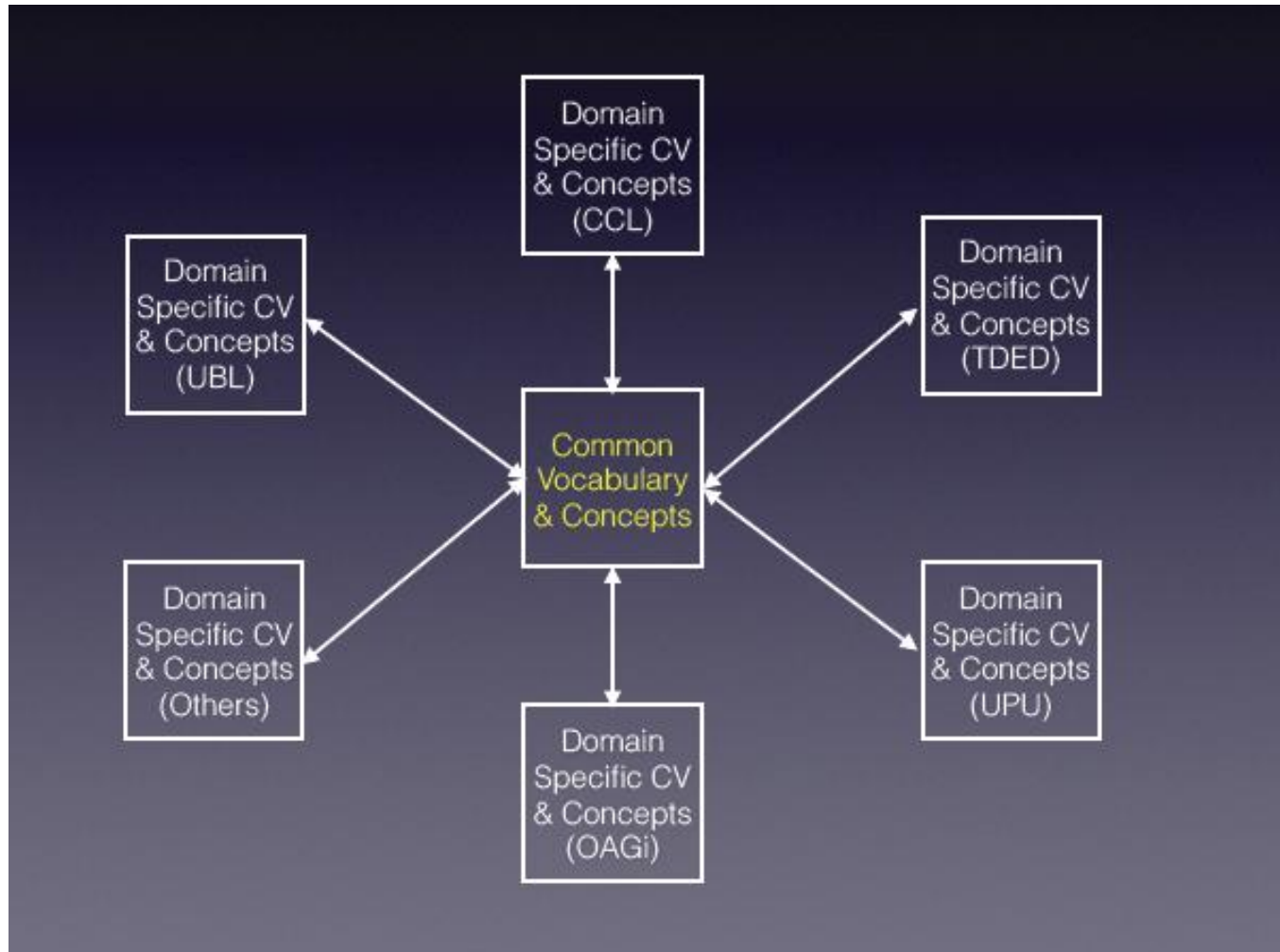


# Semantic Concepts Tree

- Top Terms
- Narrower Terms
- Conceptual Terms
- Scheme and Components



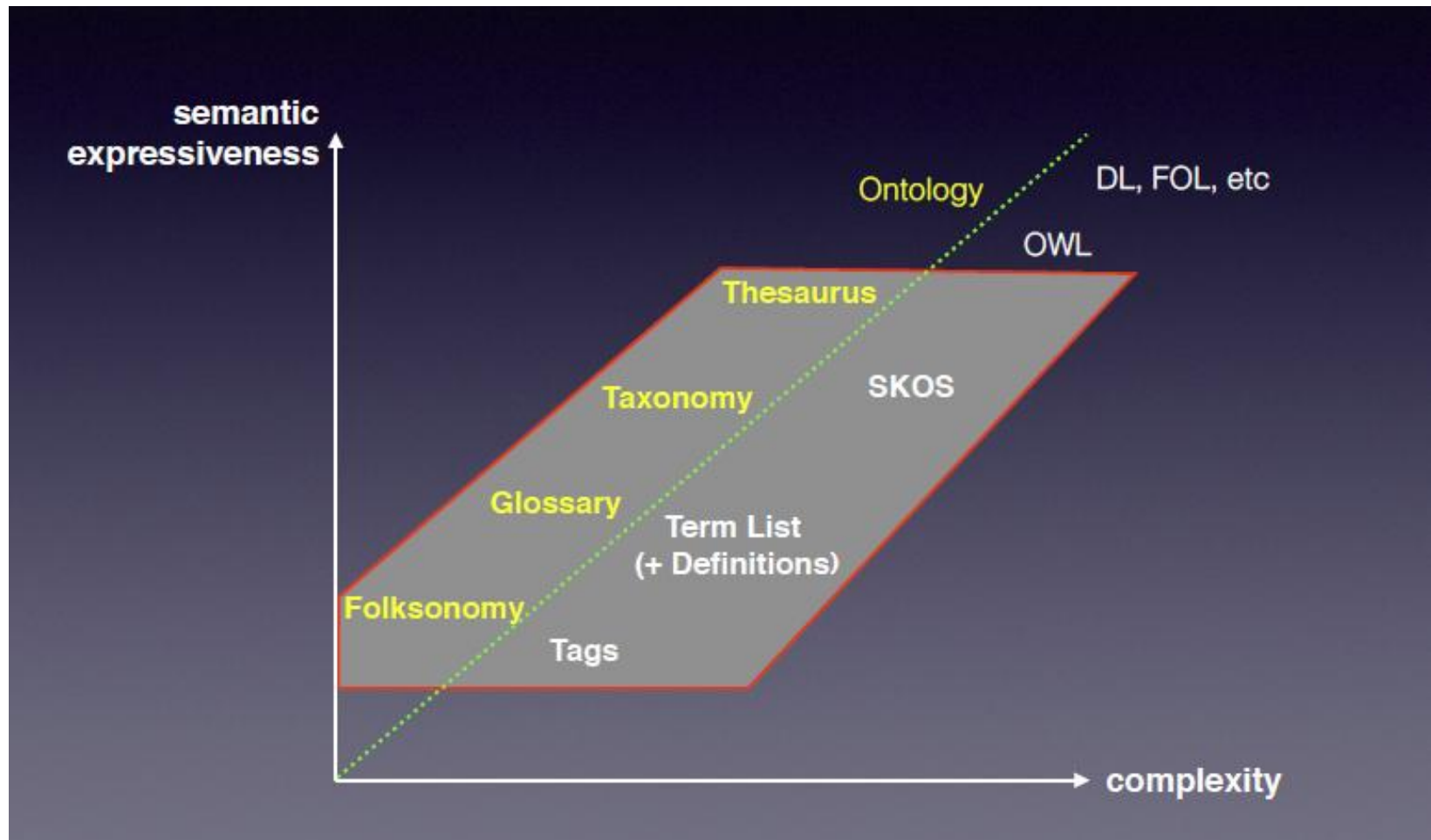
# Linking Concepts using Web and SKOS



# What is SKOS?

- *Simple Knowledge Organization System*
- A model for expressing the basic structure and content of concept schemes such as **thesauri**, **classification schemes**, **taxonomies**, **folksonomies**, and other similar types of controlled vocabularies
- W3C specification
- Available as open source implementation - iQvoc

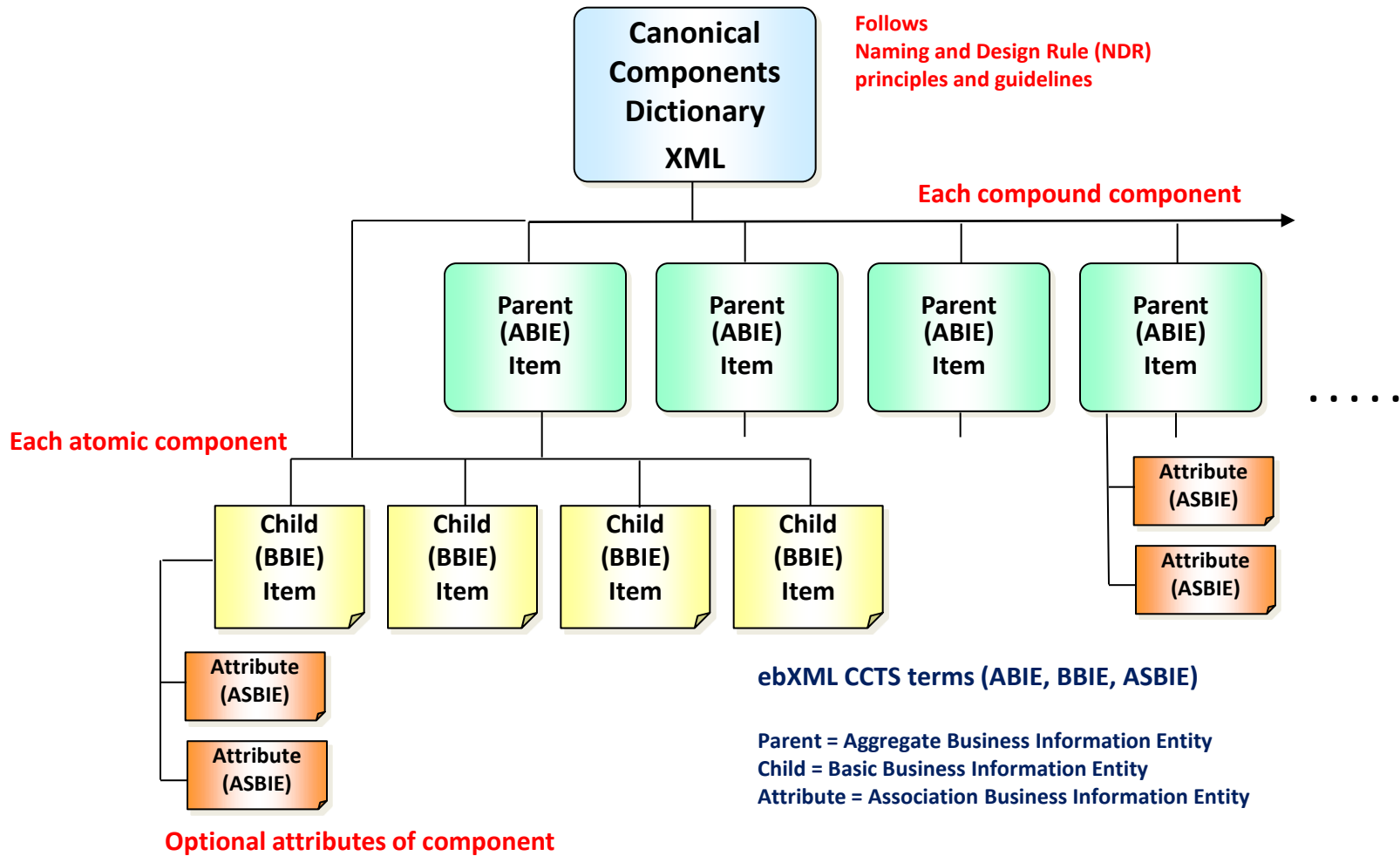
# Knowledge Organization Systems (KOS)



# ebXML CCTS Dictionary

- XML-4-CCTS schema for representing core components with XML
- OASIS Content Assembly Mechanism (CAM) dictionaries
  - Subset of XML-4-CCTS using 8 key components
  - CAM dictionaries compatible with:
    - Eclipse tree viewer tool
    - Excel spreadsheets
    - MindMap viewers
    - UML/XMI physical models

# Conceptual Information Model



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\* CCTS – Core Components Technical Specification

# Putting all the pieces together

SKOS, CCTS, Dictionaries, NIEM,  
Open Data, FOSS, XML, JSON

# Conceptual Vocabulary Structure

## Core Vocabulary

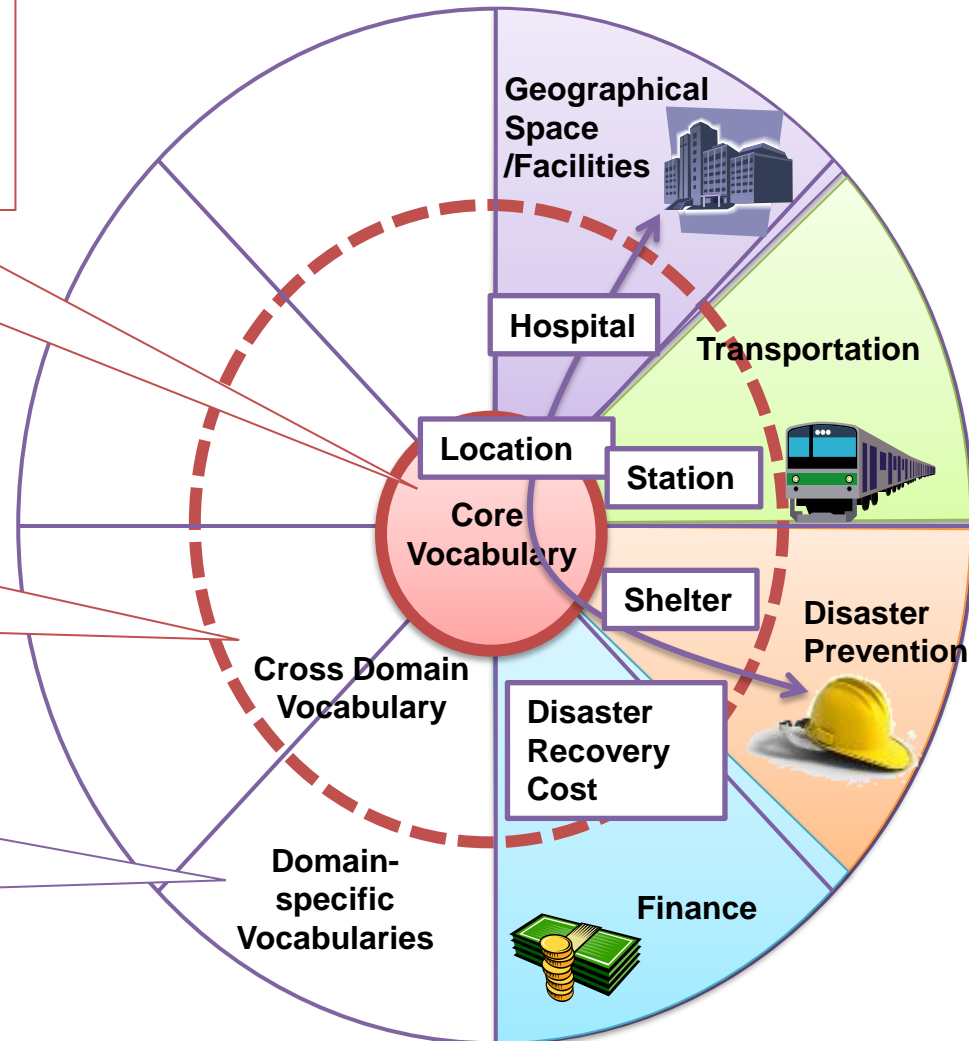
Universal vocabularies that are widely used in any domain (top terms).  
E.g. person, address, place, date.

## Cross Domain Vocabulary

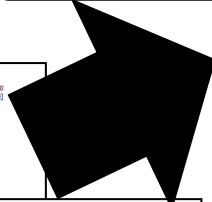
Key vocabularies among domain-specific vocabularies that are referenced in other domains.  
E.g. hospital, station, shelter.

## Domain-specific Vocabularies

Vocabularies that are specialised for the use in each domain.  
E.g. Number of beds, Schedule.



## ■ Top Terms



名前	属性	データ型	参照	説明	備考
氏名	PersonName	String	参照	氏名	氏名
性別	Gender	String	参照	性別	性別
年齢	Age	Integer	参照	年齢	年齢
住所	Address	String	参照	住所	住所
職業	Job	String	参照	職業	職業
学歴	Education	String	参照	学歴	学歴
収入	Income	Double	参照	収入	収入
健康状態	HealthStatus	String	参照	健康状態	健康状態
家族構成	FamilyStructure	String	参照	家族構成	家族構成
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税金	Tax	Double	参照	税金	税金
資産	Assets	Double	参照	資産	資産
負債	Liabilities	Double	参照	負債	負債
総資産	TotalAssets	Double	参照	総資産	総資産
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生活費	LivingExpenses	Double	参照	生活費	生活費
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食費	FoodExpenses	Double	参照	食費	食費
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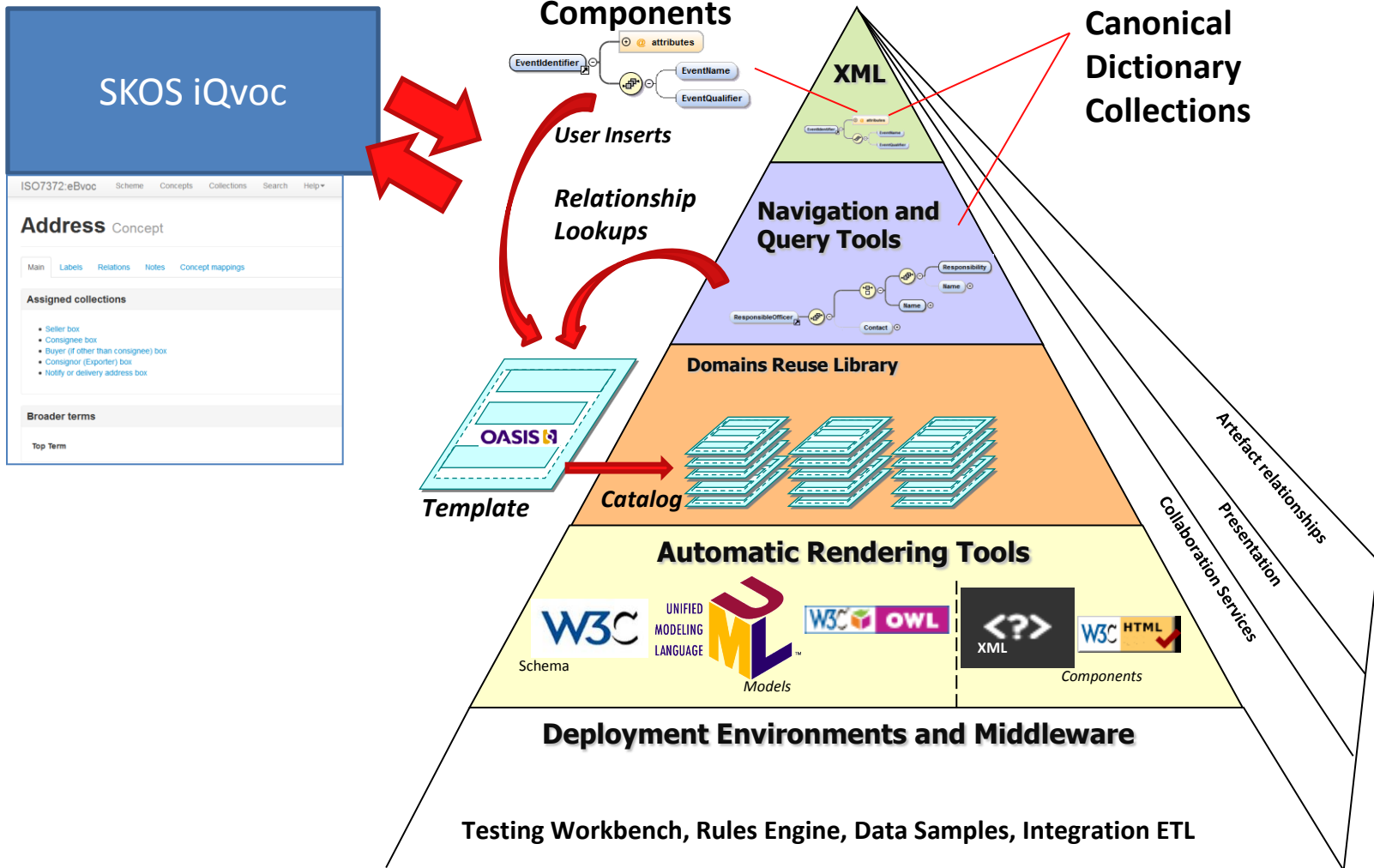
項目名	項目ID	Name / Title (漢字)	Modified Value (漢字, extended)	Data Type	Data Type (漢字, extended)	Cardinality	Description (日本語)
連絡先【住所】	ContactInformation	ContactInformation	CContactInformation	住所情報	CContactInformation	0..n	連絡先を管理するためのデータ型 A data type for how to contact a person or organization.
名前	ContactName	ContactName	CContactName	姓	CContactName	0..n	連絡先の姓 A name of contacting source.
氏名	Name	ContactInformationName	CContactInformationName	姓	CName	0..n	連絡先の氏名 A name of contact point.
組織名	Organization	ContactInformationOrganization	CContactInformationOrganization	組織名	COrganization	0..n	連絡先の組織名 An organization or organization point.
関係者名	PersonType	ContactInformationPersonType	CContactInformationPersonType	姓	CPersonType	0..n	連絡先の関係者名 A role of a contact person.
電子メール	EmailAddress	ContactInformationEmailAddress	CContactInformationEmailAddress	電子メール	CEmailAddress	0..n	連絡先の電子メールアドレス A name of a contact person. An electronic mailing address by which a person or organization may be contacted.
メールアドレス	EmailAddress	ContactInformationEmailAddress	CContactInformationEmailAddress	電子メール	CEmailAddress	0..n	連絡先のメールアドレス A point address by which a person or organization may be contacted.
送付先	MailingAddress	ContactInformationMailingAddress	CContactInformationMailingAddress	送付先	CAddress	0..n	送付先 A telephone number for a facsimile device by which a person or organization may be contacted.
電話番号	TelephoneNumber	ContactInformationPhoneNumber	CContactInformationPhoneNumber	電話番号	CTelephoneNumber	0..n	連絡先の電話番号 A telecommunication device by which a person or organization may be contacted.
FAX番号	Extension	ContactInformationExtension	CContactInformationExtension	電子メール	CExtension	0..n	連絡先のFAX番号 A telecommunication device by which a person or organization may be contacted.
FAX番号	ExtNumber	ContactInformationExtNumber	CContactInformationExtNumber	電話番号	CExtNumber	0..n	連絡先のFAX番号 A telephone number for a facsimile device by which a person or organization may be contacted.
携帯電話番号	MobileTelephoneNumber	ContactInformationMobileTelephoneNumber	CContactInformationMobileTelephoneNumber	電話番号	CTelephoneNumber	0..n	連絡先の携帯電話番号 A telecommunication device by which a person or organization may be contacted.
Webサイト	Website	ContactInformationWebsite	CContactInformationWebsite	URL	CWebsite	0..n	連絡先のWebサイト A website address by which a person or organization may be contacted.
識別子	Identification	ContactInformationIdentification	CContactInformationIdentification	URL	CIdentification	0..n	連絡先の識別子 A website address by which a person or organization may be contacted.
対話経路	AvailableLanguage	ContactInformationAvailableLanguage	CContactInformationAvailableLanguage	言語	CAvailableLanguage	0..n	連絡先との通話に利用可能な言語 A language used for communication between two parties.
電話番号	TelephoneNumber	ContactInformationTelephoneNumber	CContactInformationTelephoneNumber	電話番号	CTelephoneNumber	0..n	連絡先と通話するためのデータ型 A data type for a telephone number for a telecommunication device.
国番号	CountryCallingNumber	ContactInformationCountryCallingNumber	CContactInformationCountryCallingNumber	国番号	CCountryCallingNumber	0..1	国際電報に際する国番号 A country code for international telegrams.
区別	Full	ContactInformationFull	CContactInformationFull	電話番号	CFull	0..1	完全な電話番号 A complete telephone number.

# Vocabulary Item

## Person

Name (Class/Property)	Name (English)	Identifier (English)	Data Type (English)	cardinality	Description (English)
人	Person	ic:Person	extends ic:Entity		
氏名	Name	ic:PersonName	ic:PersonName	0..n	Name of a Person
性別	GenderText	ic:PersonGenderText	xsd:string	0..1	Gender of a Person
性別(コード)	GenderCode	ic:PersonGenderCode	ic:Code	0..1	Gender of a Person
生年月日	BirthDate	ic:PersonBirthDate	ic:DateTime	0..1	Date of Birth of a Person
死亡年月日	DeathDate	ic:PersonDeathDate	ic:DateTime	0..1	Date of Death of a Person
住所	ResidenceAddress	ic:PersonResidenceAddress	ic:Address	0..n	Present address of a Person
本籍	DomicileOfOrigin	ic:PersonDomicileOfOrigin	ic:Address	0..1	Legal residence address of a Person
連絡先	ContactInformation	ic:PersonContactInformation	ic:ContactInformation	0..n	Contact information of a Person
ID	Identification	ic:PersonIdentification	ic:Identification	0..n	Identification of a Person
国籍	NationalityText	ic:PersonNationalityText	xsd:string	0..n	A country that assigns rights, duties, and privileges to a person because of the birth or naturalization of the person in that country.
国籍(コード)	NationalityCode	ic:PersonNationalityCode	ic:Code	0..n	A country that assigns rights, duties, and privileges to a person because of the birth or naturalization of the person in that country.
出生国	BirthCountry	ic:PersonBirthCountry	xsd:string	0..1	A location where a person was born.
出生国(コード)	BirthCountryCode	ic:PersonBirthCountryCode	ic:Code	0..1	A location where a person was born.
出生地	BirthPlace	ic:PersonBirthPlace	ic:Location	0..1	A location where a person was born.

# Dictionary Technology



# Available NIEM XML Dictionaries

## NIEM 2.1 dictionaries

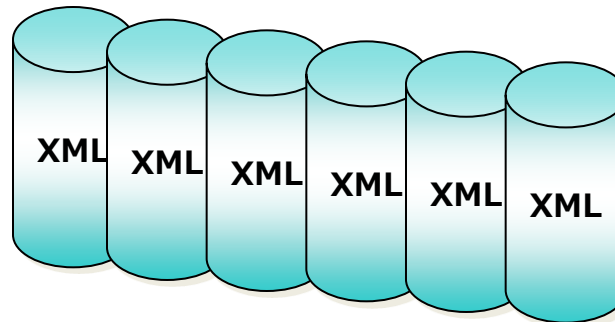
- CBRN dictionary
- Emergency dictionary
- Family dictionary
- Immigration dictionary
- Infrastructure dictionary
- Intelligence dictionary
- Justice dictionary
- Maritime dictionary
- Screening dictionary
- Trade dictionary
- Immigration blueprint
- **NIEM core dictionary**

*Note: Those marked in bold are model style dictionaries with recursive components.*

**Available from download site** *direct link:*

<http://sourceforge.net/projects/camprocessor/files>

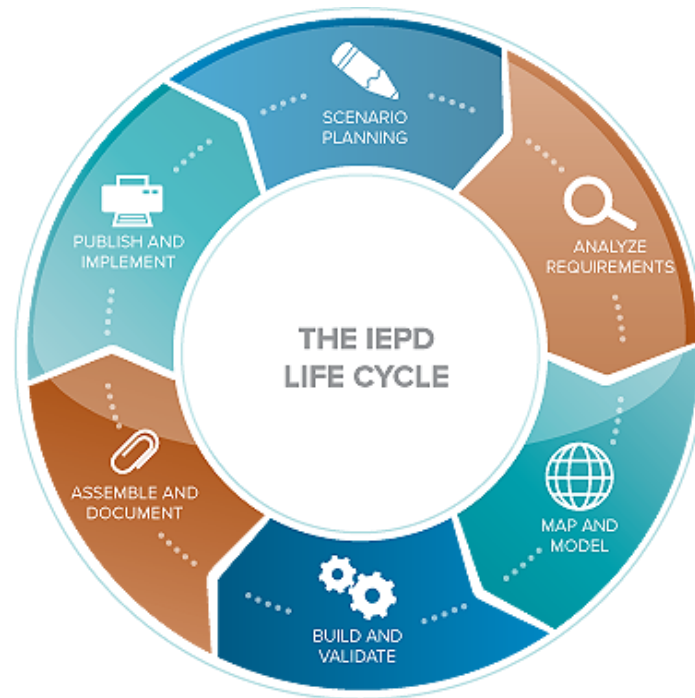
*+ includes spreadsheets and sample models*



# The 8 "D"s and NIEM

- Design
- Develop
- Deploy
- Document
- Dictionaries
- Discovery
- Differentiate
- Diagnose

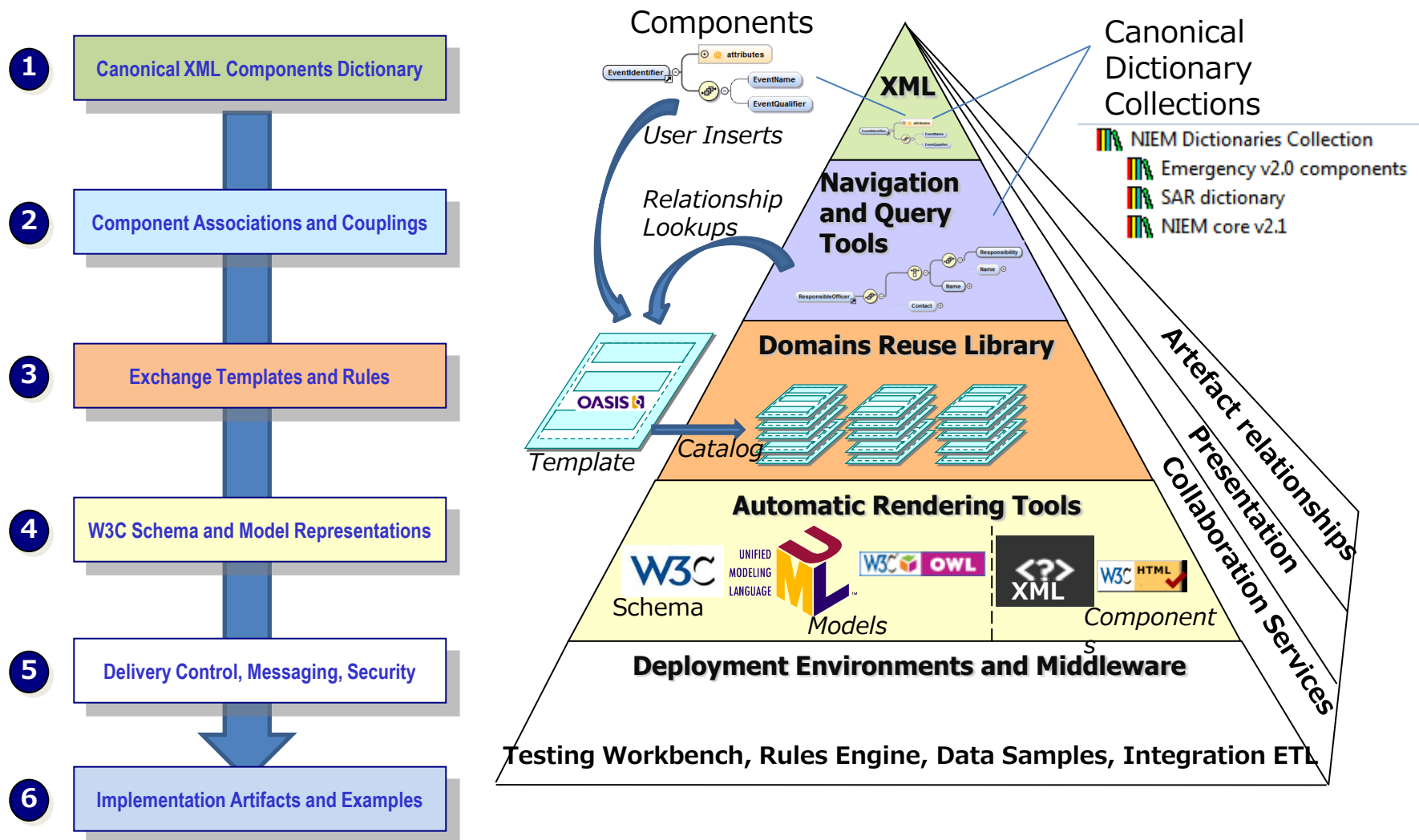
## NIEM IEPD Process



**Repeatable, Reusable Process**  
(Exchange Specification Lifecycle)

\*IEPD - Information Exchange Package Documentation

# Vision: Top Down Exchange Assembly



# CAM Toolkit

<http://www.cameditor.org>

CAM Template Editor - C:\CAM\dev\CAM\EDXL\HAVE\HospitalStatus.cam

File Edit View XML Tools Run Window Help

Structures

ID	Reference	Taxonomy	Taxonomy Oth...
----	-----------	----------	-----------------

Structure

```
Structure ID="HospitalStatus" ref="" taxonomy="XML"
<HospitalStatus>
  * <Hospital>
    <Organization>
      ? <EmergencyDepartmentStatus>
      ? <HospitalBedCapacityStatus>
      ? <ServiceCoverageStatus>
      ? <HospitalFacilityStatus>
      ? <HospitalEOCStatus> %"Active"%</HospitalEOC
      ? <HospitalEOCPlan> %"Active"%</HospitalEOCP
      ? <ClinicalStatus> %"Normal"%</ClinicalStatus>
      ? <DeconCapacity>
      ? <MorgueCapacity>
      ? <FacilityStatus> %"Normal"%</FacilityStatus>
      ? <SecurityStatus> %"Normal"%</SecurityStatus>
      ? <Activity24Hr>
      *? <CommentText> %string%</CommentText>
      ? <HospitalResourcesStatus>
      <LastUpdateTime> %YYYY-MM-DD'T'HH:MM:SS.SZ%</
```

ItemRules

Category	Action	Item
DEFAULT	makeOptional()	//HospitalFaci
DEFAULT	restrictValues('Active' 'Inactive')	//HospitalFaci
DEFAULT	setDefault(Inactive)	//HospitalFaci

Dictionaries

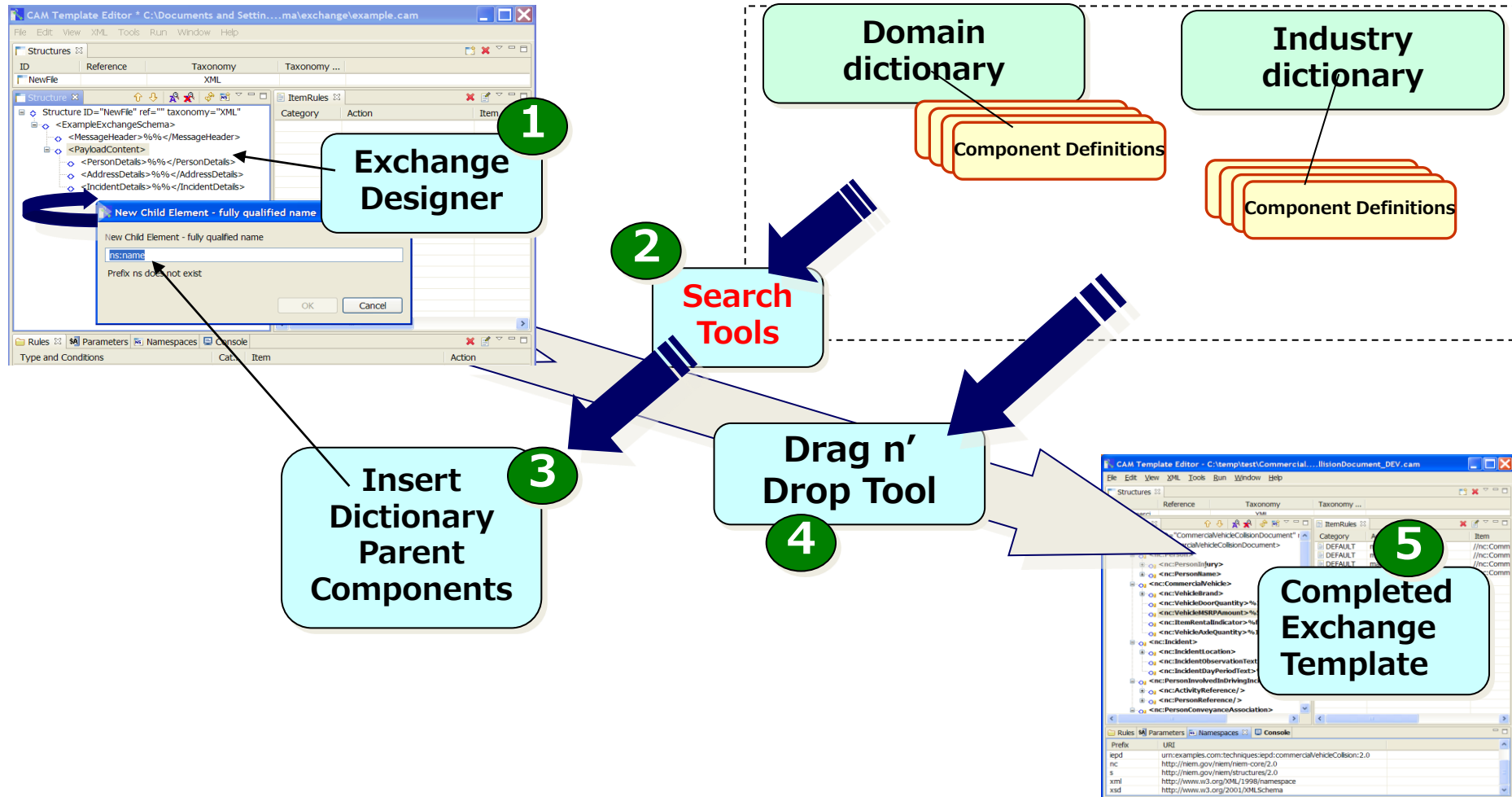
Rules

Type and Conditions	Category	Item	Action
default context	DEFAULT		

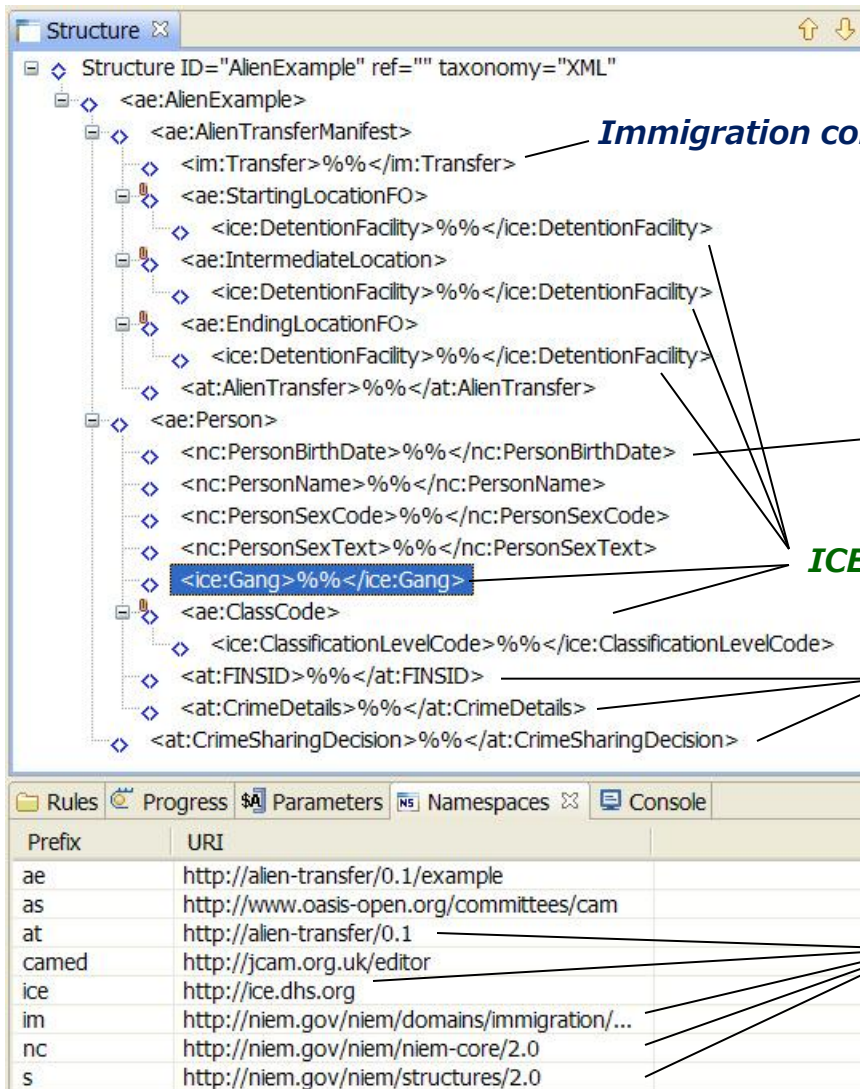


# Visual Designer with Dictionary Collection

## Collection



# Alien Transfer Manifest – Mock Up



*Immigration component*

*NIEM components*

*ICE components referenced*

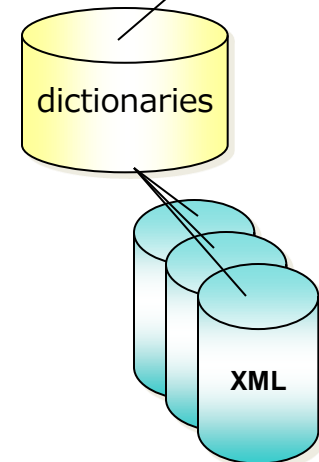
*EID pre-defined collections*

*based on NIEM + ICE + new*

*Namespaces of dictionary components*

## Collection

- ICE EDM dictionary
- NIEM Immigration dictionary
- EID extensions dictionary



Definitions stored as syntax neutral canonical XML

Technical Note: Inline child elements for ice: components shown for illustrative purposes only; actually are type reuse references (paperclip icon on parent node).

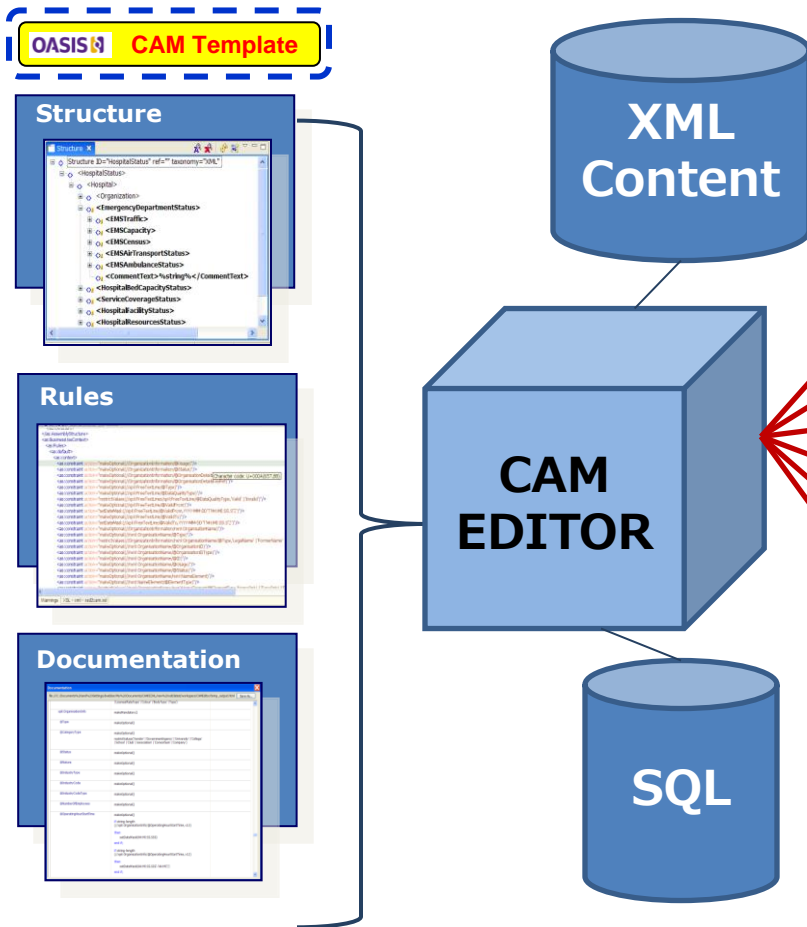
# Differentiate

---

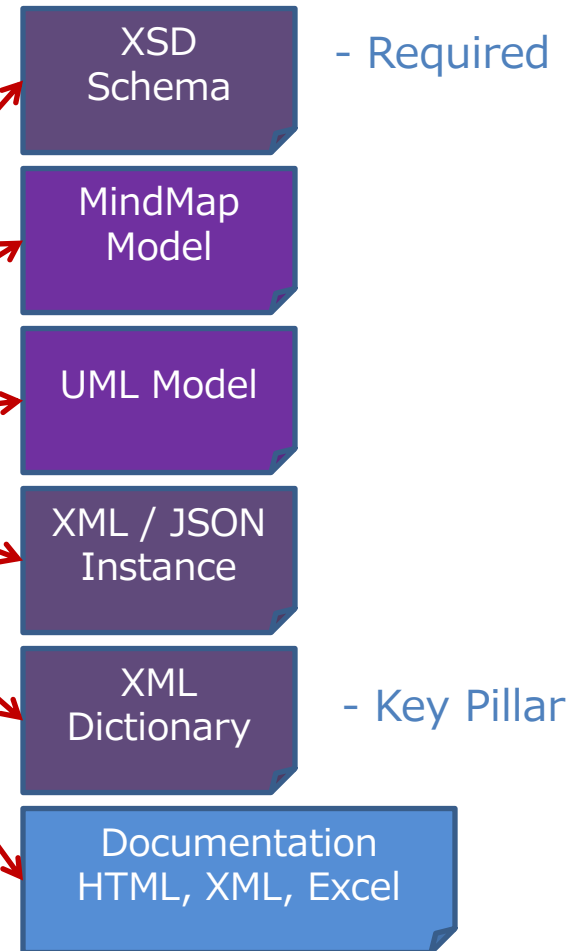
- This step includes building in deployment specific details and rules and usage policy determinations
  - Add additional XPath rules for local integration needs
  - Constrain code lists to local use
  - Limit and restrict content based on policy and role of exchange partners
    - **Contextually exclude structure components based on rules**
  - Create other integration artifacts for middleware
- *Can configure these aspects through the CAM template editor*

# Delivery – CAM Editor Developer Tools

## Editing/XML/SQL/Mapping



## Target Renderings (via XSLT)



# Example – Chicago Pharmacy Vaccines Search

Pharmacy Search Demo

<http://www.verifyxml.org>

**WALGREEN CO 09001**  
191 NORTH CLARK STREET  
CHICAGO IL 60601-6232

Vaccine	In Stock	No Required
Flu Shot	Y	N
Flu nasal spray	Y	N
Hepatitis A	Y	Y
Hepatitis B	Y	Y
HPV	Y	N

**Business Hours**

Day	Hours
Su	9:00am to 7:00pm
Mo	9:00am to 7:00pm
Tu	9:00am to 7:00pm
We	9:00am to 7:00pm
Th	9:00am to 7:00pm
Fr	9:00am to 7:00pm
Sa	9:00am to 7:00pm

**Providers**

- BOND DRUG COMPANY OF ILLINOIS
- CVS PHARMACY 4781
- OSCO DRUG 5514
- WALGREEN CO 09001
- WALGREENS 10558

**Vaccine Search**

**Vaccines**

- ☐ Hepatitis
- ☐ Shingles
- ☐ TD
- ☐ Flu
- ☐ Coccid
- ☐ HPV
- ☐ Varicella
- ☐ MMR

**Location**

Enter ZIP code: 60601

Radius: 0 miles

**Search**

1. Socrata data extract
2. MySQL database
3. Glassfish
4. Open-XDX
5. Prime Faces
6. Hosting site

Combines: rapid development paradigm; open data approach; open source tools; RESTful web services; community based resources and delivery; NIEM-aligned information feeds.

# CAMeditor.ORG Project Statistics

The screenshot displays the CAMeditor.ORG website. At the top, the browser address bar shows the URL: [sourceforge.net/apps/mediawiki/camprocessor/index.php?title=Main\\_Page](http://sourceforge.net/apps/mediawiki/camprocessor/index.php?title=Main_Page). Below the address bar, there are navigation tabs: [page](#), [discussion](#), [view source](#), and [history](#). The main heading is "Main Page".

On the left side, there is a sidebar with a red header "CAM" and a logo. Below it, there are sections for "navigation" and "search". The "navigation" section lists links: Main Page, Community portal, Current events, Recent changes, Random page, and Help. The "search" section has a search box and buttons for "Go" and "Search". Below the search box is a "toolbox" section with links: What links here, Related changes, Special pages, Printable version, and Permanent link.

The main content area is titled "CAM - Content Assembly Mechanism - toolkit". It contains several paragraphs of text describing the toolkit. The first paragraph states: "The CAM editor is the leading open source toolkit for building and deploying XML exchange public open standard. The CAM editor can import, analyze and refactor existing exchange compatibility and use in middleware, including generating model compliant XML Schema integration patterns. The full XML exchange structure, rules and documentation details are in standard XML template format." The second paragraph states: "These OASIS CAM standard XML validation templates can include use of content models lookups, and business logic expressed as XPath rules with warnings and error flagging throughout the comprehensive XML exchange handling framework." The third paragraph states: "The CAM toolkit provides an intuitive approach using a WYSIWYG visual structure editor to process of developing and managing XML business information exchanges. This gives developers analysis that are needed for consistent, interoperable and reliable exchanges. The CAM toolkit of generating supporting artifacts such as business documentation, cross-reference spreadsheets, Schema, JAXB data bindings and test XML instances. Compatible with the NIEM approach integration with extensible profiles for NIEM, OASIS and more." The fourth paragraph states: "The CAM toolkit supports the use of Canonical Model dictionary components with visual Dr provides a set of tools for harvesting and generating canonical dictionaries from existing XML enterprise data modelling tools. The CAM approach enables core component message assembly dictionary collections." The fifth paragraph states: "The standalone CAMV validation engine, written in Java, implements an XML validation framework specification as the foundation. Also designed for integration with Service-Oriented Architect validation framework supports use with other message based integration patterns such as E Integration (EAI), LEXS (Logical Entity Exchange System) and ebXML messaging system." The sixth paragraph states: "The CAM Editor has local language support for French, Spanish, Russian, Norwegian, Chinese." Below the main content area, there is a section titled "Sponsors" with the ORACLE logo. The text states: "Oracle is a proud sponsor of the CAM project and its application to the National Information Exchange along with XML information exchanges for public sector applications. A CAM Editor with NIEM is available. Also the JAX-WS Java Starter Kit for Oracle and NIEM is now available here. Y Oracle NIEM web site. Also interesting news, reports and insights into CAM and XML from". Below the sponsors section, there is a section titled "Screenshots" with the text "Illustrative screenshots from CAM editor main menu interface" and "CAMed Screenshots".

## SNAPSHOT OF PROJECT ACTIVITIES

**250,000 CAMeditor.org page visits**

**175 countries have downloaded tools;**

**30% of visitors are from U.S.;  
850+ downloads weekly**

**9,000 students views of  
online video training  
resources**

**8 languages now available**

**[www.cameditor.org](http://www.cameditor.org)**