

Data In and Out



CDISC ODM and WebServices do the Hokey-Cokey

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CDISC ODM

- Operational Data Model
- Based on XML
- Metadata and Data standard
- Available for > 10 years
- Widely adopted in Industry
- Many certifications (<http://www.cdisc.org/odm-certification>)
- Many more non-certified organizations support the standard

Web Services

“Web Services are application programming interfaces (API) that are accessed via Hypertext Transfer Protocol (HTTP)...”

- Wikipedia

There are many variants but Medidata has chosen a simple XML-over HTTP style

Very low barrier to entry:

- Web Browser
- SAS using PROC HTTP
- CuRL from command-line
- Scripting Languages..

And the 'Hokey Cokey'?

A traditional song and associated dance:

*You put your right leg in,
Your right leg out:
In, out, in, out.
You shake it all about.
You do the hokey cokey,
And you turn yourself around.
That's what it's all about!*

Very easy to learn and a lot of fun if you try.

Just like ODM and Web Services!

ODM and Web Services allow us to work with EDC and other systems,
Putting data in, pulling data out, in, out, in out, shaking all about...

ODM is Message, Web Service is Transport

- ODM provides many message options:
 - Create study Metadata
 - Extract study Metadata
 - Create Subjects
 - Add or Update Clinical data
 - Extract Clinical Data
- Web Services provide a way to deliver this message to EDC system for action
- This presentation on Rave and Rave Web Services (RWS) but other vendors have similar capabilities

Practical Application

- Suzanne works in a Clinical Programming group within Data Management
- She is asked to integrate data coming from an outside system into an EDC study
- The data will be sent as a CSV file
- She is provided a study name and username and password to the EDC system and asked to “Work it out”
- Luckily Suzanne is Smart and can Get Things Done

Getting Data In

The CSV File Specification

Column	Format	Description
SUBID	\$5	Unique Subject Identifier
INITS	\$3	Patient initials
BIRTH_DAT	YYYY-MM-DD	Date of birth
OBSDAT	YYYY-MM-DD	Observation date
HEIGHT	4.1	Height Centimeters
WEIGHT	3.2	Weight Kilos

The CSV File

SUBID	INITS	BIRTH_DAT	OBSDAT	HEIGHT	WEIGHT
001	GTD	1973-06-26	2013-02-01	174.5	132
002	O K	1971-10-13	2013-02-09	173	82.5
003	LKY	1953-08-10	2013-03-14	152	95.2
004	VOS	1975-02-08	2013-03-16	178	67.7
005	ITG	1977-10-23	2013-03-19	158	81.5
006	G D	1970-04-18	2013-03-24	180.5	73.9
007	PWB	1957-10-14	2013-04-06	175	
008	MDM	1973-01-18	2013-04-11	190	114.8
009	Q G	1974-03-04	2013-04-16	184	68.8
010	YOP	1964-03-03	2013-04-26	175	92.7

Where does this data even go ?

Suzanne has no idea about this study. She asks Monika, the Data Management Lead for this project.

Monika provides a specification for the study and a link to some technical documentation on integration using Web Services and ODM.

The screenshot shows a web browser window displaying the 'Contents' page of the Medidata Rave Web Services documentation. The browser's address bar shows 'Contents — Rave W...'. The page features the Medidata logo and a table of contents. The 'On this page' section lists the following items:

- Contents
 - 1. Introduction
 - About this Guide
 - Introduction to Rave Web Services
 - How to use this guide
 - 2. Solutions
 - 2.1 Retrieving Clinical View Data with Biostat Gateway
 - 3. Request Services
 - 3.1 Working with subject data
 - 3.2 Working with study and library metadata
 - 3.3 Retrieving clinical study and library lists
 - 3.4 Retrieving subject lists
 - 3.5 Retrieving clinical view datasets as ODM
 - 3.6 Retrieving clinical view form datasets as CSV
 - 3.7 Retrieving metadata for clinical view datasets as ODM
 - 3.8 Retrieving study and library metadata lists
 - 3.9 Retrieving study and library metadata
 - 3.10 Retrieving Custom datasets
 - 4. Reference
 - Indices and tables

The 'Next topic' section lists 'About this Guide'. The 'Quick search' section includes a search bar and a 'Go' button. The 'Enter search terms or a module name' text is visible below the search bar.

The main content area displays the 'Contents' page structure:

- 1. Introduction
 - About this Guide
 - Introduction to Rave Web Services
 - How to use this guide
- 2. Solutions
 - 2.1 Retrieving Clinical View Data with Biostat Gateway
- 3. Request Services
 - 3.1 Working with subject data

The '3.1 Working with subject data' section is expanded, showing a POST request to `https://{host}/RaveWebServices/webservice.aspx?PostODMCLinicalData`. The response is a list of items:

- Locating my study
- Creating my subject in a study and site
- Locating my subject
- Locating my site
- Locating my folder
- Locating my form
- Upserting my form
- Locating my log line
- Upserting my log line
- Updating my whole item group
- Updating my "text" data-type field
- Updating my "date" data-type field
- Updating my "unit dictionary" data-type field
- Updating my "data dictionary" data-type field
- Working with field workflow properties

Mapping

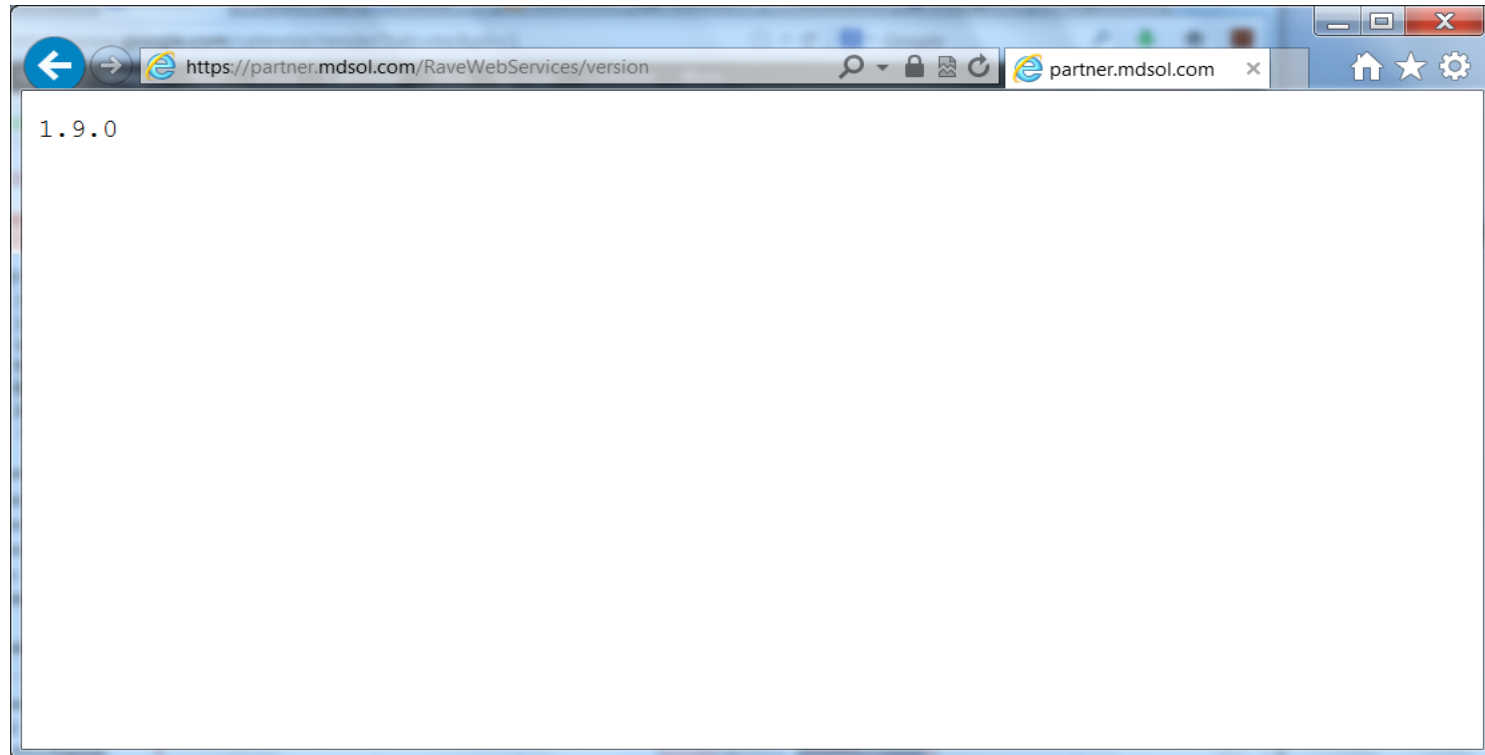
Suzanne works with Monika to match the input file to the study design

Event	Form	Field	Format	CSV File Map	Description
-	ENROL	SUBID	\$5	SUBID	Unique Subject Identifier
-	ENROL	INITS	\$3	INITS	Patient initials
-	ENROL	BIRTH_DAT	YYYY MM DD	BIRTH_DAT	Date of birth
SCREEN	VITAL	VDAT	YYYY MM DD	OBSDAT	Visit date
SCREEN	VITAL	HEIGHT_CM	4.1	HEIGHT	Height Centimeters
SCREEN	VITAL	WEIGHT_KG	3.2	WEIGHT	Weight Kilos

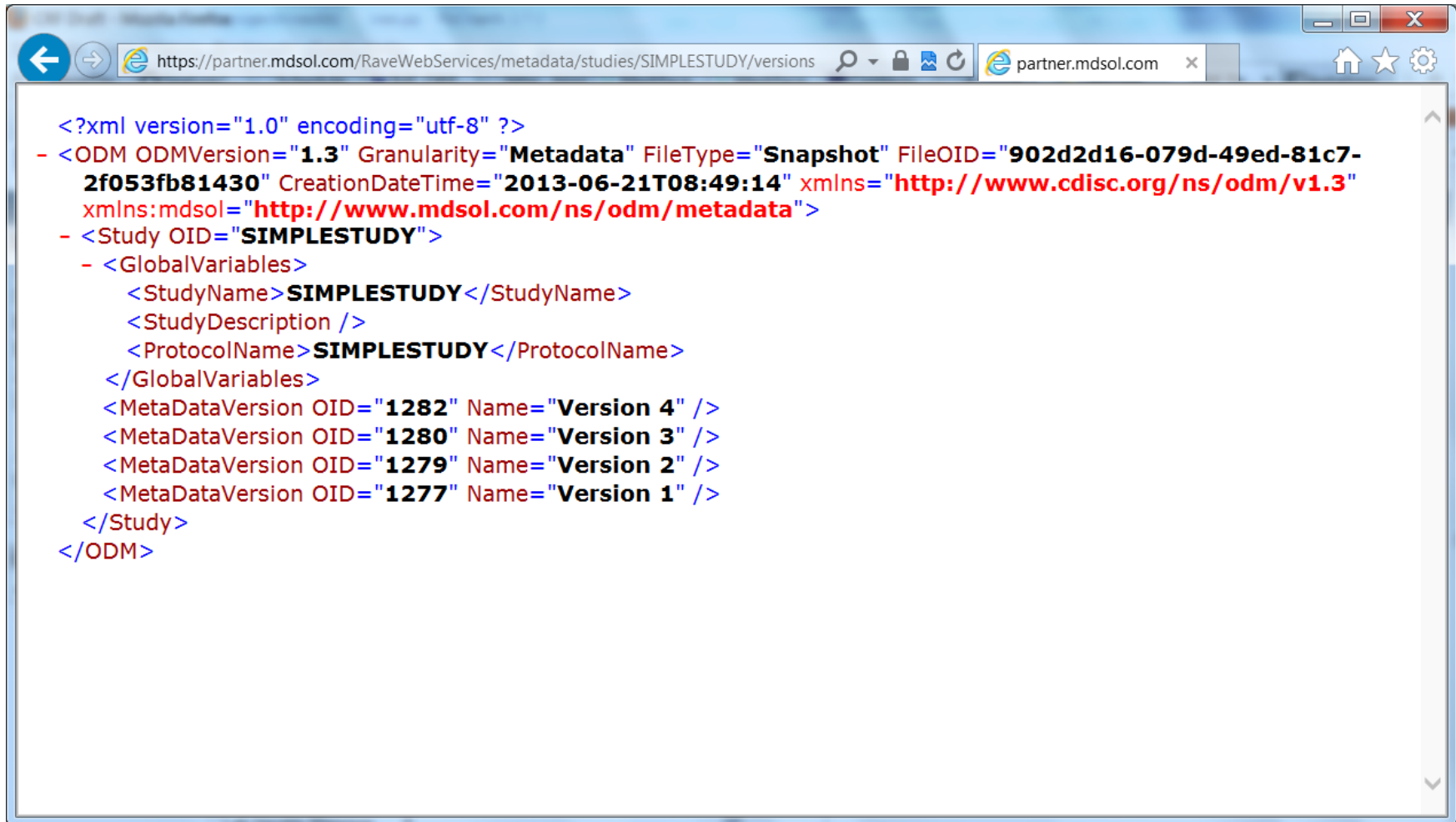
Now she knows WHERE it goes. How to get the data there?

Exploring the Web Service Interface

- Suzanne reads the guide and starts to test the web service interface using a web browser.
- First, a simple test to get the version of the Web Services:



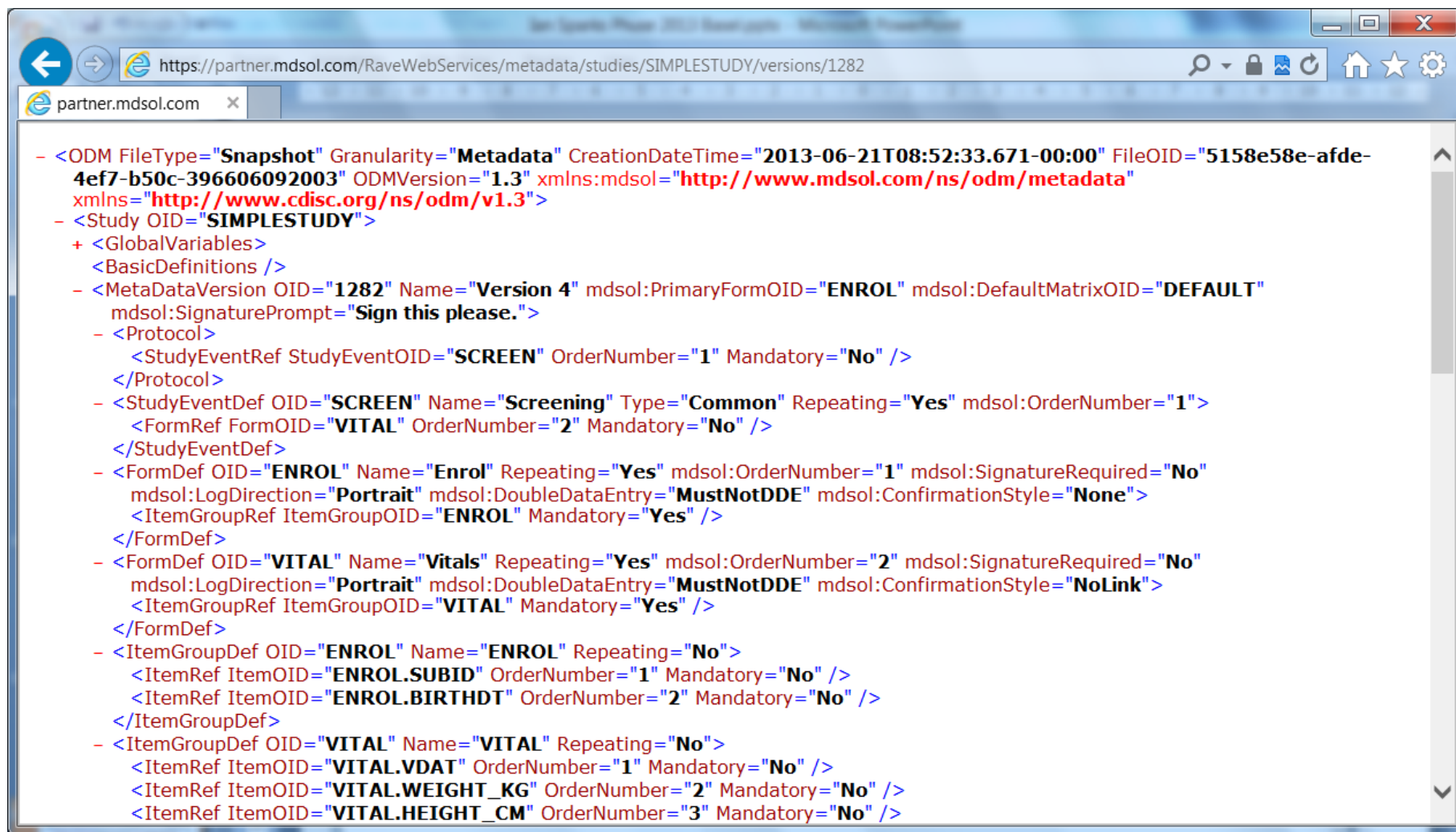
What versions do we have for this study?



```
<?xml version="1.0" encoding="utf-8" ?>
- <ODM ODMVersion="1.3" Granularity="Metadata" FileType="Snapshot" FileOID="902d2d16-079d-49ed-81c7-2f053fb81430" CreationDateTime="2013-06-21T08:49:14" xmlns="http://www.cdisc.org/ns/odm/v1.3" xmlns:mdsol="http://www.mdsol.com/ns/odm/metadata">
- <Study OID="SIMPLESTUDY">
  - <GlobalVariables>
    <StudyName>SIMPLESTUDY</StudyName>
    <StudyDescription />
    <ProtocolName>SIMPLESTUDY</ProtocolName>
  </GlobalVariables>
  <MetaDataVersion OID="1282" Name="Version 4" />
  <MetaDataVersion OID="1280" Name="Version 3" />
  <MetaDataVersion OID="1279" Name="Version 2" />
  <MetaDataVersion OID="1277" Name="Version 1" />
</Study>
</ODM>
```

Suzanne knows she wants the latest MetaDataVersion, 1282

Getting the MetaData

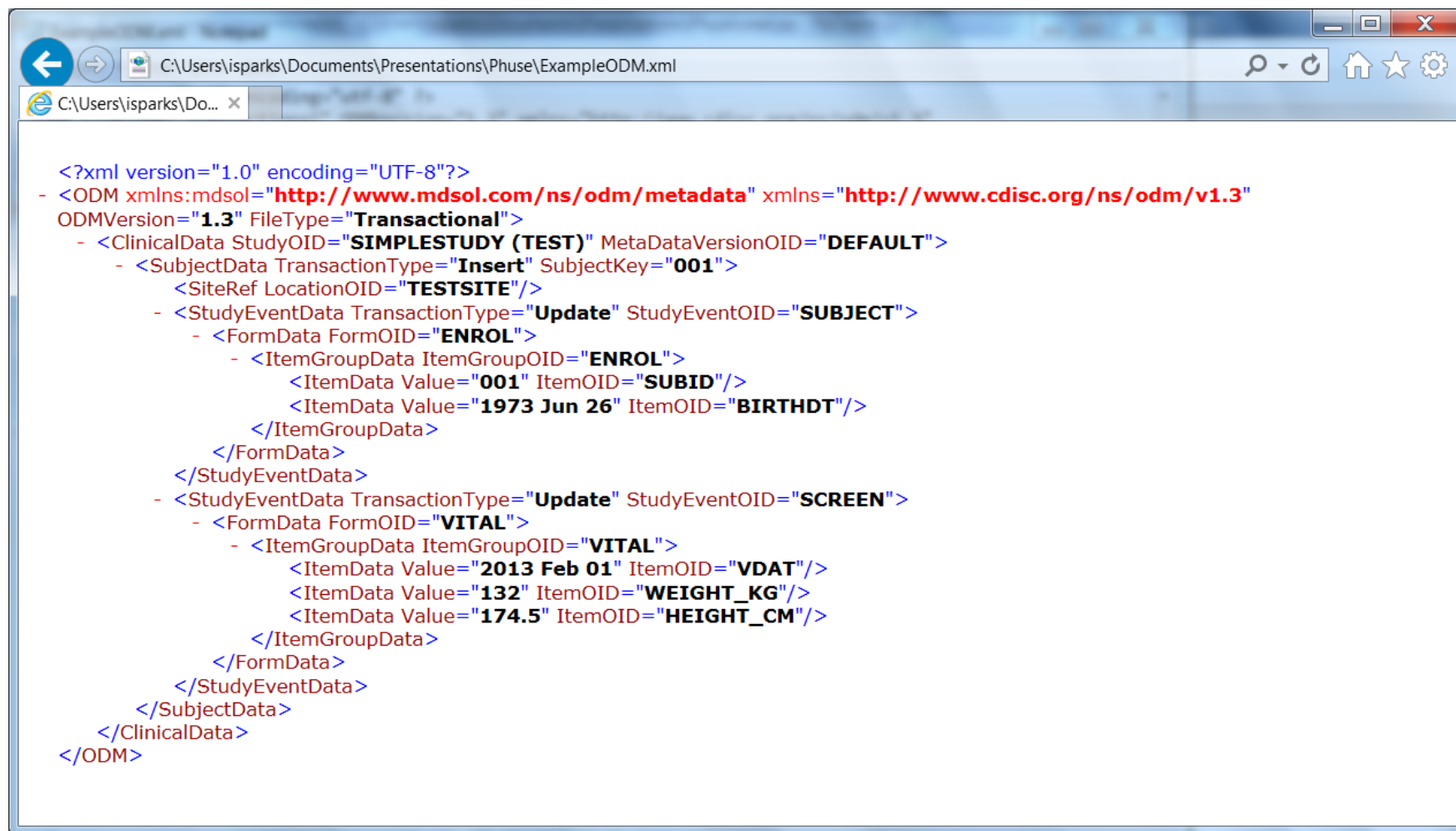


The screenshot shows a web browser window with the address bar displaying `https://partner.mdsol.com/RaveWebServices/metadata/studies/SIMPLESTUDY/versions/1282`. The browser's address bar also shows the domain `partner.mdsol.com`. The main content area displays an XML response, which is a metadata document for a study. The XML is structured as follows:

```
- <ODM FileType="Snapshot" Granularity="Metadata" CreationDateTime="2013-06-21T08:52:33.671-00:00" FileOID="5158e58e-afde-4ef7-b50c-396606092003" ODMVersion="1.3" xmlns:mdsol="http://www.mdsol.com/ns/odm/metadata"
  xmlns="http://www.cdisc.org/ns/odm/v1.3">
- <Study OID="SIMPLESTUDY">
+ <GlobalVariables>
  <BasicDefinitions />
- <MetaDataVersion OID="1282" Name="Version 4" mdsol:PrimaryFormOID="ENROL" mdsol:DefaultMatrixOID="DEFAULT"
  mdsol:SignaturePrompt="Sign this please.">
- <Protocol>
  <StudyEventRef StudyEventOID="SCREEN" OrderNumber="1" Mandatory="No" />
</Protocol>
- <StudyEventDef OID="SCREEN" Name="Screening" Type="Common" Repeating="Yes" mdsol:OrderNumber="1">
  <FormRef FormOID="VITAL" OrderNumber="2" Mandatory="No" />
</StudyEventDef>
- <FormDef OID="ENROL" Name="Enrol" Repeating="Yes" mdsol:OrderNumber="1" mdsol:SignatureRequired="No"
  mdsol:LogDirection="Portrait" mdsol:DoubleDataEntry="MustNotDDE" mdsol:ConfirmationStyle="None">
  <ItemGroupRef ItemGroupOID="ENROL" Mandatory="Yes" />
</FormDef>
- <FormDef OID="VITAL" Name="Vitals" Repeating="Yes" mdsol:OrderNumber="2" mdsol:SignatureRequired="No"
  mdsol:LogDirection="Portrait" mdsol:DoubleDataEntry="MustNotDDE" mdsol:ConfirmationStyle="NoLink">
  <ItemGroupRef ItemGroupOID="VITAL" Mandatory="Yes" />
</FormDef>
- <ItemGroupDef OID="ENROL" Name="ENROL" Repeating="No">
  <ItemRef ItemOID="ENROL.SUBID" OrderNumber="1" Mandatory="No" />
  <ItemRef ItemOID="ENROL.BIRTHDT" OrderNumber="2" Mandatory="No" />
</ItemGroupDef>
- <ItemGroupDef OID="VITAL" Name="VITAL" Repeating="No">
  <ItemRef ItemOID="VITAL.VDAT" OrderNumber="1" Mandatory="No" />
  <ItemRef ItemOID="VITAL.WEIGHT_KG" OrderNumber="2" Mandatory="No" />
  <ItemRef ItemOID="VITAL.HEIGHT_CM" OrderNumber="3" Mandatory="No" />
```

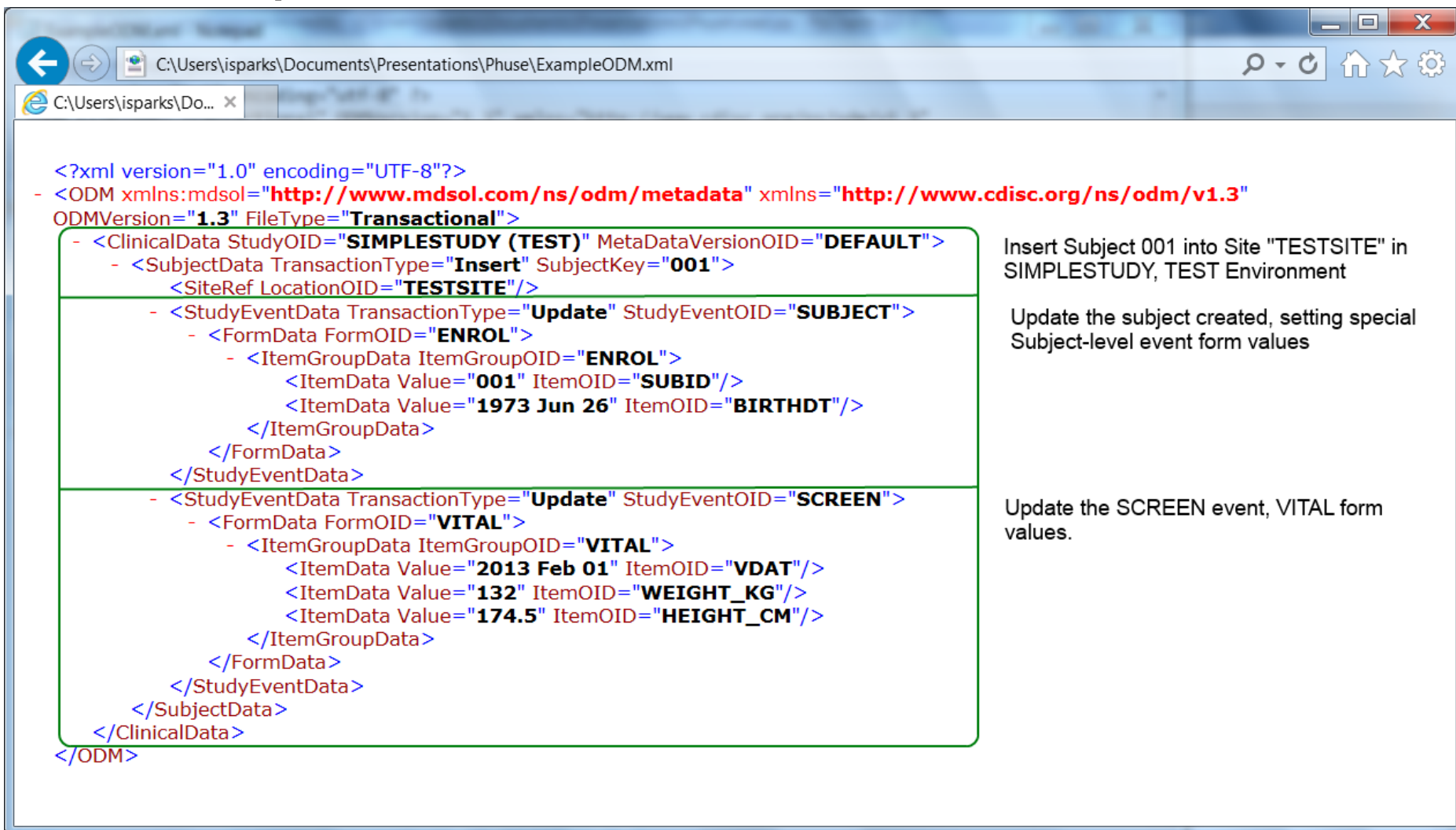
Updating the Data

- Suzanne creates an ODM ClinicalData message



```
<?xml version="1.0" encoding="UTF-8"?>
- <ODM xmlns:mdsol="http://www.mdsol.com/ns/odm/metadata" xmlns="http://www.cdisc.org/ns/odm/v1.3"
  ODMVersion="1.3" FileType="Transactional">
  - <ClinicalData StudyOID="SIMPLESTUDY (TEST)" MetaDataVersionOID="DEFAULT">
    - <SubjectData TransactionType="Insert" SubjectKey="001">
      <SiteRef LocationOID="TESTSITE"/>
      - <StudyEventData TransactionType="Update" StudyEventOID="SUBJECT">
        - <FormData FormOID="ENROL">
          - <ItemGroupData ItemGroupOID="ENROL">
            <ItemData Value="001" ItemOID="SUBID"/>
            <ItemData Value="1973 Jun 26" ItemOID="BIRTHDT"/>
          </ItemGroupData>
        </FormData>
      </StudyEventData>
      - <StudyEventData TransactionType="Update" StudyEventOID="SCREEN">
        - <FormData FormOID="VITAL">
          - <ItemGroupData ItemGroupOID="VITAL">
            <ItemData Value="2013 Feb 01" ItemOID="VDAT"/>
            <ItemData Value="132" ItemOID="WEIGHT_KG"/>
            <ItemData Value="174.5" ItemOID="HEIGHT_CM"/>
          </ItemGroupData>
        </FormData>
      </StudyEventData>
    </SubjectData>
  </ClinicalData>
</ODM>
```

Anatomy..



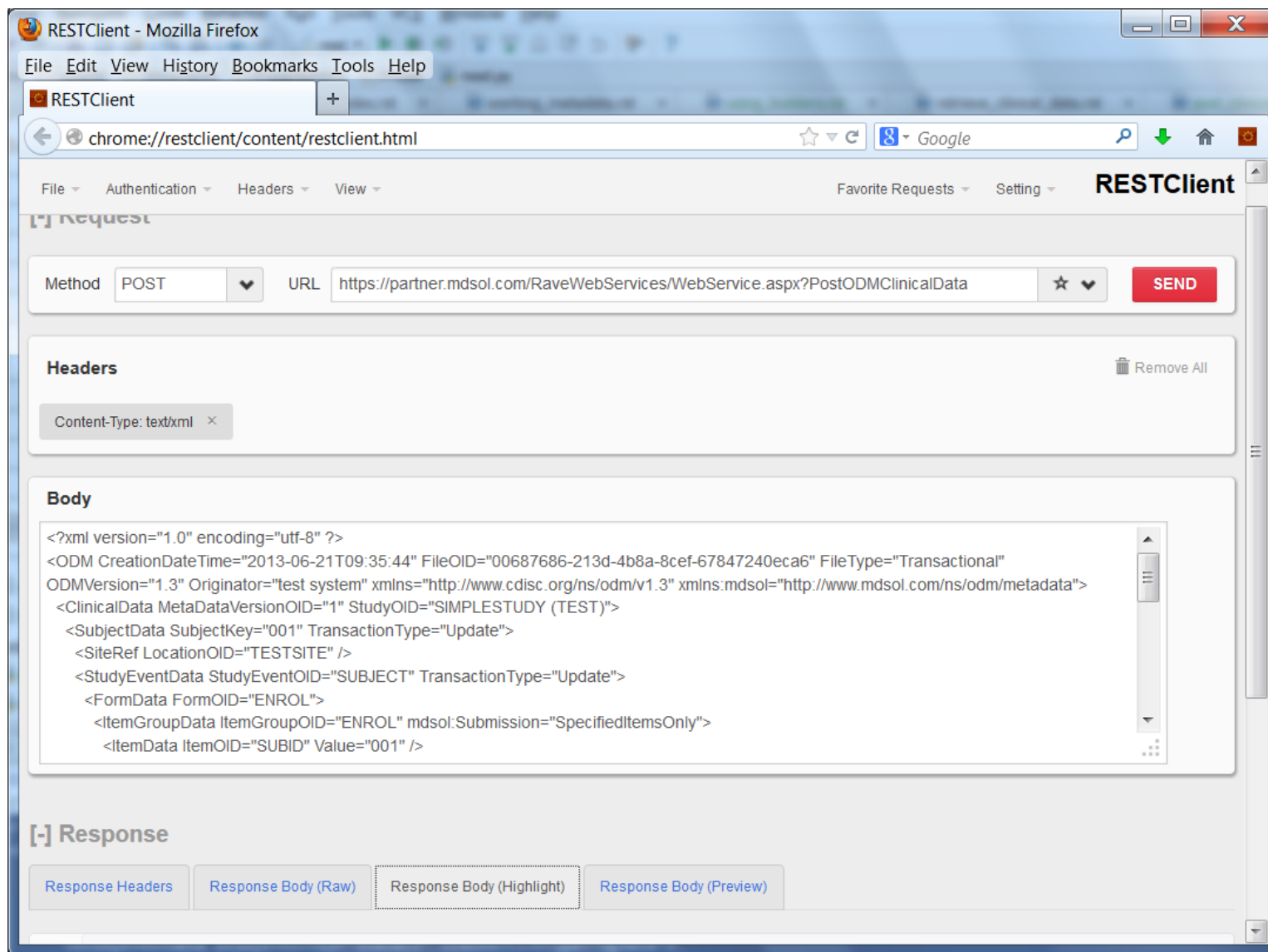
The screenshot shows a web browser window with the address bar displaying `C:\Users\isparks\Documents\Presentation\Phuse\ExampleODM.xml`. The XML content is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
- <ODM xmlns:mdsol="http://www.mdsol.com/ns/odm/metadata" xmlns="http://www.cdisc.org/ns/odm/v1.3"
  ODMVersion="1.3" FileType="Transactional">
  - <ClinicalData StudyOID="SIMPLESTUDY (TEST)" MetaDataVersionOID="DEFAULT">
    - <SubjectData TransactionType="Insert" SubjectKey="001">
      <SiteRef LocationOID="TESTSITE"/>
    - <StudyEventData TransactionType="Update" StudyEventOID="SUBJECT">
      - <FormData FormOID="ENROL">
        - <ItemGroupData ItemGroupOID="ENROL">
          <ItemData Value="001" ItemOID="SUBID"/>
          <ItemData Value="1973 Jun 26" ItemOID="BIRTHDT"/>
        </ItemGroupData>
      </FormData>
    </StudyEventData>
    - <StudyEventData TransactionType="Update" StudyEventOID="SCREEN">
      - <FormData FormOID="VITAL">
        - <ItemGroupData ItemGroupOID="VITAL">
          <ItemData Value="2013 Feb 01" ItemOID="VDAT"/>
          <ItemData Value="132" ItemOID="WEIGHT_KG"/>
          <ItemData Value="174.5" ItemOID="HEIGHT_CM"/>
        </ItemGroupData>
      </FormData>
    </StudyEventData>
  </SubjectData>
</ClinicalData>
</ODM>
```

Annotations on the right side of the XML content:

- Insert Subject 001 into Site "TESTSITE" in SIMPLESTUDY, TEST Environment
- Update the subject created, setting special Subject-level event form values
- Update the SCREEN event, VITAL form values.

RESTClient in Browser



Success!

File ▾ Authentication ▾ Headers ▾ View ▾ Favorite Requests ▾ Setting ▾ **RESTClient**

Content-Type: text/xml ×

[+] Response

Response Headers Response Body (Raw) **Response Body (Highlight)** Response Body (Preview)

```
1. <Response
2.           ReferenceNumber="1d8d67ad-3a65-4b9d-8232-d74df7258301"
3.           InboundODMFileOID="00687686-213d-4b8a-8cef-67847240eca6"
4.           IsTransactionSuccessful = "1"
5.           SuccessStatistics="Rave objects touched: Subjects=1; Folders=0; Forms=0; Fields=5;
LogLines=0"
6.           NewRecords="">
7. </Response>
```

And in EDC....



Medidata Solutions Worldwide

TEST

 Messages  My Profile  Help  Home  Logout
User: Ian Sparks

  SIMPLESTUDY  TESTSITE  001  Enrol

Subject Status: Enrolled

Subject: 001
Page: Enrol

Subject ID	001	       
Date of Birth	1973 Jun 26	       

[Printable Version](#) [View PDF](#) [Icon Key](#)
CRF Version 1282 - Page Generated: 21 Jun 2013 09:38:26 Greenwich Standard Time

Save Cancel



Click Here for Customer Support Information

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Do the same for all rows of CSV file

```
*Untitled*
File Edit Format Run Options Windows Help

import csv
from datetime import datetime
from rwslib.rws import RWSConnection
from rwslib.builders import *

#Make a RWS Connection
rws = RWSConnection('partner','username','password')

#Open the CSV file and loop through it
with open('pdat.csv', 'rb') as csvfile:
    reader = csv.DictReader(csvfile, delimiter=',')
    for row in reader:

        #Put dates into format that this study will accept
        birth_dat = datetime.strptime(row['BIRTH_DAT'], '%Y-%m-%d').strftime('%Y %b %d')
        obs_dat = datetime.strptime(row['OBSDAT'], '%Y-%m-%d').strftime('%Y %b %d')

        odm = ODM("test system") (
            ClinicalData("SIMPLESTUDY", "TEST") (
                SubjectData("TESTSITE", row['SUBID'], "Insert") (
                    StudyEventData("SUBJECT", transaction_type="Update") (
                        FormData("ENROL") (
                            ItemGroupData() (
                                ItemData("SUBID", row['SUBID']),
                                ItemData("BIRTHDT", birth_dat)
                            )
                        )
                    ),
                    StudyEventData("SCREEN", transaction_type="Update") (
                        FormData("VITAL") (
                            ItemGroupData() (
                                ItemData("VDAT", obs_dat),
                                ItemData("HEIGHT_CM", row['HEIGHT']),
                                ItemData("WEIGHT_KG", row['WEIGHT']),
                            )
                        )
                    )
                )
            )
        )

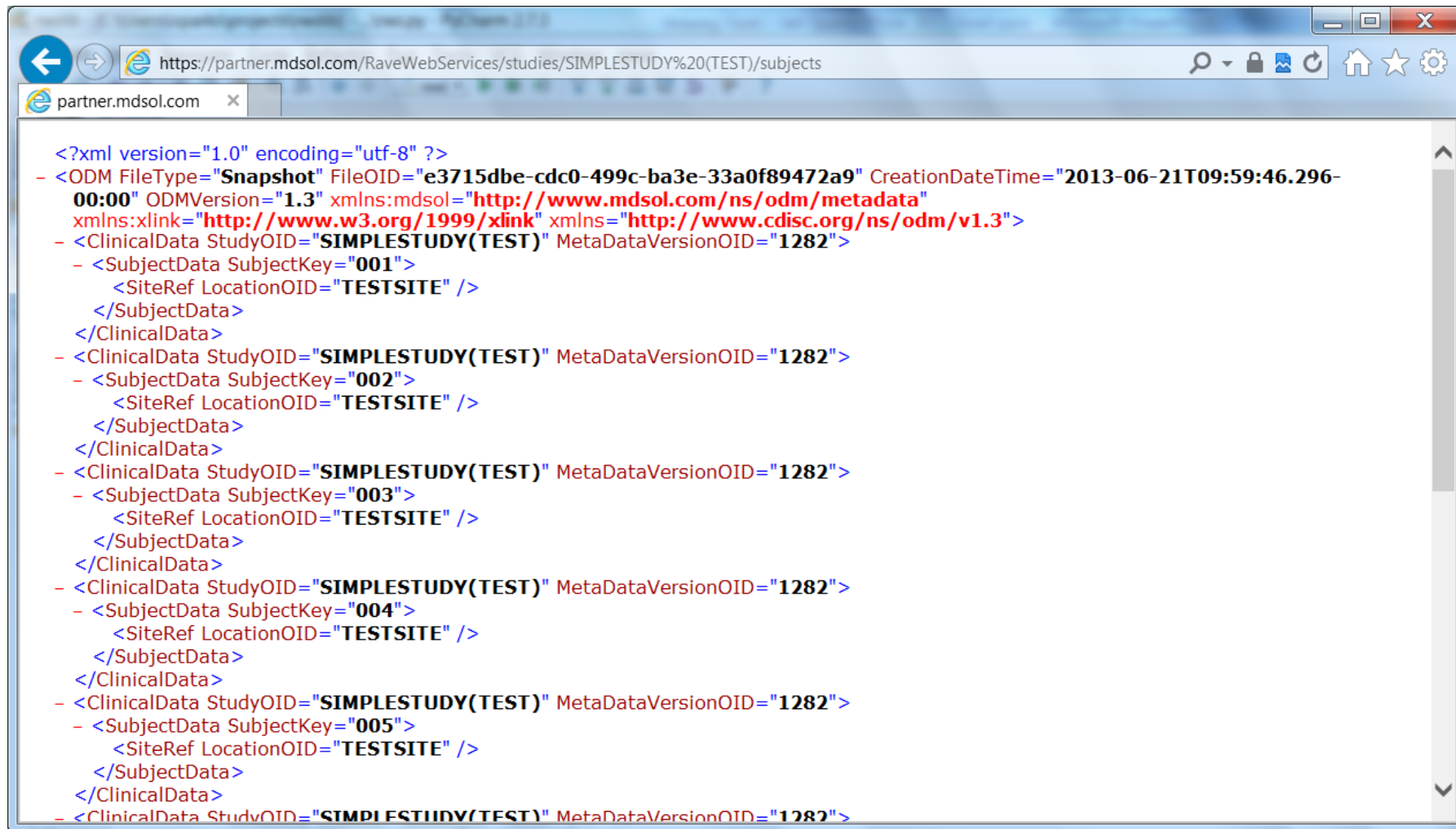
        #Post the data to EDC
        rws.post_data(str(odm))
```

Ln: 7 | Col: 50

Suzanne's work is done!

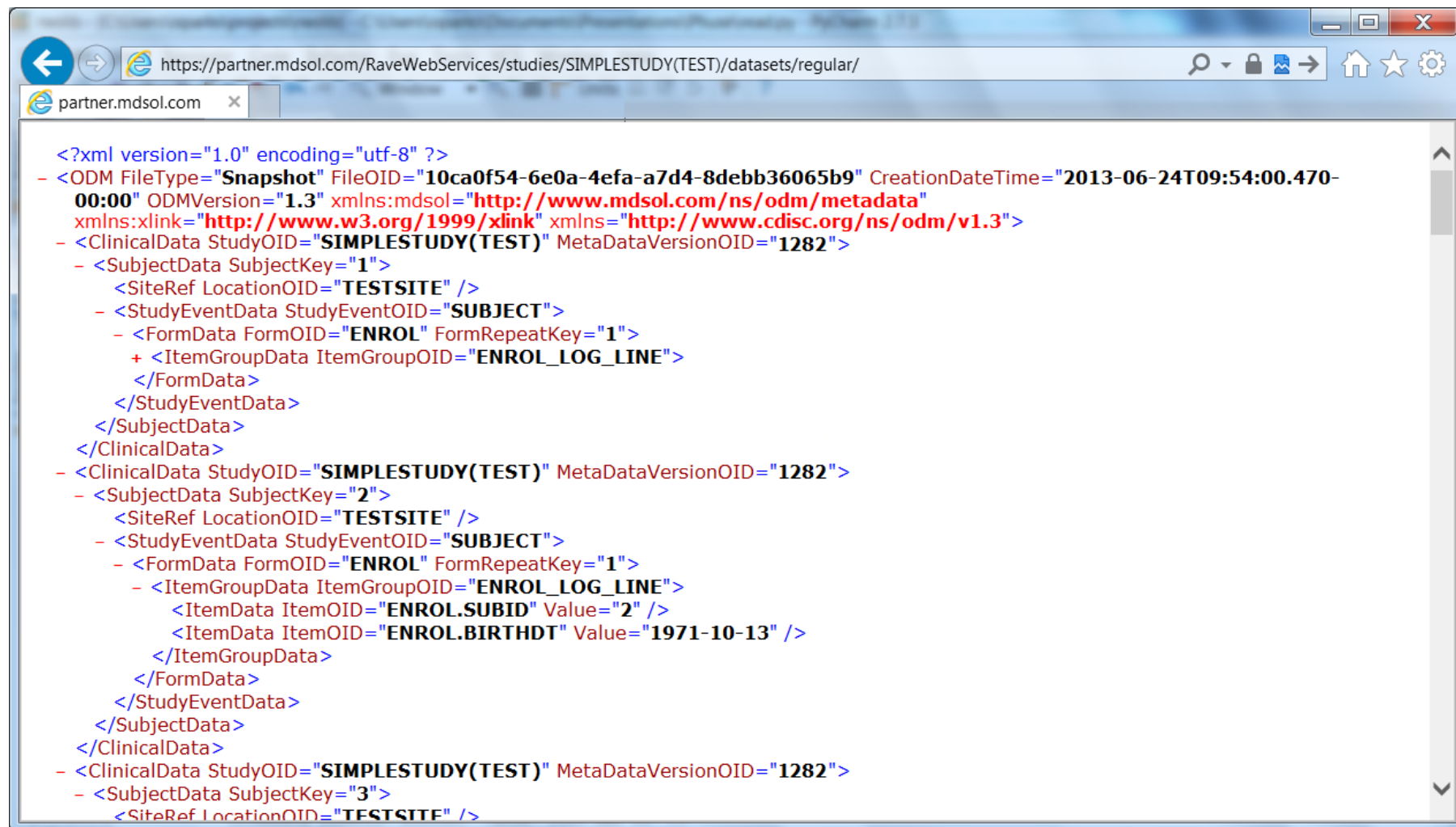
Getting Data Out

Listing Subjects



```
<?xml version="1.0" encoding="utf-8" ?>
- <ODM FileType="Snapshot" FileOID="e3715dbe-cdc0-499c-ba3e-33a0f89472a9" CreationDateTime="2013-06-21T09:59:46.296-00:00" ODMVersion="1.3" xmlns:mdsol="http://www.mdsol.com/ns/odm/metadata"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns="http://www.cdisc.org/ns/odm/v1.3">
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="001">
    <SiteRef LocationOID="TESTSITE" />
  </SubjectData>
</ClinicalData>
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="002">
    <SiteRef LocationOID="TESTSITE" />
  </SubjectData>
</ClinicalData>
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="003">
    <SiteRef LocationOID="TESTSITE" />
  </SubjectData>
</ClinicalData>
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="004">
    <SiteRef LocationOID="TESTSITE" />
  </SubjectData>
</ClinicalData>
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="005">
    <SiteRef LocationOID="TESTSITE" />
  </SubjectData>
</ClinicalData>
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
```

Getting ODM Data



```
<?xml version="1.0" encoding="utf-8" ?>
- <ODM FileType="Snapshot" FileOID="10ca0f54-6e0a-4efa-a7d4-8debb36065b9" CreationDateTime="2013-06-24T09:54:00.470-00:00" ODMVersion="1.3" xmlns:mdsol="http://www.mdsol.com/ns/odm/metadata"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns="http://www.cdisc.org/ns/odm/v1.3">
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="1">
    <SiteRef LocationOID="TESTSITE" />
    - <StudyEventData StudyEventOID="SUBJECT">
      - <FormData FormOID="ENROL" FormRepeatKey="1">
        + <ItemGroupData ItemGroupOID="ENROL_LOG_LINE">
          </FormData>
        </StudyEventData>
      </SubjectData>
    </ClinicalData>
  - <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
    - <SubjectData SubjectKey="2">
      <SiteRef LocationOID="TESTSITE" />
      - <StudyEventData StudyEventOID="SUBJECT">
        - <FormData FormOID="ENROL" FormRepeatKey="1">
          - <ItemGroupData ItemGroupOID="ENROL_LOG_LINE">
            <ItemData ItemOID="ENROL.SUBID" Value="2" />
            <ItemData ItemOID="ENROL.BIRTHDT" Value="1971-10-13" />
          </ItemGroupData>
          </FormData>
        </StudyEventData>
      </SubjectData>
    </ClinicalData>
  - <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
    - <SubjectData SubjectKey="3">
      <SiteRef LocationOID="TESTSITE" />
```

By Form..

```
<?xml version="1.0" encoding="utf-8" ?>
- <ODM FileType="Snapshot" FileOID="b6f0bf3a-fafd-4371-97c0-9a19453d6194" CreationDateTime="2013-06-24T12:11:03.394-00:00" ODMVersion="1.3" xmlns:mdsol="http://www.mdsol.com/ns/odm/metadata"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns="http://www.cdisc.org/ns/odm/v1.3">
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="1">
    <SiteRef LocationOID="1282"="TESTSITE" />
    - <StudyEventData StudyEventOID="SCREEN" StudyEventRepeatKey="1">
      - <FormData FormOID="VITAL" FormRepeatKey="1">
        - <ItemGroupData ItemGroupOID="VITAL_LOG_LINE">
          <ItemData ItemOID="VITAL.VDAT" Value="2013-02-01" />
          <ItemData ItemOID="VITAL.WEIGHT_KG" Value="132.0" />
          <ItemData ItemOID="VITAL.HEIGHT_CM" Value="174.5" />
        </ItemGroupData>
      </FormData>
    </StudyEventData>
  </SubjectData>
</ClinicalData>
- <ClinicalData StudyOID="SIMPLESTUDY(TEST)" MetaDataVersionOID="1282">
  - <SubjectData SubjectKey="2">
    <SiteRef LocationOID="TESTSITE" />
    - <StudyEventData StudyEventOID="SCREEN" StudyEventRepeatKey="1">
      - <FormData FormOID="VITAL" FormRepeatKey="1">
        - <ItemGroupData ItemGroupOID="VITAL_LOG_LINE">
          <ItemData ItemOID="VITAL.VDAT" Value="2013-02-09" />
          <ItemData ItemOID="VITAL.WEIGHT_KG" Value="82.5" />
          <ItemData ItemOID="VITAL.HEIGHT_CM" Value="173.0" />
        </ItemGroupData>
      </FormData>
    </StudyEventData>
  </SubjectData>
</ClinicalData>
```

Getting CSV Data

The screenshot shows a Microsoft Excel window with the following details:

- Address Bar:** <https://partner.mdsol.com/RaveWebServices/studies/SIMPLESTUDY/datasets/regular/ENROL.csv>
- Excel Ribbon:** Home, Insert, Page Layout, Formulas, Data, Review, View, Team. The 'Data' tab is active, showing options like 'From Access', 'From Web', 'From Text', 'From Other Sources', 'Existing Connections', 'Refresh All', 'Connections', 'Sort', 'Filter', 'Clear', 'Reapply', 'Advanced', 'Text to Columns', 'Remove Duplicates', 'Data Validation', 'Consolidate', 'What-If Analysis', 'Group', 'Ungroup', 'Subtotal', and 'Outline'.
- Formula Bar:** A1, userid
- ENROL.csv [Read-Only] Window:**

	Z	AA	AB	AC	AD	AE	AF	AG	AH
1	SaveTs	MinCreate	MaxUpdat	SUBID	BIRTHDT	BIRTHDT_RAW	BIRTHDT_1	BIRTHDT_2	BIRTHDT_3
2	2013-06-2	2013-06-2	2013-06-2	1	1973-06-26T00:00:00	1973 Jun 26	1973-06-2	1973	6
3	2013-06-2	2013-06-2	2013-06-2	2	1971-10-13T00:00:00	1971 Oct 13	1971-10-1	1971	10
4	2013-06-2	2013-06-2	2013-06-2	3	1953-08-10T00:00:00	1953 Aug 10	1953-08-1	1953	8
5	2013-06-2	2013-06-2	2013-06-2	4	1975-02-08T00:00:00	1975 Feb 08	1975-02-0	1975	2
6	2013-06-2	2013-06-2	2013-06-2	5	1977-10-23T00:00:00	1977 Oct 23	1977-10-2	1977	10
7	2013-06-2	2013-06-2	2013-06-2	6	1970-04-18T00:00:00	1970 Apr 18	1970-04-1	1970	4
8	2013-06-2	2013-06-2	2013-06-2	7	1957-10-14T00:00:00	1957 Oct 14	1957-10-1	1957	10
9	2013-06-2	2013-06-2	2013-06-2	8	1973-01-18T00:00:00	1973 Jan 18	1973-01-1	1973	1
10	2013-06-2	2013-06-2	2013-06-2	9	1974-03-04T00:00:00	1974 Mar 04	1974-03-0	1974	3
11	2013-06-2	2013-06-2	2013-06-2	10	1964-03-03T00:00:00	1964 Mar 03	1964-03-0	1964	3
12									
13									
14									
15									

Summary

- Pushed data in
 - ODM Clinical Data
- Pulled data out
 - ODM Study Metadata
 - ODM Subject List
 - ODM Clinical Data
 - CSV Clinical Data
- Analysis and Manipulation (shaking it all about)
 - Still the role of the Clinical Programmer / Statistician !
- Things we could have discussed:
 - Creating study designs with ODM (Metadata import)
 - Web Services Outbound (don't call us, we'll call you)

Thank you !