

Everything You Always Wanted To Know About R



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What would YOU like to know about R?

Some Opinions about R

R is not validated

R is not well tested

The FDA does not allow the use of R

R is for free



R is faster than SAS

SAS has an interface to R

SAS could be replaced by R

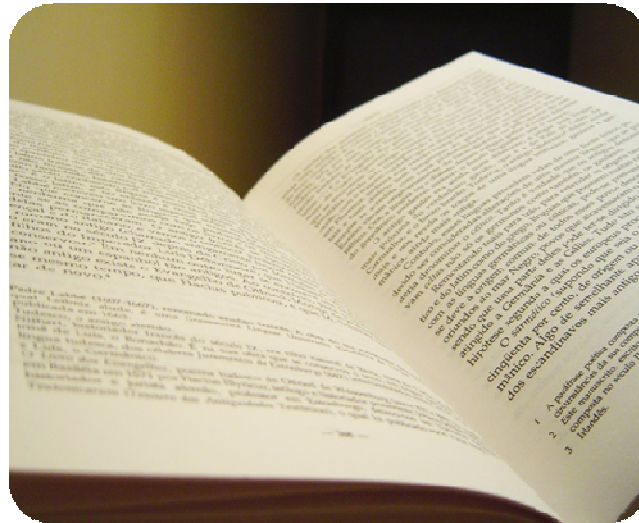
What is R?

R is...

- ... a software for statistical computing and graphics
- ... a programming language
- ... a programming environment
- ... a community



R is Open Source



Who is the Owner of R?

- The [R Foundation for Statistical Computing](#)
 - official voice of the R project
 - non-profit organization seated in Vienna, Austria
 - R Development Core-Team
 - holds and administers the copyrights of the R software and documentation.
- 1993 first occurrence in a mailing list (Ross Ihaka and Robert Gentleman at the University of Auckland)
- Huge amount of freely available additional packages



How to get R?

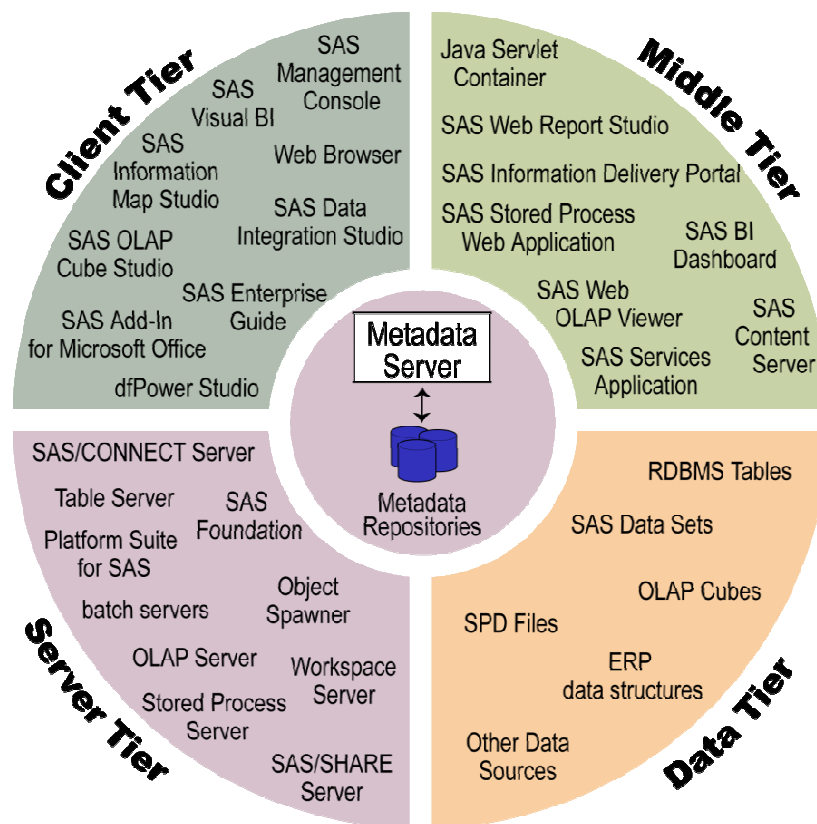
Installation of R

- r-project.org
- [R for Windows](#) (~50 MB)
 - Core Installation
 - Base / Recommended Packages
- ~5500 [add-on Packages](#)
- [Task view](#)



Demo

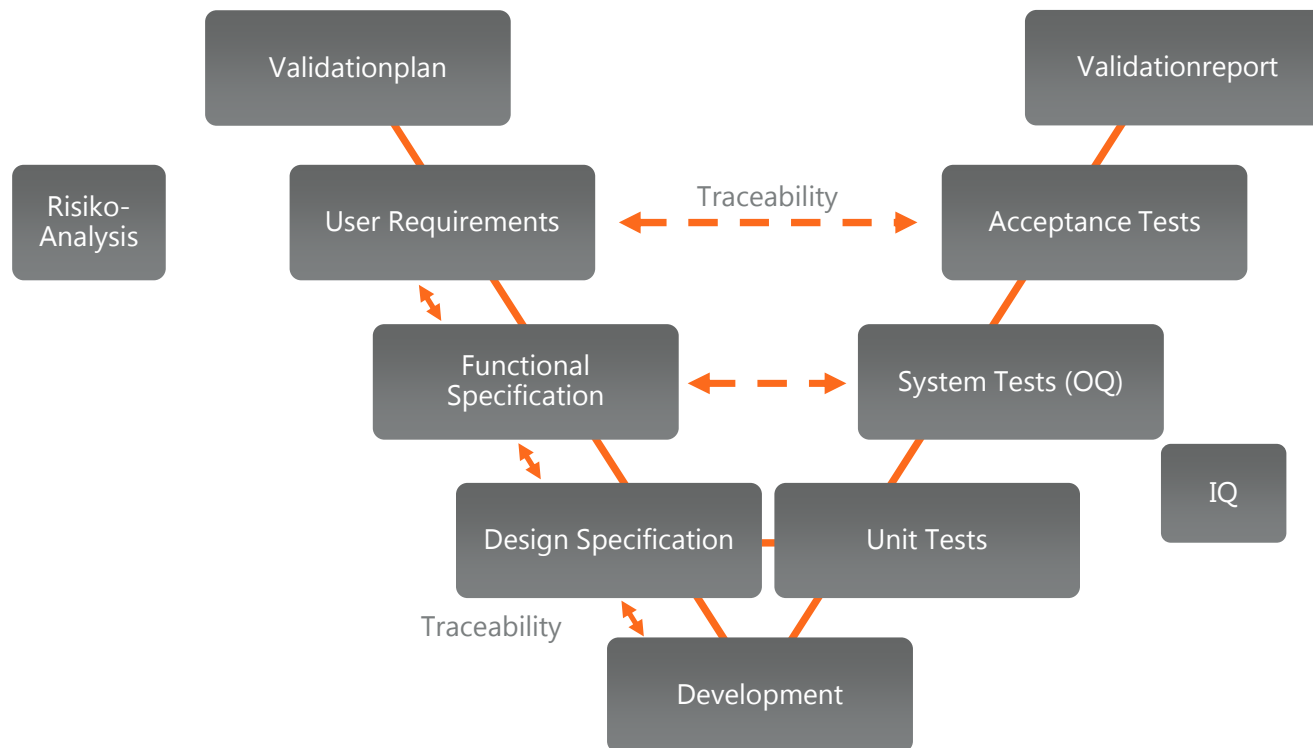
SAS could be Replaced by R?



- SAS Base
- SAS Stat
- SAS Graph
- SAS Macro
- SAS IML
- ...

R is not validated?

Validate the Software or the Process?



Documents

- [An Introduction to R](#)
- [R Installation and Administration](#)
- [Testing Installation](#)
- [R Data Import/Export](#)
- [The R Reference Index](#)
- R: Regulatory Compliance and Validation Issues. [A Guidance Document for the Use of R in Regulated Clinical Trial Environments](#)

FDA does not allow the use of R

Some Challenges of Using *R* in a Regulatory Environment

Jae Brodsky

Office of Biostatistics, OTS, CDER, FDA



The Big Question

How well can *R* be used as a statistical tool in a large federal regulatory agency such as the FDA?

<http://blog.revolutionanalytics.com/downloads/FDA-Janice-Brodsky-UseR-2012.pdf>

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Current *R* Usage at the FDA

- FDA offices use *R* on a daily basis
 - includes Office of Biostatistics
- FDA scientists have written *R* packages for other scientists' use (FDA or non-FDA)
- FDA does not endorse or require the use of any specific software for statistical analysis

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Current FDA *R* Setup

Only base and recommended packages are fully supported by the R core. Code or functions outside of these packages are used at the reviewer's own risk.

- Base: *datasets*, *graphics*, *grDevices*, *grid*, *methods*, *splines*, *stats*, *stats4*, *tcltk*, *tools*, *utils*
- All results from data should be reproducible independent of software used.
- FDA is not responsible if results have discrepancies.

Sponsors may use R in their submissions. Data must be submitted in *xpt* format. Reviewers would like to know:

- which *R* functions were used
- how they were accessed
- that the results are accurate, reliable, and consistent

<http://blog.revolutionanalytics.com/downloads/FDA-Janice-Brodsky-UseR-2012.pdf>

Is there an interface from SAS to R?

PROC IML as Interface to R

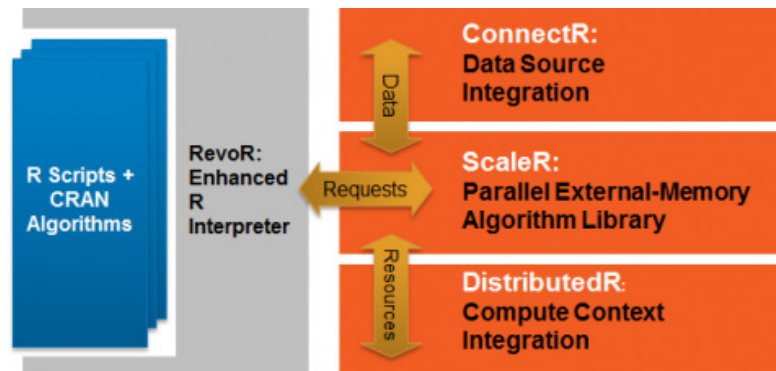
Submit Code

Transfer SAS Datasets

```
PROC IML;  
  SUBMIT / R;  
    <R-Code>  
  ENDSUBMIT;  
QUIT;
```

- ExportDataSetToR
- ImportDataSetFromR

Revolution Analytics



- Commercial R-Version
- Big Data Analytics Framework
- ConnectR: access to any data source e.g. complex distributed file systems and MPP databases
- ScaleR : algorithms optimized for parallel execution on Big Data
- DistributedR: parallel execution framework for e.g. clustered systems with hundreds of servers

Literature

- R Manuals
- Introductory Statistics with R
- R for SAS and SPSS Users
- <http://sas-and-r.blogspot.de/>
- <http://www.r-bloggers.com/>
- <http://r4stats.com/>, Robert A. Muenchen
- SAS 9.3 Interface to R

Thank You for Your Attention.



Any Questions?