

ODM seeks SDTM - The missing link revisited

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ODM seeks SDM

For quality long-term interchange.

The missing link

- ODM Study Design -> EDC system (oper.database)
- Data collection -> Operational Database
- Operational database -> ODM export



- Generation of submission data (SDTM)



If life were perfect ...

- One question on CRF : one SDTM field
 - SDTM codelists used in CRF
 - Only answers in English

 - But life isn't perfect ...
-
-

SDTM starts at study design (think SDTM, write ODM)

- Use ODM for study design (tools available)
- Annotate questions with SDTM information (SDSVarName attr. on ItemDef)
- Set up operational database / EDC system from ODM
- Annotate (sub)forms with Domain information (Domain attribute on ItemGroupDef)

```
- <ItemDef OID="IT.AECONTRT" Name="Actions taken, other" DataType="text"  
  SDSVarName="AEACNOTH">  
  <CodeListRef CodeListOID="CL.AECONTR" />  
</ItemDef>
```

Think SDTM, write ODM

- Use CDASH forms if possible
 - Use CDISC Controlled Terminology if possible
 - Invest in Localization (translations) of CDISC Controlled Terminology
 - Think about future mapping problems when designing the study
 - Data types
 - Codelists
 - ...
-
-

Use CDASH forms if possible

Group: Adverse events

Has the subject experienced any adverse events*

Yes ▾

Group: Adverse events

Insert after selected Group

Remove selected Group

Event No.*

1

Adverse event*

Headache

Start Date*

2007-09-16



Is the adverse event still continuing

Yes ▾

Was event serious*

No ▾

Is there a reasonable possibility that the AE may have been caused by the study drug*

Yes ▾

Action taken with study drug*

Study drug regimen changed ▾

Subject outcome*

Subject remains in study ▾



Use CDISC CT as ODM / define.xml Codelists

```
<!-- Vital Signs Test Codes, Source: CDISC Controlled Terminology SDTM Package-1 and Lab Test Terms Final, June 2007 -->
```

```
- <CodeList OID="CL.VSTESTCD" Name="Vital Signs Test Code" DataType="text">
```

```
- <CodeListItem CodedValue="BMI">
```

```
- <Decode>
```

```
  <TranslatedText xml:lang="en">Body Mass Index</TranslatedText>
```

```
  </Decode>
```

```
</CodeListItem>
```

```
- <CodeListItem CodedValue="BODYFAT">
```

```
- <Decode>
```

```
  <TranslatedText xml:lang="en">Adipose Tissue</TranslatedText>
```

```
  </Decode>
```

```
</CodeListItem>
```

```
- <CodeListItem CodedValue="BSA">
```

```
- <Decode>
```

```
  <TranslatedText xml:lang="en">Body Surface Area</TranslatedText>
```

```
  </Decode>
```

```
</CodeListItem>
```

```
- <CodeListItem CodedValue="DIABP">
```

```
- <Decode>
```

```
  <TranslatedText xml:lang="en">Diastolic Blood Pressure</TranslatedText>
```

```
  </Decode>
```

```
</CodeListItem>
```

```
- <CodeListItem CodedValue="FRMSIZE">
```

```
- <Decode>
```

```
  <TranslatedText xml:lang="en">Body Frame Size</TranslatedText>
```

```
  </Decode>
```

```
</CodeListItem>
```


Invest in translations of CT in multi-language studies

```
- <CodeList OID="CL.AEREL" Name="AE Relationship to Study Drug" DataType="text" SASFormatName="AEREL">
- <CodeListItem CodedValue="0">
- <Decode>
  <TranslatedText xml:lang="en">None</TranslatedText>
  <TranslatedText xml:lang="de">Keine</TranslatedText>
  <TranslatedText xml:lang="fr">Aucun</TranslatedText>
</Decode>
</CodeListItem>
- <CodeListItem CodedValue="1">
- <Decode>
  <TranslatedText xml:lang="en">Unlikely</TranslatedText>
  <TranslatedText xml:lang="de">Unwahrscheinlich</TranslatedText>
  <TranslatedText xml:lang="fr">Peu probable</TranslatedText>
</Decode>
</CodeListItem>
- <CodeListItem CodedValue="2">
- <Decode>
  <TranslatedText xml:lang="en">Possible</TranslatedText>
  <TranslatedText xml:lang="de">Möglich</TranslatedText>
  <TranslatedText xml:lang="fr">Possible</TranslatedText>
</Decode>
</CodeListItem>
- <CodeListItem CodedValue="3">
- <Decode>
  <TranslatedText xml:lang="en">Probable</TranslatedText>
  <TranslatedText xml:lang="de">Wahrscheinlich</TranslatedText>
  <TranslatedText xml:lang="fr">Probable</TranslatedText>
</Decode>
</CodeListItem>
</CodeList>
```

From operational data (ODM) to SDTM records

New software tool available:

SDTM-ETLTM



SDTM-ETL : drag-and-drop

SDTM-ETL - version 1.1

File Edit View Navigate Insert Transform About

ODM

- Study
 - GlobalVariables
 - BasicDefinitions
 - MetaDataVersion : Version 1.1.0
 - Protocol
 - StudyEventDef : Pre-treatment
 - StudyEventDef : Post-treatment
 - FormDef : Visit Form
 - FormDef : Adverse Events
 - FormDef : Concom Meds
 - FormDef : Physical Exam
 - ItemGroupDef : Common
 - ItemDef : Site ID
 - ItemDef : Subject ID
 - ItemGroupDef : Physical Exam
 - ItemDef : Compound
 - ItemDef : Therapeutic Area
 - ItemDef : Protocol Number
 - ItemDef : Country
 - ItemDef : Record status, 5 levels, internal use
 - ItemDef : Physical Exam Body System
 - ItemDef : Normal/Abnormal/Not Done
 - ItemDef : Comment
- CodeList : AE Action Taken, Study Drug
- CodeList : AE Action Taken, Other
- CodeList : AE Outcome
- CodeList : AE Relationship to Study Drug
- CodeList : AE Severity
- CodeList : Assigned Study Drug
- CodeList : Record Status, Internal
- CodeList : Normal/Abnormal/Not Done
- CodeList : PE Body System
- CodeList : Conmed Regimen
- CodeList : Conmed Route
- CodeList : Country

Domains (ItemGroups)

ble	Variable	Variable	Variable	Variable	Variable
OTC	DM.RFENDTC	DM.SITEID	DM.INVID	DM.INVNAM	DM.BF
M	TS.TSVAL				
	SE.ELEMENT	SE.SESTDTC	SE.SEENDTC	SE.SEUPDES	
JM	SV.VISITDY	SV.SVSTDTC	SV.SVENDTC	SV.SVUPDES	
ID	EX.EXSPID	EX.EXTRT	EX.EXCAT	EX.EXSCAT	EX.EX
PID	CM.CMSPID	CM.CMTRT	CM.CMMODIFY	CM.CMDECOD	CM.CI
PID	SU.SUSPID	SU.SUTRT	SU.SUMODIFY	SU.SUDECOD	SU.SU
ID	AE.AEREFID	AE.AESPID	AE.AETERM	AE.AEMODIFY	AE.AE
PID	DS.DSREFID	DS.DSSPID	DS.DSTERM	DS.DSDECOD	DS.DS
	DV.DVTERM	DV.DVDECOD	DV.EPOCH	DV.DVSTDTC	DV.DV
PID	MH.MHREFID	MH.MHSPID	MH.MHTERM	MH.MHMODIFY	MH.MI
PID	EG.EGREFID	EG.EGSPID	EG.EGTESTCD	EG.EGTEST	EG.EC
	IE.IETESTCD	IE.IETEST	IE.IECAT	IE.IEASCAT	IE.IEC
ID	LB.LBREFID	LB.LBSPID	LB.LBTESTCD	LB.LBTEST	LB.LB
PID	PE.PESPID	PE.PETESTCD	PE.PETEST	PE.PEMODIFY	PE.PE
PID	SC.SCSPID	SC.SCTESTCD	SC.SCTEST	SC.SCCAT	SC.SC
ID	VS.VSSPID	VS.VSTESTCD	VS.VSTEST	VS.VSCAT	VS.VS
Q	CO.IDVAR	CO.IDVARVAL	CO.COREF	CO.CODTC	CO.CO
PID	QS.QSSPID	QS.QSTESTCD	QS.QSTEST	QS.QSCAT	QS.QS
PID	DA.DASPID	DA.DAREFID	DA.DATESTCD	DA.DATEST	DA.DA
PID	PC.PCREFID	PC.PCSPID	PC.PCBATID	PC.PCTESTCD	PC.PC
PID	PP.PPTESTCD	PP.PPTEST	PP.PPCAT	PP.PPSCAT	PP.PP
PID	MB.MBREFID	MB.MBSPID	MB.MBTESTCD	MB.MBTEST	MB.ME
PID	MS.MSREFID	MS.MSSPID	MS.MSTESTCD	MS.MSTEST	MS.MS
	RELTYPE	RELID			
	QNAM	QLABEL	QVAL	QORIG	QEVA
OTC	DM.RFENDTC	DM.SITEID	DM.INVID	DM.INVNAM	DM.BF
PID	QS.QSSPID	QS.QSTESTCD	QS.QSTEST	QS.QSCAT	QS.QS
JM	SV.VISITDY	SV.SVSTDTC	SV.SVENDTC	SV.SVUPDES	
PID	PE.PESPID	PE.PETESTCD	PE.PETEST	PE.PEMODIFY	PE.PE
ID	AE.AEREFID	AE.AESPID	AE.AETERM	AE.AEMODIFY	AE.AE

PE.PETESTCD
Mandatory: Yes
OrderNumber: 7
ItemDef Name: PETESTCD
Data type: text
Length: 8
Define label: Body System Examined Short Name

\$PE.PETESTCD = /*FORM.VITPHYEX.IG.PHYEX.IT.BODY_SYS/@Value

With many wizards

CodeList mapping between ODM "AE Severity" and SDTM "Severity/Intensity S...



ODM CodeList Item	SDTM CodeList Item
1 - Mild	MILD - MILD
2 - Moderate	MILD - MILD
3 - Severe	MILD - MILD
4 - Life Threatening	MODERATE - MODERATE
MISSING/INVALID VALUE	SEVERE - SEVERE
	MISSING VALUE

EX.EXRO
CM.CMC
SU.SUD
AE.AESE
DS.DSS
MH.VISIT
EG.EGST
LB.LBST
PE.PEST
SC.SCR
VS.VSNF
QS.QSR
DA.DAST
PC.PCST
PP.VISIT

And an easy-to-learn scripting language

The Transformation Script

```
$BIRTHDATE = xpath(/StudyEventData[@StudyEventOID='SE.VISIT0']/FormData[@FormOID='FORM.DEMOG']/ItemGroup)
# Date of first visit (reference date)
$VISITDATE = xpath(/StudyEventData[@StudyEventOID='SE.VISIT0']/FormData[@FormOID='FORM.VISIT']/ItemGroup)
# Get the difference between the dates as a number of days
# datediff gives the date difference as number of days
$AGEDAYS = datediff($VISITDATE,$BIRTHDATE) ;
# the floor function transforms to an integer
$AGE = floor($AGEDAYS / 365.2) ;
```

Scripting Language Functions

+	-	*	/		
xpath	usubjid	investigator	site		
substring	substring-before	substring-after	concat	string-length	replace
if	elseif	else	trim	upper-case	lower-case
<	>	<=	>=	==	!=

Test - Transform to XSLT

Features of the SDTM-ETL software

- All scripts stored in the define.xml structure / file
 - Define.xml in sync with the mapping and SDTM records
 - Contains latest CDISC SDTM Controlled Terminology
 - SDTM “CDISC Notes” implemented (“Help”)
 - Mapping can be tested during development
-
-

SDTM-ETL: output

- SDTM records in XML format
 - SDTM records in SAS Transport format
 - Automatic creation of SUPPQUAL when necessary
 - define.xml in sync with SDTM records
 - SQL “Create Table” statements
 - For generation of SDTM database / datawarehouse
 - SQL “Insert” statements
 - For population of SDTM database / datawarehouse
-
-



ODM file with cli

C:\SDTM-ETL\Te

ODM Output file

C:\test.xml

Split records

View Result

Save result S

SAS XPORT files

C:\SDTM-ETL\Te

Messages and e

BODY EXAM DAT

BODY EXAM DAT

BODY EXAM DAT

BODY EXAM DAT

BODY EXAM DAT

BODY EXAM DAT

BODY EXAM DAT

First visit date =

AE end date = 20

First visit date =

AE end date = 20

First visit date =

AE end date =

First visit date =

AE end date = 20

Error Messages:

STUDYID	DOMAIN	USUBJID	SUBJID	DM.RFSTDTCT	DM.RFENDTCT	DM.S
MyStudy	DM	001		2006-04-01	2006-05-12	LOC.site0
MyStudy	DM	002		2006-04-02	2006-05-02	LOC.site0
MyStudy	DM	003		2006-04-03	2006-05-03	LOC.site0
MyStudy	DM	004		2006-04-04	2006-05-04	LOC.site0
MyStudy	DM	005		2006-04-04	2006-05-05	LOC.site0
MyStudy	DM	006		2006-04-06	2006-05-06	LOC.site0
MyStudy	DM					
MyStudy	DM					
MyStudy	DM					
MyStudy	DM					
MyStudy	DM					
MyStudy	DM					
MyStudy	DM					
MyStudy	DM					

SAS System Viewer - [PE.xpt]

File Edit View Window Help

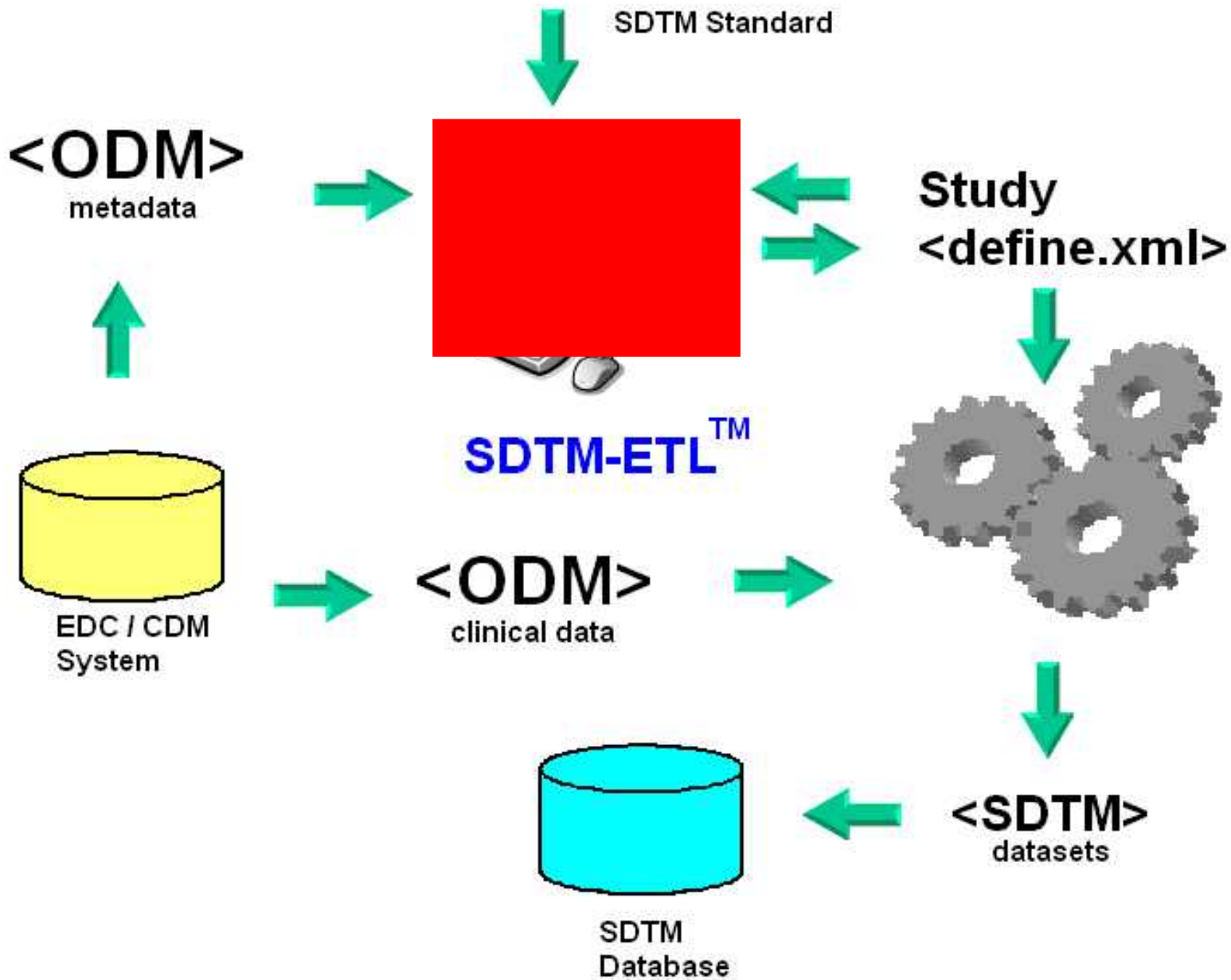
	STUDYID	DOMAIN	USUBJID	PESEQ	PETESTCD	PETEST	PEORRES	PESTAT	PE
1	MyStudy	PE	001	1	1	Head, Ne	Normal	.	.
2	MyStudy	PE	001	2	2	Eyes, Ea	Normal	.	.
3	MyStudy	PE	001	3	3	Chest	Normal	.	.
4	MyStudy	PE	001	4	4	Lungs	Abnormal	.	.
5	MyStudy	PE	001	5	5	Heart	Abnormal	.	.
6	MyStudy	PE	001	6	6	Lymph No	Abnormal	.	.
7	MyStudy	PE	001	7	7	Abdomen	Normal	.	.
8	MyStudy	PE	001	8	8	Anorecta	Not Done	NOT DONE	The
9	MyStudy	PE	001	9	9	Genitali	Normal	.	.
10	MyStudy	PE	001	10	10	Skin	Abnormal	.	.
11	MyStudy	PE	001	11	11	Musculos	Normal	.	.
12	MyStudy	PE	001	12	12	Neurolog	Normal	.	.
13	MyStudy	PE	001	13	13	Other	Normal	.	.

Ready Hdn cols:0 Obs 1-273 of 273 NUM

OK

OK

USUBJID	CM.CMSEQ	CM.CMGRPID	CM.CMSPID
USUBJID	SU.SUSEQ	SU.SUGRPID	SU.SUSPID
USUBJID	AE.AESEQ	AE.AEGRPID	AE.AEREFID
USUBJID	DS.DSSEQ	DS.DSGRPID	DS.DSREFID
USUBJID	DV.DVSEQ	DV.DVCAT	DV.DVTERM
USUBJID	MH.MHSEQ	MH.MHGRPID	MH.MHREFID
USUBJID	EG.EGSEQ	EG.EGGRPID	EG.EGREFID
USUBJID	IE.IESEQ	IE.IESPID	IE.IETESTCD



Best practices

- Use a study design tool that is based on, or at least exports in ODM
- Annotate your ODM Forms with SDTM
 - ItemGroupDef : **Domain**
 - ItemDef : **SDSVarName**
Alias
- Keep a repository of forms, subforms, questions, codelists in ODM format
- Select only EDC vendors that import/export ODM
 - Is your EDC Vendor ODM Certified ?

The diagram shows two input fields, one for 'Height' and one for 'Weight'. Each field is represented by four small boxes followed by a decimal point and another small box. Below each field is a light blue box containing red text: 'VSORRES where VSTESTCD = HEIGHT' for the Height field and 'VSORRES where VSTESTCD = WEIGHT' for the Weight field.

Best practices

- Try to use CDISC Controlled Terminology as much as possible / reasonable
 - Also in your (e)CRFs
- Train your people in SDTM
- Start your mapping before database closing



The future

- SDTM *and* ADaM in XML
 - define.xml 1.1
 - No more SAS Transport ...
 - SDTM, ADaM and define.xml all speak the same language
 - Submit CRFs to FDA as ODM
-
-

ODM seeks SDTM ?

Update to:

Think SDTM – Write ODM

