

(Inter)facing SAS®



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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

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 |

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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

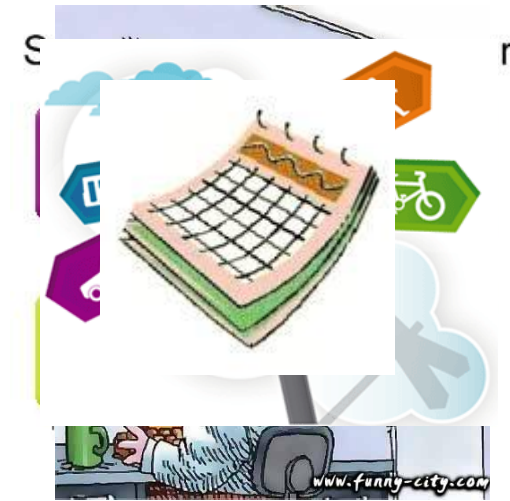
Application development

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.)

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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

| | | Application type | | | | | |
|------------------------|-------------------------------|------------------|----------------------|---------------|-----------------|---------|----------------------|
| | | Desktop App | Embedded application | | Web application | | |
| | | DotNet | SAS/AF | SAS EG Add-in | SAS/Intrnet | SAS IDP | Microsoft SharePoint |
| Characteristics | 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 | -- | ++ | -- | + | + | -- |





User requirements

Report laboratory parameters

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| Accessibility | -- | -- | -- | ++ | ++ | ++ |
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| Performance | ++ | + | ++ | - | -- | -- |
| Look and feel | ++ | + | ++ | - | - | - |
| Functionality | + | - | ++ | -- | + | + |
| Implementation | ++ | + | + | - | -- | -- |
| Independency | ++ | + | + | - | - | - |
| Embedding other functionality | + | - | + | + | + | ++ |
| SAS platform integration | - | + | + | - | ++ | + |
| Role based functionality | + | - | + | - | ++ | ++ |
| Exploratory analysis | -- | -- | ++ | -- | -- | -- |
| Version control | ++ | - | ++ | - | - | - |
| Single technology vendor | -- | ++ | -- | + | + | -- |

User Requirements

Decision 1: The user interface

Decision 2: Application selection

Application design

Application development

Designing the application

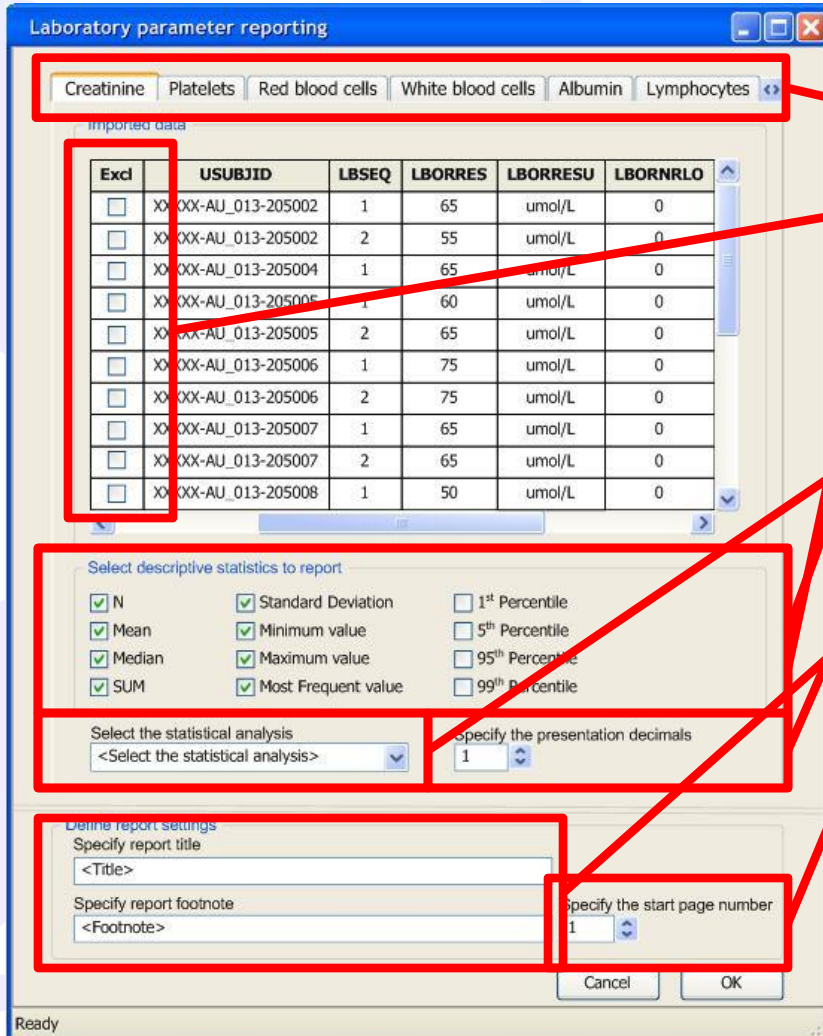
"A layer of simplicity over the applications complexity"

- 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 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



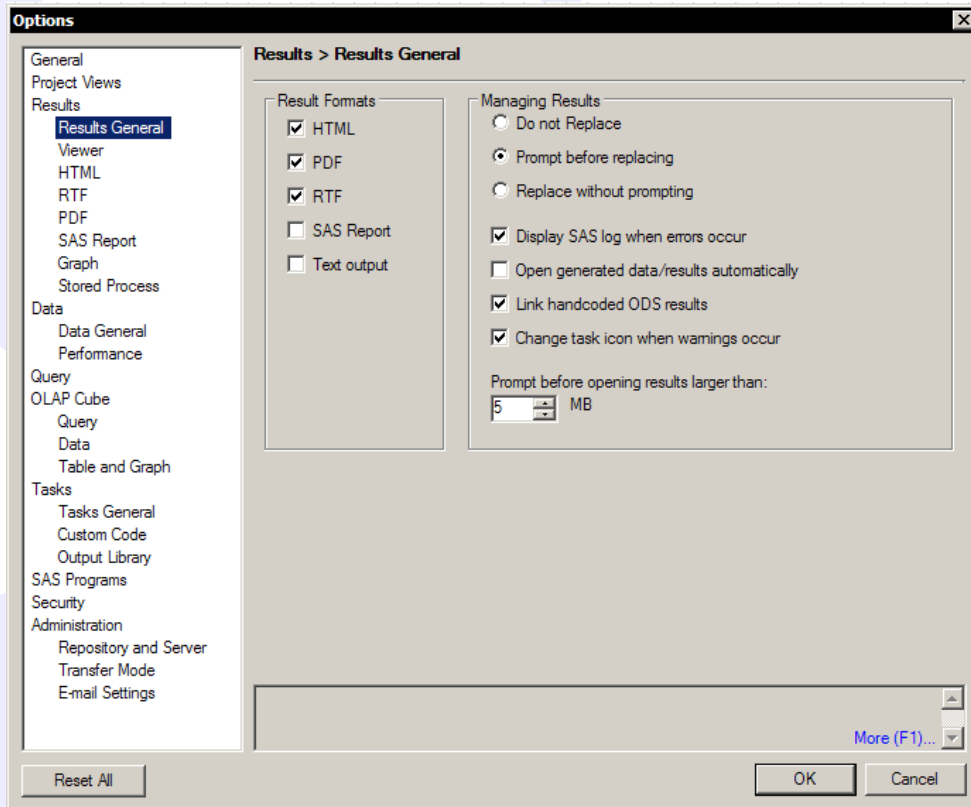
The screenshot shows a 'Laboratory parameter reporting' dialog box. At the top, there are tabs for 'Creatinine', 'Platelets', 'Red blood cells', 'White blood cells', 'Albumin', and 'Lymphocytes'. Below this is a table of 'Imported data' with columns: Excl, USUBJID, LBSEQ, LBORRES, LBORRESU, and LBORNRO. The table contains 8 rows of data. Below the table are several sections for configuring report parameters:

- Select descriptive statistics to report:** A grid of checkboxes for N, Mean, Median, SUM, Standard Deviation, Minimum value, Maximum value, Most Frequent value, 1st Percentile, 5th Percentile, 95th Percentile, and 99th Percentile.
- Select the statistical analysis:** A dropdown menu currently showing '<Select the statistical analysis>'. To its right is a spinner for 'Specify the presentation decimals' set to 1.
- Define report settings:** A section with two text input fields: 'Specify report title' (containing '<Title>') and 'Specify report footnote' (containing '<Footnote>'). To the right is another spinner for 'Specify the start page number' set to 1.


Red boxes and lines highlight these sections, with callouts 2 through 8 pointing to specific features.

- | ID | Requirement |
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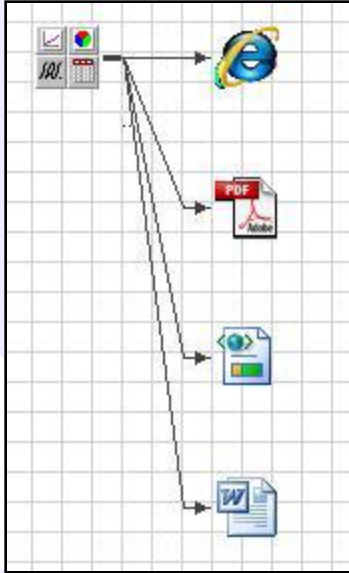
Step 3: Report processing and output



ID Requirement

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

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
```

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| 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 |

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