Notes on Using the UDEF

These notes on using the Universal Data Element Framework (UDEF) describe a concept of operations that applies to any organization that has the requirement to exchange data between applications, whether internal or external to the organization, and that cannot be adequately satisfied by an existing data standard.

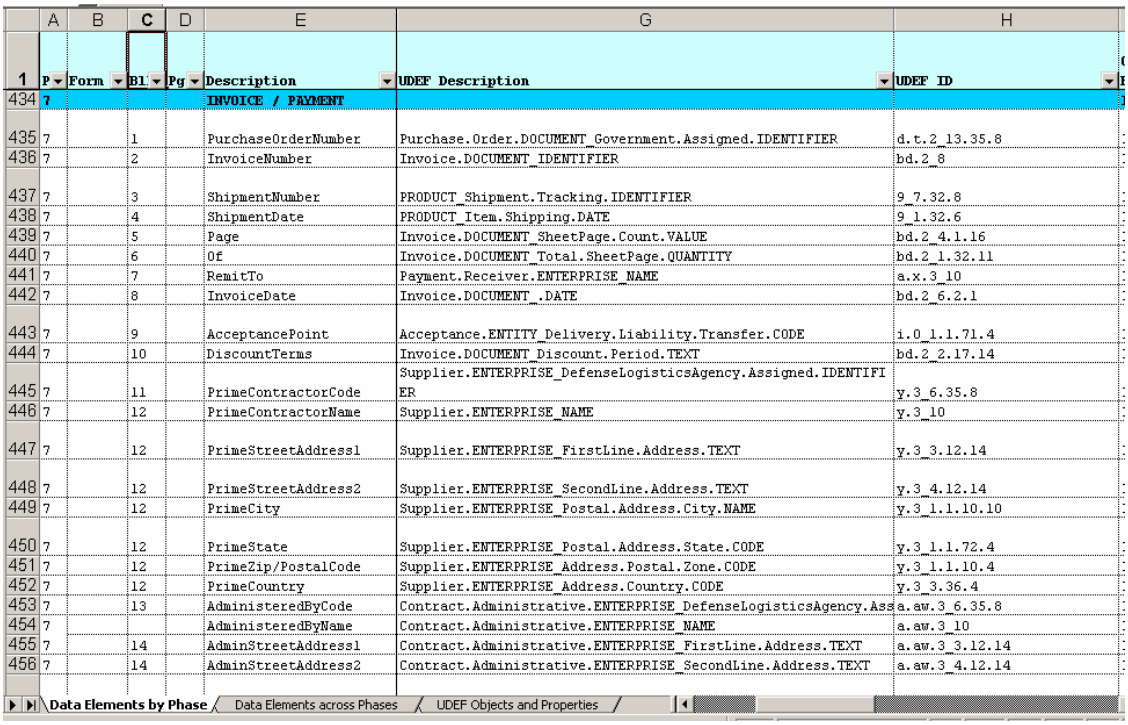
Mapping Application Data Element Concepts to the UDEF

To map a data element concept to the UDEF, follow these six basic steps.

1. Identify the applicable UDEF property word that characterizes the dominant attribute (property) of the data element concept. For example: *Name*, *Identifier*, *Date*, etc.
2. Identify the dominant UDEF object word that the dominant property (selected in step 1) is describing. For example, *Person_Name*, *Product_Identifier*, *Document_Date*, etc.
3. By reviewing the UDEF tree for the selected property identified in step 1, identify applicable qualifiers that are necessary to describe the property word term unambiguously. For example, *Family Name*.
4. By reviewing the UDEF tree for the selected object identified in step 2, identify applicable qualifiers that are necessary to describe the object word term unambiguously. For example, *Customer Person*.
5. Concatenate the object term and the property term to create a UDEF naming convention compliant name where it is recognized that the name may seem artificially long. For example, *Customer Person_Family Name*.
6. Derive a structured ID based on the UDEF taxonomy that carries the UDEF inherited indexing scheme. For example <*CustomerPersonFamilyName UDEFID=”as.5_11.10”*>.

The UDEF can be viewed on the Web at http://www.opengroup.org/udefinfo/defs.htm and is available for download in XML and RDF form – see http://www.opengroup.org/udef/

The following sample spreadsheet shows each UDEF ID that was mapped to every data element concept in a government invoice transaction. When the data element concepts associated with the application that generates the invoice are also assigned a UDEF ID, mapping the data elements in a financial application to create the government invoice transaction would be greatly simplified. Once the data elements in a financial application have a UDEF ID, cost savings can be realized in creating other transactions using the same data elements for the same or different trading partners, regardless of the variations in data element names and structures that different trading partners may use.



	A	B	C	D	E	G	H
1	P	Form	Bl	Pg	Description	UDEF Description	UDEF ID
434	7				INVOICE / PAYMENT		
435	7		1		PurchaseOrderNumber	Purchase.Order.DOCUMENT_Government.Assigned.IDENTIFIER	d.t.2_13.35.8
436	7		2		InvoiceNumber	Invoice.DOCUMENT_IDENTIFIER	bd.2_8
437	7		3		ShipmentNumber	PRODUCT_Shipment.Tracking.IDENTIFIER	9_7.32.8
438	7		4		ShipmentDate	PRODUCT_Item.Shipping.DATE	9_1.32.6
439	7		5		Page	Invoice.DOCUMENT_SheetPage.Count.VALUE	bd.2_4.1.16
440	7		6		Of	Invoice.DOCUMENT_Total.SheetPage.QUANTITY	bd.2_1.32.11
441	7		7		RemitTo	Payment.Receiver.ENTERPRISE_NAME	a.x.3_10
442	7		8		InvoiceDate	Invoice.DOCUMENT_.DATE	bd.2_6.2.1
443	7		9		AcceptancePoint	Acceptance.ENTITY_Delivery.Liability.Transfer.CODE	i.0_1.1.71.4
444	7		10		DiscountTerms	Invoice.DOCUMENT_Discount.Period.TEXT	bd.2_2.17.14
445	7		11		PrimeContractorCode	Supplier.ENTERPRISE_DefenseLogisticsAgency.Assigned.IDENTIFIER	y.3_6.35.8
446	7		12		PrimeContractorName	Supplier.ENTERPRISE_NAME	y.3_10
447	7		12		PrimeStreetAddress1	Supplier.ENTERPRISE_FirstLine.Address.TEXT	y.3_3.12.14
448	7		12		PrimeStreetAddress2	Supplier.ENTERPRISE_SecondLine.Address.TEXT	y.3_4.12.14
449	7		12		PrimeCity	Supplier.ENTERPRISE_Postal.Address.City.NAME	y.3_1.1.10.10
450	7		12		PrimeState	Supplier.ENTERPRISE_Postal.Address.State.CODE	y.3_1.1.72.4
451	7		12		PrimeZip/PostalCode	Supplier.ENTERPRISE_Address.Postal.Zone.CODE	y.3_1.1.10.4
452	7		12		PrimeCountry	Supplier.ENTERPRISE_Address.Country.CODE	y.3_3.36.4
453	7		13		AdministeredByCode	Contract.Administrative.ENTERPRISE_DefenseLogisticsAgency.Ass	a.aw.3_6.35.8
454	7				AdministeredByName	Contract.Administrative.ENTERPRISE_NAME	a.aw.3_10
455	7		14		AdminStreetAddress1	Contract.Administrative.ENTERPRISE_FirstLine.Address.TEXT	a.aw.3_3.12.14
456	7		14		AdminStreetAddress2	Contract.Administrative.ENTERPRISE_SecondLine.Address.TEXT	a.aw.3_4.12.14

Data Elements by Phase | Data Elements across Phases | UDEF Objects and Properties

Figure 1: Government Invoice Transaction

If a data element concept cannot be mapped to the UDEF as it currently exists, then you may need extensions to the UDEF. Submit proposed extensions to the UDEF in accordance with the Open Group's published guidelines.

Global UDEF Registry

It is intended to establish a Global UDEF Registry at some point in the future. The following diagram highlights the key role that this registry will play in aligning data element concepts across different applications. Once the application data element concepts have been assigned a UDEF ID, it is a relatively simple process to use the UDEF ID to map data element concepts with different names that have the same meaning. As illustrated in the diagram, both the "System A" data element concept named "Design_ Release" and the "System B" data element concept named "Engrg-Rel Date" were independently mapped to the same UDEF name and ID pair; therefore, they have the same meaning. The UDEF ID should be assigned as an optional alias for each application and recorded in a mapping matrix.

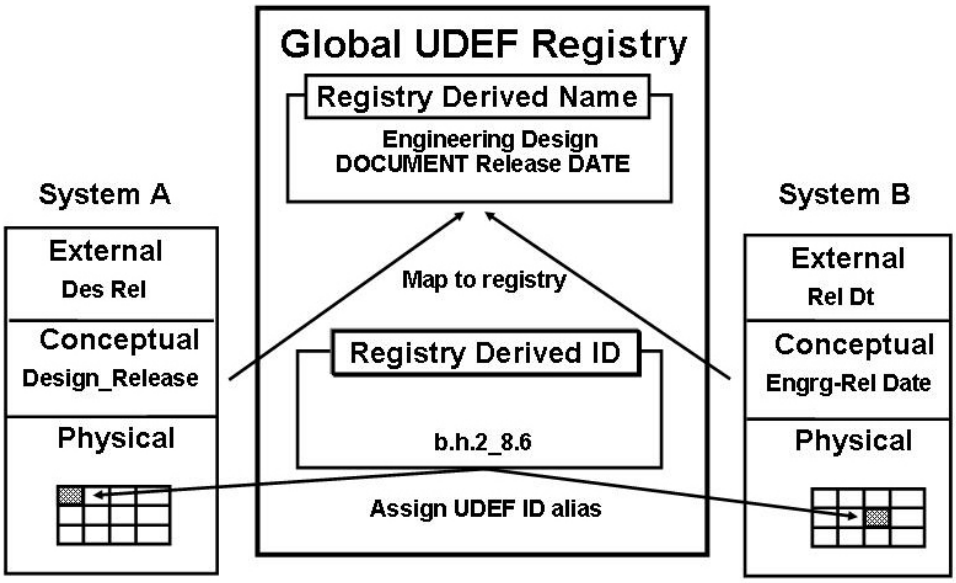


Figure 2: The Global UDEF Registry

Cross-Reference Matrix

You should maintain a cross-reference matrix for mappings across disparate standards and applications.

The following example mapping matrix shows how the same data element concept, though named differently in each column, has the same UDEF ID. If all the data elements in all data standards and application interfaces were associated to a UDEF ID, mapping one data standard or application programming interface (API) to another would be greatly simplified and could be automated. See the row highlighted in blue, below, as UDEF ID = e.2_8 corresponding to Standard A name “Contract Document Identifier”.

UDEF ID	Standard A	Standard B	Application A
3_6.35.8	CAGE Code	Entity Identifier Code + Identification Code Qualifier	Company ID
9_9	Product Name	Product/Service Name	
y.3_9		Entity (Supplier) Name	Supplier
e.2_8	Contract Document Identifier	Buyer’s Contract Number	Contract No
9_11	Product Quantity	Quantity Ordered	Item Qty
2_33.4	Document Type Code	Report Type Code	Doc Type

Figure 3: Example Mapping Matrix

An example cross-reference matrix for a typical purchase order was developed by the Electronics Industry Data Exchange (EIDX) organization and is freely available for download at http://www.eidx.comptia.org/guidelines/xref_download.aspx. This cross-reference matrix maps data element concepts that are common for a typical purchase order across widely adopted standards such as X12, EDIFACT, OAGIS, RosettaNet, and xCBL to the UDEF.

Interpreting Information

The following example shows how the UDEF helps a company to interpret information from external sources so that it can be processed by their applications.

Company A needs to send an XML file to Company B. Company B needs to process the data into their application using a flat file.

COMPANY A – XML File

```
<?xml version="1.0" encoding="utf-8" standalone="yes" ?>
- <EOCData>
  - <Data>
      <BuyingEntity>12345</BuyingEntity>
      <BuyingEntityPurchaseOrderNumber>PO123456789</BuyingEntityPurchaseOrderNumber>
      <BuyingEntityPOLineItemNumber>22</BuyingEntityPOLineItemNumber>
      <ActionCode>A</ActionCode>
      <VersionNumber>3.0.0</VersionNumber>
      <Email>JaneSmith@partner.com</Email>
      <Name>Jane Smith</Name>
      <Organization>98765</Organization>
      <Phone>(217) 123-4567</Phone>
      <ParentEOC />
      <AddedOrRemovedfromParentEOCCode />
      <EffectiveDate />
      <Description>Wigget</Description>
      <CurrentPartNumber />
      <CurrentPartNumberEffectiveDate />
      <EnterpriseIdentifier>98765</EnterpriseIdentifier>
      <IssuingAgencyCode>D</IssuingAgencyCode>
      <ManufacturerCode />
      <ManufacturerIdentifier />
      <OriginalPartNumber>PN12345</OriginalPartNumber>
      <SerialNumber>001</SerialNumber>
      <EOC>D98765PN12345001</EOC>
      <EOCType>EOC2</EOCType>
      <ContractNumber>F1234G0200102</ContractNumber>
      <PrimeContractorIdentifier>NAV023</PrimeContractorIdent
      <AcceptanceDate />
      <AcquisitionCost />
      <ClinSlinElin>0002</ClinSlinElin>
      <ShipToCode />
      <UnitOfMeasure>EA</UnitOfMeasure>
      <StatusCode />
    </Data>
  </EOCData>
```

COMPANY B – Flat File Layout

	A	B	C	D	E	F	G
1		Draft Version 3.0					
2		**Data Element**	**Format**	**Max Size**	**Use**	**Data Element Description**	**Additional Comments**
3		**PO INFO**				M - Mandatory, C - Conditional, O - Optional	
4		Buying-Company	Text	13	M	The 5 digit CAGE, 6 digit DoDAAC, or 9 digit DUNS of the Buying Company.	
5		Buying-Company-PO-Number	Text	20	M	The Purchase Order Number of the Buying Company	
6		Buying-Company-PO-LineItemNumber	Text	10	M	The Purchase Order Line Item Number of the Buying Company	
7		Method	Text	10	O	Method used to mark I=Intrusive or NI=Non-Intursive	
8		Grade	Text	1	O	Grade letter of mark A, B, C, D, E, F, P	
9		Action-ID	Text	1	M	Identifies the action this record is performing; A=Add, U=Update, R=Remove, S=Supplement any	Use S only if this record is supplying additional data for a EOC already sent in this or another file.
10		Version	Text	10	M	ABC Company version number for this format document	
11		**POINT OF CONTACT**					
12		POC-Email	Text	60	M	Email address of the person or office listed in Name.	
13		POC-Name	Text	120	M	Person or office who would be contacted if there are technical issues associated with the XML transaction.	
14		POC-Organization	Text	9	M	The 5 digit CAGE, 6 digit DoDAAC, or 9 digit DUNS of the organization providing the XML document.	
15		POC-Phone	Text	25	M	Phone number of the person or office listed in Name.	
16							
17		**EOC DATA**					
18		EOC-or-Parent	Text	78	C	The EOC of the item that contains the embedded item.	
19		Added-Or-Removed-from-Parent	Text	1	C	"A" if being added to an item. "R" if being removed from an item.	Required if Parent-EOC provided
20		Date-Of-Change	CCYY-MM-DD	10	C	The date the item was embedded into another item or removed from an	Required if Parent-EOC provided
21		Description	Text	250	M	Description of the item.	
22		CPN	Text	32	C	Used only if the item's current part number is different from the Original Part Number. Must be provided if Current Part Number Effective Date is provided.	Required if Part Number was changed
23		CPN-Effective-Date	CCYY-MM-DD	10	C	The date the item was modified or changed to the current part number from a previous part number. Must be provided if Current Part Number is provided.	Required if Part Number was changed
24		Organization-ID	Text	13	C	Code identifying the Organization that assigned the embedded item with the EOC data elements. If EOC Type is EOC1 or EOC2, this is the same Organization Identifier that was used in the construct. Required if EOC Type is EOC1 or EOC2.	
		Issuing-Agency-Qualifier	Text	3	C	Designator to indicate which code was used in the Organization Identifier. Required if EOC Type is EOC1 or	

Figure 4: Input File and Application Data Format

For COMPANY B to use COMPANY A's data file to feed their application they will first need to map COMPANY A's XML Child Node names to their Flat File Data Element names. This can be difficult to do without a good understanding what exactly is provided in the XML Child Node names and the Flat File Data Element names.

This would have been a much simpler mapping process if UDEF IDs were associated to both applications and/or data standards. See the same XML file from COMPANY A below with UDEF IDs and look at COMPANY B Flat File Layout with UDEF IDs included below. Even though existing standards can provide this capability, the UDEF simplifies the integration resulting in cost and time savings.

COMPANY A – XML File with UDEF

```
<?xml version="1.0" encoding="utf-8" standalone="yes" ?>
- <EOCData>
  - <Data>
      <BuyingEntity UDEFID="q.3_0">12345</BuyingEntity>
      <BuyingEntityPurchaseOrderNumber UDEFID="d.t.2_2.35.8">PO123456789</BuyingEntityPurchaseOrderNumber>
      <BuyingEntityPOLineItemNumber UDEFID="d.t.2_1.17.8">22</BuyingEntityPOLineItemNumber>
      <MarkMethod />
      <MarkGrade />
      <ActionCode UDEFID="c.n.0_1.46.4">A</ActionCode>
      <VersionNumber UDEFID="a.b.av.2_4.8.8">3.0.0</VersionNumber>
      <Email UDEFID="a.a.h.0_1.1.49.8">JaneSmith@partner.com</Email>
      <Name UDEFID="a.a.h.0_10">Jane Smith</Name>
      <Organization UDEFID="a.ax.3_0">90765</Organization>
      <Phone UDEFID="a.a.h.0_3.49.0">(217) 123-4567</Phone>
      <ParentEOC />
      <AddedOrRemovedfromParentEOCCode />
      <EffectiveDate />
      <Description UDEFID="g.9_9.14.14">Wlgget</Description>
      <BatchLot />
      <CurrentPartNumber />
      <CurrentPartNumberEffectiveDate />
      <EnterpriseIdentifier UDEFID="a.a.i.3_8">98765</EnterpriseIde
      <IssuingAgencyCode UDEFID="3_1.1.02.33.4">D</IssuingAgenc
      <ManufacturerCode />
      <ManufacturerIdentifier />
      <OriginalPartNumber UDEFID="q.9_1.16.35.8">PN12345</Origir
      <SerialNumber UDEFID="g.9_1.1.31.8">001</SerialNumber>
      <EOC UDEFID="g.9_54.8">D98765PN12345001</EOC>
      <EOCType UDEFID="g.9_4.7.33.4">EOC2</EOCType>
      <BaggedOrTaggedCode />
      <Contents />
      <MarkEffectiveDate />
      <AddedOrRemovedCode />
      <MarkerCode />
      <MarkerIdentifier />
      <MediumCode />
      <Value />
```

COMPANY B – Flat File Layout with UDEF

Data Element	Format	Max Size	Use	Data Element Description	Additional Comments	UDEF ID	UDEF Name
Draft Version 2.0							
			M=Mandatory, C=Conditional, O=Optional				
PO INFO			M				
Buying Company	Text	13	M	The 5 digit CAGE, 6 digit DoDAAC, or 9 digit DUNS of the Buying Company		g.3_6	Buyer ENTERPRISE_IDENTIFIER
Buying Company PO Number	Text	20	M	The Purchase Order Number of the Buying Company		dt.2_2.35.8	Purchase Order DOCUMENT_Purchase Assigned IDENTIFIER
Buying Company PO Line Item Number	Text	10	M	The Purchase Order Line Item Number of the Buying Company		dt.2_1.17.8	Purchase Order DOCUMENT_Line Item IDENTIFIER
Method	Text	10	O	Method used to mark I=Intrusive or NI=Non-Intrusive		g.9_5.19.33.4	Part PRODUCT_Marking Method Type CODE
Grade	Text	1	O	Grade letter of mark A,B,C,D,E,F,P		g.9_1.73.4	Part PRODUCT_Marking Grade CODE
Action ID	Text	1	M	Identifies the action this record is performing: A= Add, U=Update, R=Remove, S=Supplementary	Use S only if this record is supplying additional data for a EOC already sent in this or another file.	c.n.0_1.46.4	System Change PROCESS_Required Action CODE
Version	Text	10	M	ABC Company version number for this format document		a.b.av.2_4.8.8	Electronic File Submittal DOCUMENT_Format Version IDENTIFIER
POINT OF CONTACT							
POC-Email	Text	60	M	Email address of the person or office listed in Name.		a.a.h.0_1.1.49.8	File Submitter Contact ENTITY_Electronic Mail Access IDENTIFIER
POC-Name	Text	120	M	Person or office who would be contacted if there are technical issues associated with the XML transaction.		a.a.h.0_10	File Submitter Contact ENTITY_NAME
POC-Organization	Text	9	M	The 5 digit CAGE, 6 digit DoDAAC, or 9 digit DUNS of the organization providing the XML document.		a.ax.3_0	File Submitter ENTERPRISE_IDENTIFIER
POC-Phone	Text	25	M	Phone number of the person or office listed in Name.		a.a.h.0_3.49.0	File Submitter Contact ENTITY_Telephone Access IDENTIFIER
EOC DATA							
EOC-of-Parent	Text	78	C	The EOC of the item that contains the embedded item.		a.a.o.9_54.8	Next Higher Assembly PRODUCT_Globally Unique IDENTIFIER
Added-Or-Removed-from-Parent	Text	1	C	"A" if being added to an item, "R" if being removed from an item.	Required if Parent EOC provided	g.9_1.74.4	Part PRODUCT_Next Higher Assembly Add/Remove CODE
Date-Of-Change	CCYY-MM-DD	10	C	The date the item was embedded into another item or removed from an	Required if Parent EOC provided	a.a.o.9_15.13.6	Next Higher Assembly PRODUCT_Current Identification Effective DATE
Description	Text	250	M	Description of the item.		g.9_5.16.14	Part PRODUCT_Item Description TEXT
CPN	Text	32	C	Used only if the item's current part number is different from the Original Part Number. Must be provided if Current Part Number Effective Date is provided.	Required if Part Number was changed	g.9_1.17.35.8	Part PRODUCT_Manufacturer Current Assigned IDENTIFIER
CPN-Effective-Date	CCYY-MM-DD	10	C	The date the item was modified or changed to the current part number from a previous part number. Must be provided if Current Part Number is provided.	Required if Part Number was changed	g.9_15.13.6	Part PRODUCT_Current Identification Effective DATE
Organization-ID	Text	13	C	Code identifying the Organization that assigned the embedded item with the EOC data elements. If EOC Type is EOC1 or EOC2, this is the name Organization Identifier that was used in the construct. Required if EOC Type is EOC1 or EOC2.		a.a.i.3_0	Unique Identifier Source ENTERPRISE_IDENTIFIER
Issuing-Agency-Qualifier	Text	3	C	Designator to indicate which code was used in the Organization Identifier. Required if EOC Type is EOC1 or			

Figure 5: Input File and Application Data Format – UDEF Tagged

Having the UDEF IDs in both shows us which XML Child Nodes and Flat File Data Elements have the same meaning. We still may have differences in field size and type, and missing or extra data items; but the semantic alignment has been simplified.

COMPANY B only has to assign UDEF IDs to it's flat file layout once. Once this is done COMPANY B can use that information to do its semantic data element alignment with any other entity that needs to provide them data. So the more entities that use UDEF the more cost savings we can expect throughout the industry.

Gap Analysis

Automated Gap Analysis can make this data element alignment even faster on the assumption that UDEF IDs are provided. Source and target files are input to a gap-analysis tool. Each file contains UDEF IDs assigned to each data element name. A gap-analysis report is generated. A gap-analysis tool is available as a web service from the UDEF home page at http://www.opengroup.org/udef/.

The example illustrated in Figures 6 and 7shows the use of this tool. Figure 6 shows two different file layouts for two different applications used to either generate or process a purchase order. The OAGIS file layout represents the purchase order from a customer's procurement application, and the xCBL file represents an example target application layout used by a typical supplier's order management system. UDEF IDs have been embedded within each file. Figure 7 shows a portion of an example gap analysis report generated by the Online Gap Analysis Service in less than 1 second for the source and target files shown above. Within the report a null indicates that the data element from one application does not have a corresponding data element in the other application.

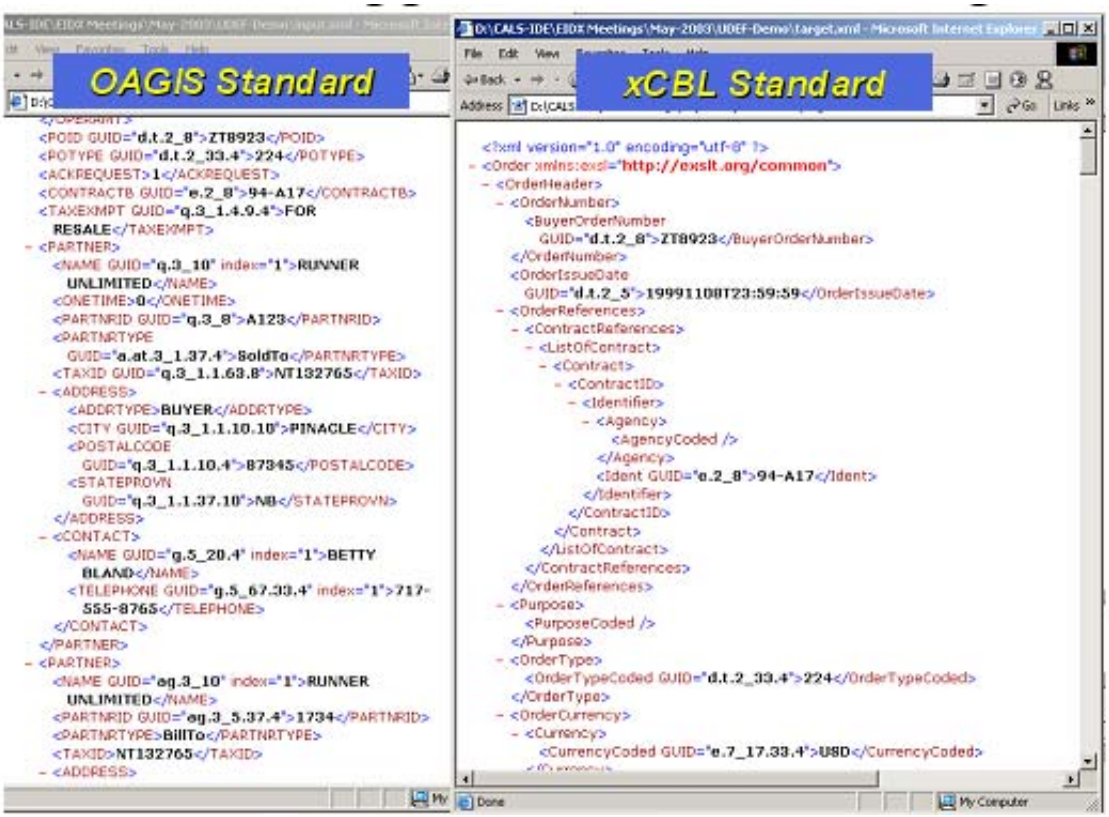


Figure 6: UDEF-Tagged Source and Target Files

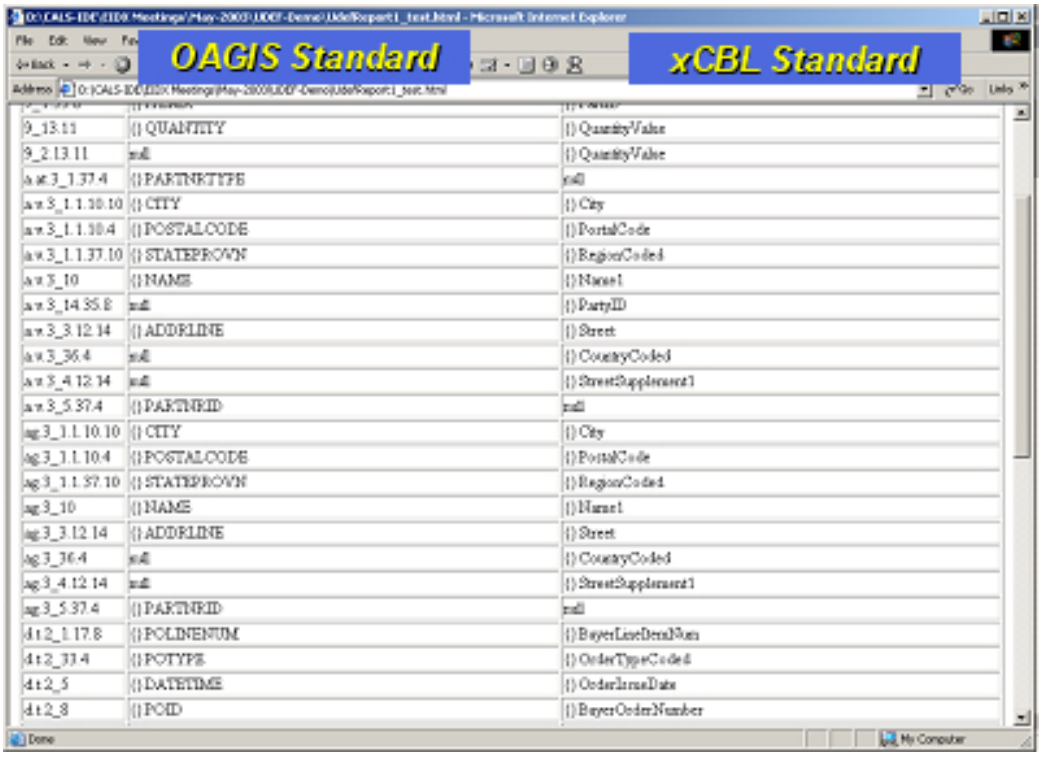


Figure 7: Gap Analysis Report