

(Inter)facing SAS®



Raymond Ebben, OCS Consulting, the Netherlands

High level walkthrough of the steps involved when creating a SAS application

- User Requirements
- Decision 1: The user interface
- Decision 2: Application selection
- Application design
- Application development
- Questions

[2/31]

User Requirements

Decision 1: The user interface

Decision 2: Application selection

Application design

Application development

Report laboratory parameters

ID	Requirement
1	Read CDISC standard laboratory data
2	Define report settings per laboratory parameter
3	Exclude values from analysis
4	Select descriptive statistics per parameter
5	Select statistical analysis per parameter
6	Select decimal presentation per parameter
7	Option to specify title and footnote
8	Option to specify the start page number
9	Option to specify output type (PDF/RTF/TXT)
10	Accessible to the biometrics department
11	Use existing SAS macros for statistical analysis

[4/31]

Report laboratory parameters (cont.)

ID	Requirement
12	Easy to implement
13	Offer an intuitive and easy to use interface
14	Everybody in the department should be able to use the application
15	Perform exploratory analysis on the data used for the standard report
16	Option to implement new statistical analysis

User Requirements

Decision 1: The user interface

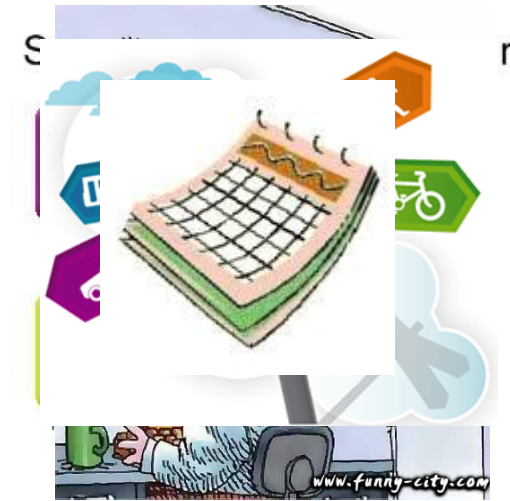
Decision 2: Application selection

Application design

Application development

General benefits of a user interface

- Broader audience
- Lower learning curve
- Less error prone
- Guiding users through the process



Drawback of a user interface

- More development time

Report laboratory parameters (cont.)

ID	Requirement
12	Easy to implement
13 ✓	Offer an intuitive and easy to use interface
14 ✓	Everybody in the department should be able to use the application
15	Perform exploratory analysis on the data used for the standard report
16	Option to implement new statistical analysis

User Requirements

Decision 1: The user interface

Decision 2: Application selection

Application design

Application development

Desktop application vs. web application

- Accessibility
- Security
- Performance
- Look and feel / Functionality
- Implementation

Embedded applications

- Can only be executed from within a desktop application
 - SAS Enterprise Guide
 - SAS/AF
- Utilise the Desktop application's functionality
 - SAS Enterprise Guide -> Exploratory analysis
 - SAS/AF -> Single technology vendor

Decision 2: Application selection [3]

	Desktop App	Embedded application		Web application		
	DotNet	SAS/AF	SAS EG Add-in	SAS/Intrnet	SAS IDP	Microsoft SharePoint
Accessibility	--	--	--	++	++	++
Security (access)	++	+	++	-	-	-
Performance	++	+	++	-	--	--
Look and feel	++	+	++	-	-	-
Functionality	+	-	++	--	+	+
Implementation	++	+	+	-	--	--
Independency	++	+	+	-	-	-
Embedding other functionality	+	-	+	+	+	++
SAS platform integration	-	+	+	-	++	+
Role based functionality	+	-	+	-	++	++
Exploratory analysis	--	--	++	--	--	--
Version control	++	-	++	-	-	-
Single technology vendor	--	++	--	+	+	--

[12/31]

Report laboratory parameters

ID	Requirement
1	Read CDISC standard laboratory data
2	Define report settings per laboratory parameter
3	Exclude values from analysis
4	Select descriptive statistics per parameter
5	Select statistical analysis per parameter
6	Select decimal presentation per parameter
7	Option to specify title and footnote
8	Option to specify the start page number
9	Option to specify output type (PDF/RTF/TXT)
10 	Accessible to the biometrics department
11	Use existing SAS macros for statistical analysis

[13/31]

Report laboratory parameters (cont.)

ID	Requirement
12 ✓	Easy to implement
13 ✓	Offer an intuitive and easy to use interface
14 ✓	Everybody in the department should be able to use the application
15 ✓	Perform exploratory analysis on the data used for the standard report
16	Option to implement new statistical analysis

Decision 2: Application selection [6]

	Desktop App	Embedded application		Web application		
	DotNet	SAS/AF	SAS EG Add-in	SAS/Intrnet	SAS IDP	Microsoft SharePoint
Accessibility	--	--	--	++	++	++
Security (access)	++	+	++	-	-	-
Performance	++	+	++	-	--	--
Look and feel	++	+	++	-	-	-
Functionality	+	-	++	--	+	+
Implementation	++	+	+	-	--	--
Independency	++	+	+	-	-	-
Embedding other functionality	+	-	+	+	+	++
SAS platform integration	-	+	+	-	++	+
Role based functionality	+	-	+	-	++	++
Exploratory analysis	--	--	++	--	--	--
Version control	++	-	++	-	-	-
Single technology vendor	--	++	--	+	+	--

[15/31]

User Requirements

Decision 1: The user interface

Decision 2: Application selection

Application design

Application development

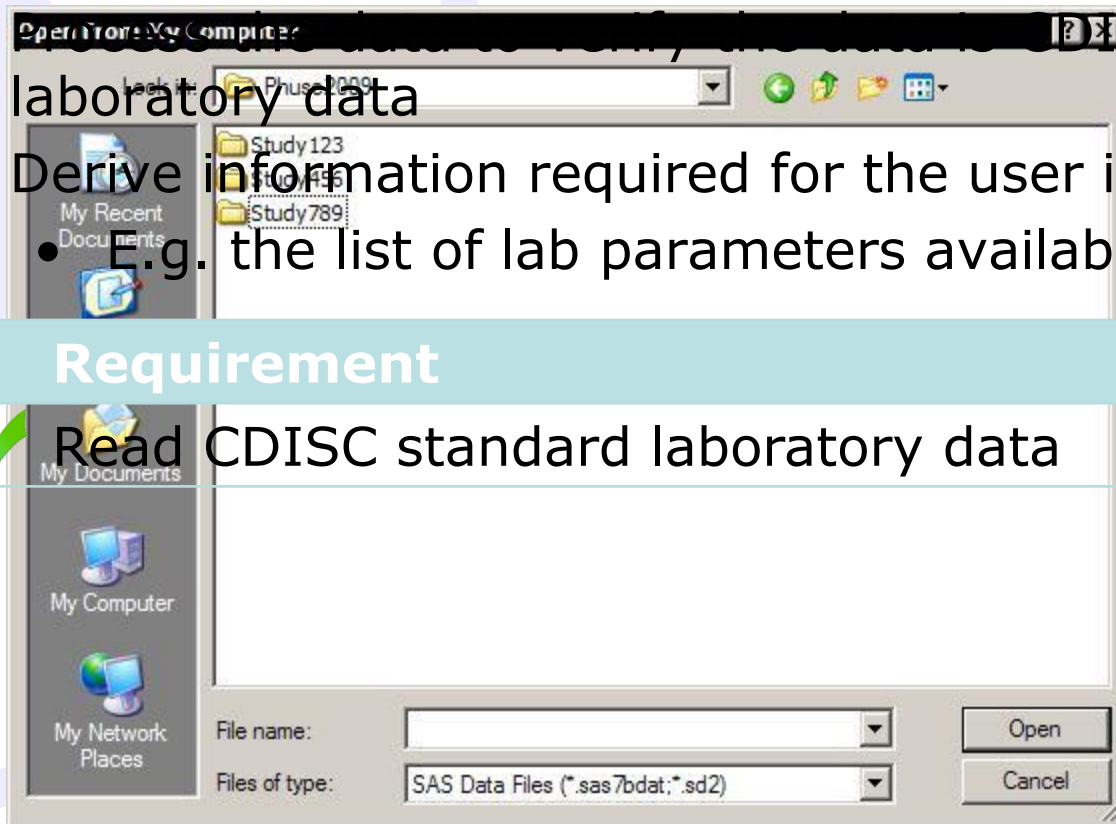
Designing the application

"A layer of simplicity over the applications complexity"

- Break down the application in logical steps
 1. Input and input processing
 2. Define analysis and report parameters
 3. Report processing and output
 4. Exploratory analysis

Step 1: Input and input processing

- Select laboratory data in CDISC standard
- Process the data to verify the data is CDISC standard laboratory data
- Derive information required for the user interface
 - E.g. the list of lab parameters available in the data



ID	Requirement
1	✓ Read CDISC standard laboratory data

Step 2: Define analysis and report parameters

- For the final report the user must be able to:
 - Specify the report title and footnote
 - Specify the page number of the first page
 - Specify the output type (PDF/RTF/LISTING)
- For each laboratory parameter the user must be able to:
 - Exclude values from analysis
 - select the descriptive statistics to be calculated
 - select the statistical analysis to be performed on the data
 - select the decimal presentation of the parameter

Step 2: Define analysis and report parameters

Laboratory parameter reporting

☒ Creatinine
 ☐ Platelets
 ☐ Red blood cells
 ☐ White blood cells
 ☐ Albumin
 ☐ Lymphocytes

Imported data

Excl	USUBJID	LBSEQ	LBORRES	LBORRESU	LBORNRL0
☐	XX-XX-AU_013-205002	1	65	umol/L	0
☐	XX-XX-AU_013-205002	2	55	umol/L	0
☐	XX-XX-AU_013-205004	1	65	umol/L	0
☐	XX-XX-AU_013-205005	1	60	umol/L	0
☐	XX-XX-AU_013-205005	2	65	umol/L	0
☐	XX-XX-AU_013-205006	1	75	umol/L	0
☐	XX-XX-AU_013-205006	2	75	umol/L	0
☐	XX-XX-AU_013-205007	1	65	umol/L	0
☐	XX-XX-AU_013-205007	2	65	umol/L	0
☐	XX-XX-AU_013-205008	1	50	umol/L	0

Select descriptive statistics to report

☒ N	☒ Standard Deviation	☐ 1 st Percentile
☒ Mean	☒ Minimum value	☐ 5 th Percentile
☒ Median	☒ Maximum value	☐ 95 th Percentile
☒ SUM	☒ Most Frequent value	☐ 99 th Percentile

Select the statistical analysis
 <Select the statistical analysis>

Specify the presentation decimals
 1

Define report settings

Specify report title
 <Title>

Specify report footnote
 <Footnote>

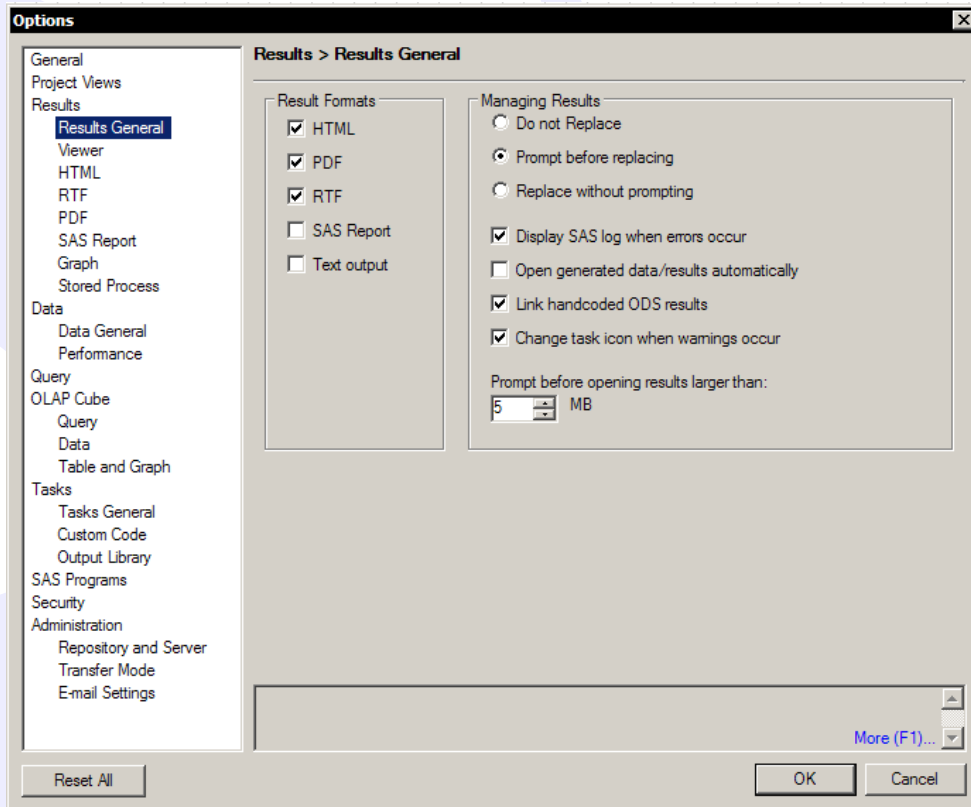
Specify the start page number
 1

Cancel OK

Ready

ID	Requirement
2 ✓	Define report settings per laboratory parameter
3 ✓	Exclude values from analysis
4 ✓	Select descriptive statistics per parameter
5 ✓	Select statistical analysis per parameter
6 ✓	Select decimal presentation per parameter
7 ✓	Option to specify title and footnote
8 ✓	Option to specify the start page number

Step 3: Report processing and output



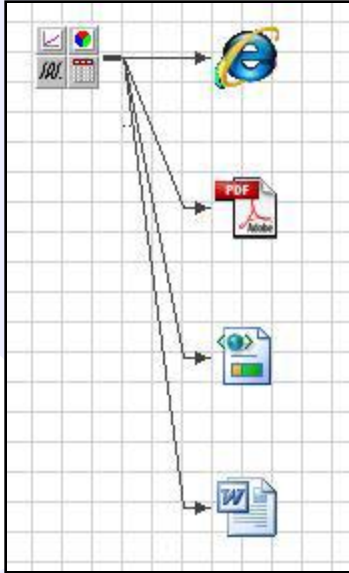
ID Requirement

9 

Option to specify output type (PDF/RTF/TXT)

[21/31]

Step 3: Report processing and output



Step 4: Exploratory analysis

User Requirements

Decision 1: The user interface

Decision 2: Application selection

Application design

Application development

Communication techniques

- Always think in SAS macros
- Parameters are passed from the interface as macro variables
- Parameters are passed to the application via a SAS dataset
- Data is physically stored and referred to via macro variables

Input processing

```
001  /*****
002  *Input file location and filename(s)
003  *****/
004  %let InputFolder=C:\PhUSE2009\Study123\;
005  %let InputFiles=SASDataSet1.sas7bdat|SASDataset2.sas7bdat;
006
007  /*****
008  * Include the SAS program processing the dataset(s) selected
009  *****/
010  %include "c:\StdPrograms\Read_and_Prepare_CDISC_LABData.sas";
```

Report processing

```
001 /*****
002 * Report Settings
003 *****/
004 %let ReportTitle=%str(Lab report PhUSE 2009);
005 %let ReportFootnote=%str(Created by OCS Consulting);
006 %let StartPage=1;
007
008 /*****
009 * Reporting parameters
010 *****/
011 %let reporting_parameters=(Creatinine, Platelets, RBC);
012
```

Report processing (cont.)

```
013  /*****
014  * Parameter Settings (For Each Parameter in the user
015  interface)
016  *****/
017  %let Creatinine_exclusions=%str(1 15);
018  %let Creatinine_Statistics=%str(N Mean Median Sum STD Mode);
019  %let Creatinine_Decimals=3;
020  %let Creatinine_Analysis=TTest;
021  %let Creatinine_Dataset=tmpds.Creatinine;
022
023  <Next parameter ....>
024
025  /*****
026  * Include the SAS program generating the report
027  *****/
028  %include "c:\StdPrograms\Generate_CDISC_LABData_Report.sas";
029
```

Report laboratory parameters

ID	Requirement
1	✓ Read CDISC standard laboratory data
2	✓ Define report settings per laboratory parameter
3	✓ Exclude values from analysis
4	✓ Select descriptive statistics per parameter
5	✓ Select statistical analysis per parameter
6	✓ Select decimal presentation per parameter
7	✓ Option to specify title and footnote
8	✓ Option to specify the start page number
9	✓ Option to specify output type (PDF/RTF/TXT)
10	✓ Accessible to the biometrics department
11	✓ Use existing SAS macros for statistical analysis

[28/31]

Report laboratory parameters (cont.)

ID	Requirement
12 ✓	Easy to implement
13 ✓	Offer an intuitive and easy to use interface
14 ✓	Everybody in the department should be able to use the application
15 ✓	Perform exploratory analysis on the data used for the standard report
16 ✓	Option to implement new statistical analysis

Topic	Paper	PhUSE
Desktop application	Migration of a flexible reporting system from SAS 6.12 to SAS 9.1.3 - A project experience	2005
Embedded application	Using SAS Enterprise Guide Add-In to Enable Guided Statistics	2008
Web application	Using the SAS Information Delivery Portal in the Pharmaceutical Sector	2006
	Web-enabling the Pharmaceutical sector	2007

Web : www.ocs-consulting.com
E-mail : sasquestions@ocs-consulting.com