

#SASGF

VIRTUAL

SAS® GLOBAL FORUM 2021

AMERICAS | MAY 18 - 20

ASIA PACIFIC | MAY 19 - 20

EMEA | MAY 25 - 26

Open Source SAS Macros – What? Where? How?

Katja Glaß, Katja Glass Consulting

Katja is a very active PhUSE member. With her IT background and being more than 14 years in the pharmaceutical industry, she is now working as part-time consultant focusing on open source for Pharma. She hosts a portal about open-source solutions for Pharma (www.glacon.eu/portal) and is very happy to perform open-source projects or provide general guidance.

Agenda



- **Introduction**
 - Licenses
 - Available Solutions
 - Aspects to Consider
 - Summary
-



Introduction



Definition Open Source:

Open Source software is software that can be freely accessed, used, changed, and shared (in modified or unmodified form) by anyone.



(<https://opensource.org/faq#osd>)

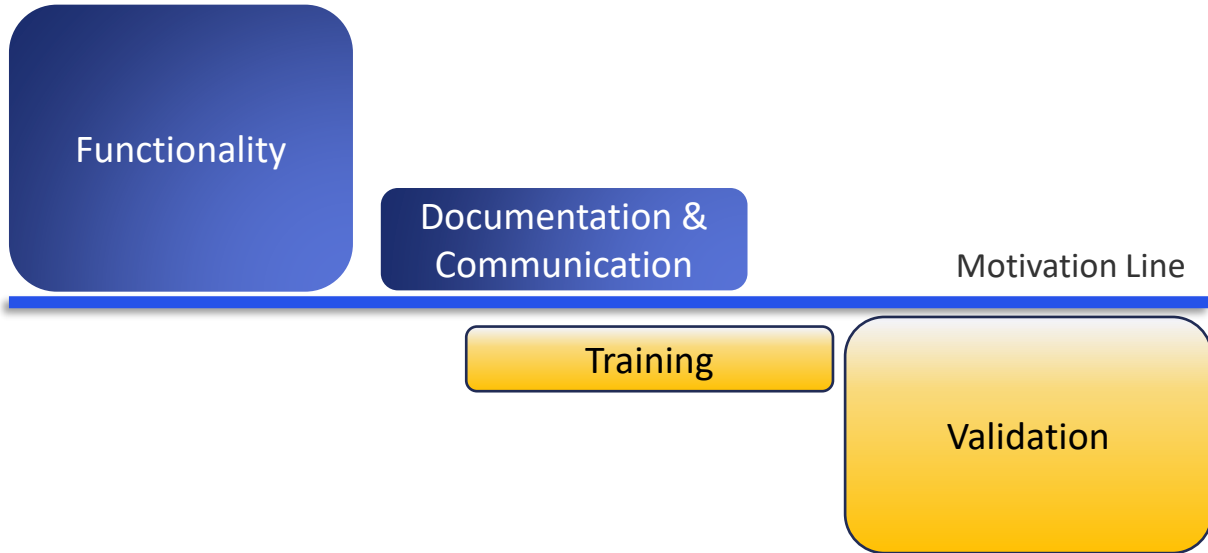
- Compared to “free” software + full transparency
 - Licenses matter (how to make further use)
-

Introduction



Content:

- Typically no financing, personal motivation counts



Introduction



Validation:

Copy program from a colleague:

- Who is responsible for this program?
- How is validation be performed?



Copy/Use open source program:

- Same rules apply
 - Using programmer is responsible
 - Validation has to be performed
-

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Open Source Licenses



➤ License types

Permissible

- Allows re-licensing of derived work

- Similar BY-Attribution



Copyleft

- Derives must use same license

- Similar ShareAlike



Permissible 67%

Copy-Left 33%

* 2019 Statistics according [WhiteSource](#)

Open Source Licenses



➤ License types

Permissible

- Use, Share, Modify
- Create proprietary versions

Copyleft

- Use, Share, Modify
- Grant “same rights” (users can use, share, modify)

Permissible 67%

Copy-Left 33%

* 2019 Statistics according [WhiteSource](#)

Open Source Licenses



➤ License types

Permissable

- **MIT**
(very short & easy)
- **Apache License 2.0**
(more complex & detailed)
- **BSD**
(no endorsement/promotion from copyright holders/contributors)

Copyleft

- **GNU-Family**
Disclose source, license & copyright notice, state changes, same license
 - LGPL – not if used as library
 - AGPL – also if used as network software (SaaS)
 - GPL

Permissable 67%

Copy-Left 33%

* 2019 Statistics according [WhiteSource](#)

Open Source Licenses



Simple Usage



Flexible use of source
code execution
results

Open Source

MIT

GPL / AGPL / LGPL

<many others>

- Use Source and/or Software
- Modify
- Keep Acknowledgements & licenses
- **No need to publish anything, use only within company / organization**

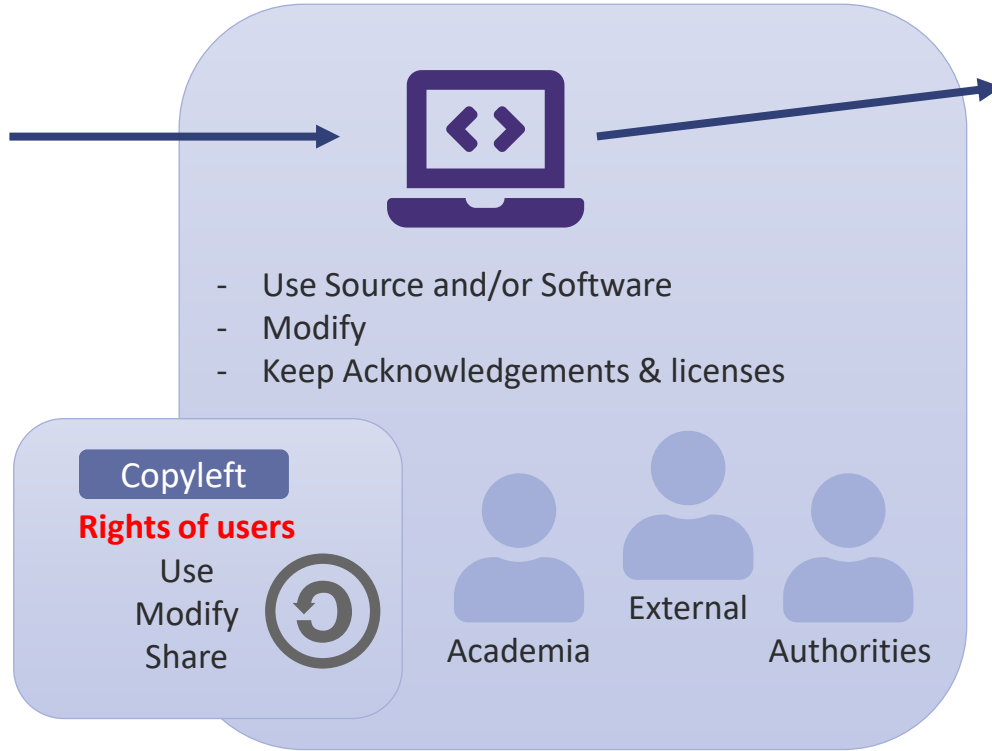
Open Source Licenses



Simple Usage



Open Source
MIT
GPL / AGPL / LGPL
<many others>



Flexible use of source
code execution
results

- Use Source and/or Software
- Modify
- Keep Acknowledgements & licenses

Copyleft

Rights of users

Use
Modify
Share



Academia

External

Authorities

Agenda



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Available Solutions



- What Solutions exist? How to know?
 - „Announcement“ of Open Source difficult
 - For R, search in CRAN
 - Presentations on Conferences (limited range)



How to find Open Source?

Available Solutions



www.glacon.eu/portal (google: clinical open source portal)

Why?

Currently it is very difficult to investigate which open source solutions are available for clinical study evaluations. There are quite some lists available for open source R programs. PhUSE has a R-Shiny App to display

What?

This page will be a link collection of open source solutions, programs and scripts for clinical study evaluations. Additional metadata will be stored and a user friendly search mask as well as different navigations are made

How?

The content is collected manually. Further information and metadata are derived according available metadata and header analysis. If you want to provide additional input, please get in touch with me via info@glacon.eu.

Available Solutions



➤ Overview -> Available Tools (www.glacon.eu/portal)

The screenshot displays the 'Available Tools' section of the Katja Glass Consulting portal. The page is organized into a grid of tool cards and a table. The tool cards provide brief descriptions and visual examples of the tools' outputs. The table provides a structured overview of the tools, including their names, descriptions, types, languages, last update dates, licenses, author types, and associated areas and sizes.

Name	Description	Type	Language	Last Updat..	License	Author Type	Area (Users)	Area (Works..	Size
FDA Jumpstar	Clinical stud..	Scripts	SAS	2016-03-11	MIT	individual	ANALYST	Outputs	medium
SASUnit	SASUnit is a..	Tool	SAS	2019-07-08	GPLv3	company	DM, ANALY..	Programmi..	medium
Spectre (Rolar	A complete..	Scripts	SAS	2015-06-17	Unlicense	individual	ANALYST	Outputs	large
SAS Macros b	Scott Bass ..	Scripts	SAS	2019-10-16	Unlicense	individual	DM, ANALY..	Programmi..	medium
SAS Macros b	Much qualit..	Scripts	SAS	2019-11-25	MIT	company	DM, ANALY..	Programmi..	medium
PhUSE White	PhUSE has ..	Scripts	R, SAS	2019-02-25	MIT	individual	ANALYST	Outputs	medium
Rholnc Plots	Multiple Plo..	Scripts	SAS	2019-08-08	MIT	company	ANALYST	Visualization	small
Going Translat	In this proje..	Scripts	R, RDF, SAS	2019-08-01	MIT	individual	PROG	Programmi..	small
PhUSE White	24 utility ma..	Scripts	SAS	2017-03-21	MIT	individual	PROG	Programmi..	small
PhUSE Contrib	There are v..	Scripts	R, SAS, Other	2019-07-20	MIT	individual			small

Available Solutions



➤ Programs -> search programs & macros (www.glacon.eu/portal)

Tool	Name	Description	Type	Class	Langua..	Mod Date	Lineo.
Show All ▾			Show All ▾	Show All ▾	Shc ▾		
Show All	Meddra_w_flag	MedDRA at a Glance Analysis Panel - The MedDRA at a Glance Analysis Panel shows the user the adverse events that occurred in the study according to their place in the MedDRA hierarchy and allows them to compare any two arms according to a number of statistics.	Script	Tool	SAS	2011-05-08	653
Chris SAS Macros							
DefineXML SAS XMLMAP							
FDA Jumpstart Scripts							
Others							
Roland's SAS® Macros							
SAS Macros by Scott Bass							
SASjs Core Macros							
SMILE							
Whitepaper Scripts	ae_v1upc	AE Toxicity Analysis Panel - The AE Toxicity Analysis Panel provides the user with different analyses to help understand the adverse events present in the study and the frequency of their occurrence by treatment arm. Statistical and frequency reports are generated to provide the user with needed information.	Script	Tool	SAS	2011-06-02	408
FDA Jumpstart Scrip	ae_v1upd	AE Severity Analysis Panel	Script	Tool	SAS	2011-06-08	299

Available Solutions



- Overview -> Filter SAS -> 17 Solutions

- SAS Macros

- FDA Jumpstart Scripts
 - RhoInc Plots
 - SASjs Core Macros
 - SMILE – Smart SAS Macros
 - SAS Macros by Scott Bass
 - Roland's SAS® Macros,
 - Chris's SAS Macros
 - ...



(www.glacon.eu/portal)

Available Solutions



- Overview -> Filter SAS -> 17 Solutions
 - SAS Scripts
 - PhUSE White Paper Central Tendencies Scripts
 - SAS® Blog
 - DefineXML SAS XMLMAP

 - Tools
 - SASUnit
 - Reindeer – Render SAS Results into Word
 - StatTag



(www.glacon.eu/portal)

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PhUSE White Paper Scripts



➤ Programs for various tables & graphics

PhUSE White Paper Central Tendencies Scripts



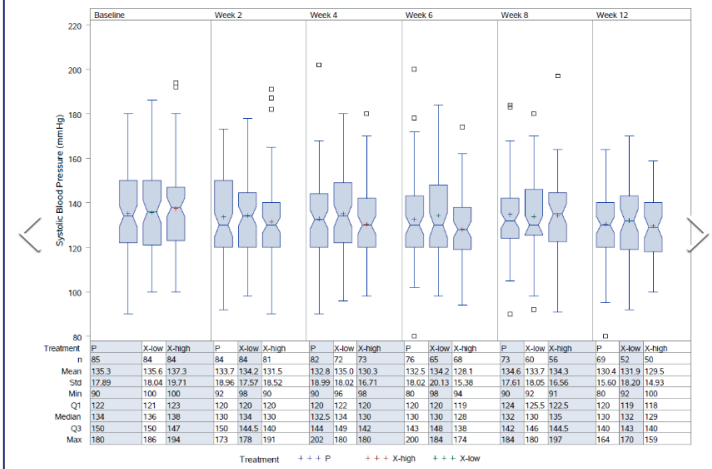
Description:

PhUSE has developed analysis and display white papers covering

evaluations. Additionally people
and SAS scripts which create the white
these scripts are made publicly available

ing the pilot study data available and are
: programs needs adaptations when

Box Plot - Systolic Blood Pressure (mmHg) by Visit, Analysis Timepoint: AFTER STANDING FOR 1 MINUTE



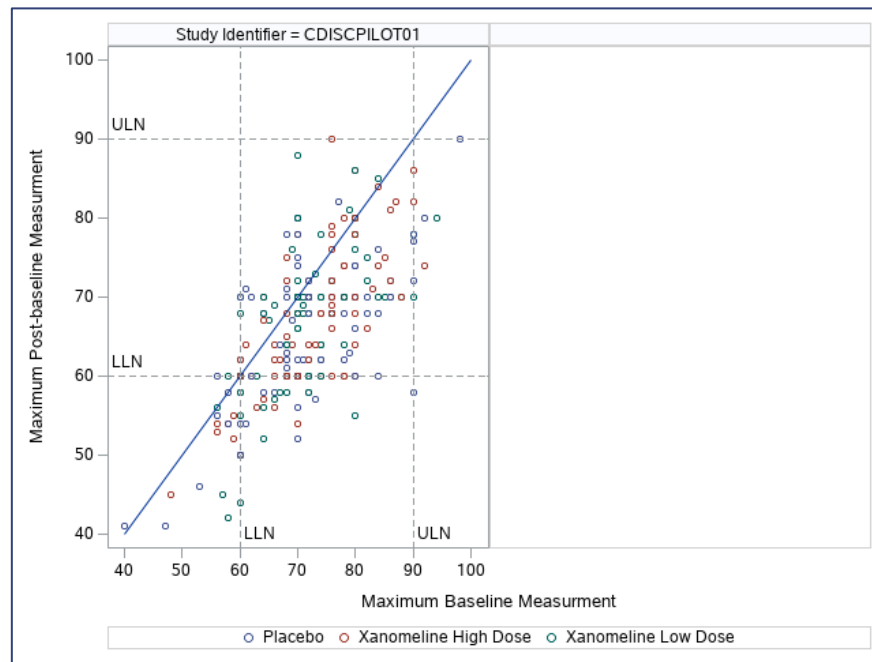
Type	Scripts
Language	R, SAS
License	MIT
Last Update Date	2019-02-25
Link Source	https://github.com/...
Link	https://github.com/...
Documentation	Specifications and YAML (script metadata) available.
Documentation	documentation RShiny App can be downloaded from CRAN - R Package PhUSE
Author Type	individual
Author(s)	PhUSE Working Group
Area (Users)	ANALYST
Area (Workspace)	Outputs
Size	medium
Link	https://www.lexjansen.com/...
Presentation(s)	

PhUSE White Paper Scripts



➤ Programs for various tables & graphics

Treatment	Baseline Result	Post-Baseline Result							
		Low		Normal		High		Total	
		n	%	n	%	n	%	n	%
Placebo (N = 81)	Low	2	(2.5)	2	(2.5)	0	(0.0)	4	(4.9)
	Normal	4	(4.9)	66	(81.5)	1	(1.2)	71	(87.7)
	High	0	(0.0)	4	(4.9)	2	(2.5)	6	(7.4)
	Total	6	(7.4)	72	(88.9)	3	(3.7)	0	(0.0)
Xanomeline Low Dose (N = 72)	Low	0	(0.0)	1	(1.4)	0	(0.0)	1	(1.4)
	Normal	2	(2.8)	66	(91.7)	0	(0.0)	68	(94.4)
	High	0	(0.0)	3	(4.2)	0	(0.0)	3	(4.2)
	Total	2	(2.8)	70	(97.2)	0	(0.0)	0	(0.0)
Xanomeline High Dose (N = 73)	Low	1	(1.4)	2	(2.7)	0	(0.0)	3	(4.1)
	Normal	2	(2.7)	64	(87.7)	0	(0.0)	66	(90.4)
	High	0	(0.0)	3	(4.1)	1	(1.4)	4	(5.5)
	Total	3	(4.1)	69	(94.5)	1	(1.4)	0	(0.0)



FDA Jumpstart Scripts



- Generic clinical standard tables based on SDTM standard
- Macros creating Excel

Odds Ratio & 95% Confidence Interval Analysis
Top 30 Odds Ratio Observations

NDA/BLA:
Study: CDISC
Analysis run date: 2016-03-07 11:15:12 AM

Placebo vs. Xanomeline High Dose

Body System	Dictionary-Derived Term	Placebo		Xanomeline High Dose		Odds Ratio	Lower 95% CI	Upper 95% CI
		Count	%	Count	%			
Gastr	Diarrhoea	9	10.5	4	4.8	2.3	(0.6, 10.8)	
Infec	Upper Respiratory Tract Infection	6	7.0	3	3.6	2.0	(0.4, 12.9)	
Genrl	Pyrexia	2	2.3	1	1.2	2.0	(0.1, 118.0)	
Infec	Urinary Tract Infection	2	2.3	1	1.2	2.0	(0.1, 118.0)	
Inj&P	Excoriation	2	2.3	1	1.2	2.0	(0.1, 118.0)	
Inv	Electrocardiogram T Wave Inversion	2	2.3	1	1.2	2.0	(0.1, 118.0)	
Nerv	Somnolence	2	2.3	1	1.2	2.0	(0.1, 118.0)	
Psych	Agitation	2	2.3	1	1.2	2.0	(0.1, 118.0)	
Psych	Confusional State	2	2.3	1	1.2	2.0	(0.1, 118.0)	
Card	Supraventricular Extrasystoles	1	1.2	1	1.2	1.0	(0.0, 77.6)	
Gastr	Abdominal Pain	1	1.2	1	1.2	1.0	(0.0, 77.6)	
Genrl	Application Site Reaction	1	1.2	1	1.2	1.0	(0.0, 77.6)	
Genrl	Asthenia	1	1.2	1	1.2	1.0	(0.0, 77.6)	
Genrl	Chills	1	1.2	1	1.2	1.0	(0.0, 77.6)	
Infec	Cystitis	1	1.2	1	1.2	1.0	(0.0, 77.6)	
Infec	Influenza	1	1.2	1	1.2	1.0	(0.0, 77.6)	
Inj&P	Fall	1	1.2	1	1.2	1.0	(0.0, 77.6)	

Odds Ratio and 95% Confidence Interval Analysis

FDA Jumpstart Scripts



ALT Baseline					
	ALT < 2x ULN		2x ≤ ALT < 5x ULN		5x
	Subject Count	%	Subject Count	%	S
ALT < 2x ULN	49	98,00	0	0,00	
2x ≤ ALT < 5x ULN	0	0,00	0	0,00	
5x ≤ ALT < 10x ULN	0	0,00	0	0,00	
10x ≤ ALT < 20x ULN	0	0,00	0	0,00	
ALT ≥ 20x ULN	0	0,00	0	0,00	

AST Baseline					
	AST < 2x ULN		2x ≤ AST < 5x ULN		5x
	Subject Count	%	Subject Count	%	S
AST < 2x ULN	49	98,00	0	0,00	
2x ≤ AST < 5x ULN	0	0,00	0	0,00	
5x ≤ AST < 10x ULN	0	0,00	0	0,00	
10x ≤ AST < 20x ULN	0	0,00	0	0,00	
AST ≥ 20x ULN	0	0,00	0	0,00	

Demographic Baseline Characteristics		Treatment A	Treatment B	Overall			
		N=302	N=159	N=461			
Age	Mean (SE)	61.8 (8.5)	60.4 (10.1)	61.3 (9.1)			
	Min	39	29	29			
	Q1	57	55	56			
	Median	61	62	61			
	Q3	68	67	68			
	Max	83	85	85			
		Count	%	Count	%	Count	%
Age Groups	between 1 year and 35 years	0	0,0	3	1,9	3	0,7
	Age between 35 and 65	186	61,6	102	64,2	288	62,5
	Age 65 and over	116	38,4	54	34,0	170	36,9
Sex	F	128	42,4	66	41,5	194	42,1
	M	174	57,6	93	58,5	267	57,9
Race	American Indian Or Alaska Native	2	0,7	0	0,0	2	0,4
	Asian	4	1,3	2	1,3	6	1,3
	Black Or African American	17	5,6	9	5,7	26	5,6
	Native Hawaiian Or Other Pacific Islander	1	0,3	0	0,0	1	0,2
	White	278	92,1	148	93,1	426	92,4
Ethnicity	Hispanic Or Latino	54	17,9	25	15,7	79	17,1
	Not Applicable	35	11,6	19	11,9	54	11,7
	Not Hispanic Or Latino	213	70,5	115	72,3	328	71,1

0	0,00	0	0,00	0	0,00	0	0,00
0	0,00	0	0,00	0	0,00	0	0,00
0	0,00	0	0,00	0	0,00	0	0,00
0	0,00	0	0,00	0	0,00	0	0,00
0	0,00	0	0,00	0	0,00	0	0,00

Data Visualizations – SAS Blog



- Blog by SAS®
- Descriptions & often with code
- License missing

Retirement Ranking, in U.S. Cities

English

Data Visualization | Programming Tips

January 15, 2020

Where's the best place to retire, in the U.S.?

As I get older, a few of my buddies are starting to retire. And this makes me think about my own retirement (not that I'm anywhere near old enough to retire, mind you!) Therefore when I saw a list of the

[Read More](#)

Robert Allison

Moment-Ratio Diagram

English

Advanced Analytics | Data Visualization

January 15, 2020

The moment-ratio diagram

In my book *Simulating Data with SAS*, I show how to use a graphical tool, called the moment-ratio diagram, to characterize and compare continuous probability distributions based on their skewness and

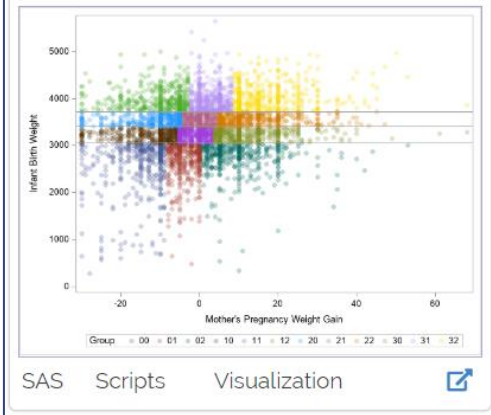
[Read More](#)

Rick Wicklin

Data Visualization - SAS Blog



SAS has a blog post where various topics are discussed and examples are provided. The 'Data Visualization' blog contains a lot of examples including source code on what graphics can be created.



RhoInc Plots



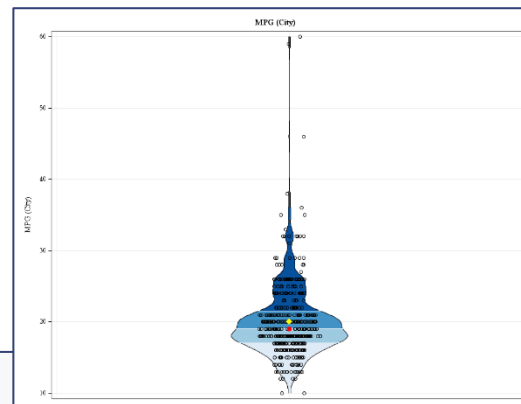
Plug-and-play example

Run the code below in your local SAS session.

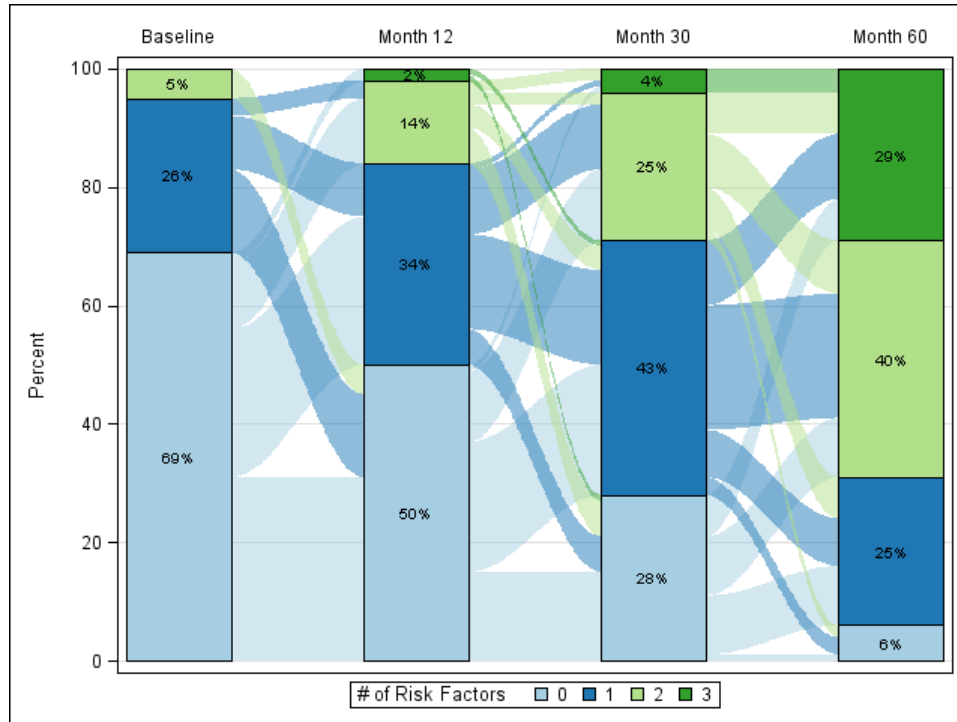
```
/*-----  
  Include %violinPlot directly from GitHub.  
  \-----  
  
  %let repo = https://github.com/RhoInc/sas-violinPlot;  
  %let file = src/violinPlot.sas;  
  %let fileURL = %sysfunc(tranwrd(%nrquote(&repo), github.com, raw.githubusercontent.com))  
  
  filename fileURL url "&fileURL";  
  %include fileURL;  
  filename fileURL;  
  
/*-----  
  Output a violin plot of SASHELP.CARS.  
  \-----  
  
  %sysexec C ;  
  %sysexec 'cd "Users\%USERNAME%";  
  ods pdf  
    file = 'Violin Plot of City MPG  
  
  %violinPlot  
    (data = sashelp.cars  
     ,outcomeVar = mpg_city);  
  
  ods pdf close;
```

%violinPlot

(data = sashelp.cars
,outcomeVar = mpg_city);



RhoInc Plots



SASjs Core Macros



- Specially developed for others
- Main maintainer: Allen Bow
 - Get* Informationen
 - mf_getFileSize
 - mf_getValue
 - mf_getVarType
- Existens-Checks
 - mf_exists (Datensatz)
 - mf_existvar (Variable)
 - mf_existvarlist (Variablen)

SASjs Core Macros

MACRO CORE (★)

Much quality. Many standards. The Macro Core library exists to save time and development effort! Herein ye shall find a veritable host of production quality SAS macros. These are a mix of tools, utilities, functions and code generators that are useful in the context of Application Development on the SAS platform. Contributions are welcomed.

Macro Name	Description	Updated
getVarType	Get the type of a variable	2 months ago
mf_getVarType	Macro to get the type of a variable	2 months ago
mf_getValue	Macro to get the value of a variable	2 months ago
mf_getFileSize	Macro to get the file size of a file	2 months ago
mf_exists	Macro to check if a dataset exists	2 months ago
mf_existvar	Macro to check if a variable exists	2 months ago
mf_existvarlist	Macro to check if a list of variables exists	2 months ago
mf_getVarType	Macro to get the type of a variable	2 months ago

SAS Scripts Programming



SASjs Core Macros



- mf_mkdir (Create directory)
- mp_binaryCopy (Perform binary Copy)
- mp_dirlist (List files and directories)
- mp_ds2cards (Create CARDS from data set)
- mp_searchdata (Search text in a Library)
- mp_zip / mp_unzip (Work with zip)
- ...



SASjs Core Macros



- SASjs – WebApp Framework for SAS
- Special Metadata Server Macros
- Special SAS Viya® Macros

%MACRO CORE (🚀) Production Ready Macros for SAS Application Developers
<https://github.com/sasjs/core>

MacroCore

- File List
 - base
 - lua
 - meta
 - metax
 - viya
 - mv_createfolder.sas**
 - mv_createwebservice.sas
 - mv_deletefoldermember.sas
 - mv_deletejes.sas
 - mv_deleteviyafolder.sas
 - mv_getaccesstoken.sas
 - mv_getapptoken.sas
 - mv_getclients.sas
 - mv_getfoldermembers.sas
 - mv_getgroupmembers.sas
 - mv_getgroups.sas
 - mv_getjobcode.sas
 - mv_getjoblog.sas
 - mv_getjobstate.sas

mv_createfolder.sas File Reference

Creates a viya folder if that folder does not already exist. [More...](#)

[Go to the source code of this file.](#)

Detailed Description

Expects oauth token in a global macro variable (default ACCESS_TOKEN).

```
options mprint;
%mv_createfolder(path=/Public)
```

Parameters

path= The full path of the folder to be created

access_token_var= The global macro variable to contain the access token

grant_type= valid values are "password" or "authorization_code" (unquoted). The default is authorization_code.

Version

VIYA V.03.04

SMILE – Smart SAS Macros



➤ Macros by Katja Glass Consulting

- %smile_ods_document_flat_label
- %smile_pdf_merge
- %smile_pdf_read_bookmarks

ods_document_flat1.pdf - Adobe Reader

Datei Bearbeiten Anzeige Fenster Hilfe

Öffnen

1 / 10 125%

Leesezeichen

- Table 1: By Group Report about shoes
- Table 2: Table Class Output
- Table 3: Multiple outputs - Cars for make = Acura
- Table 4: Multiple outputs - Cars for make = Audi
- Table 5: Multiple outputs - Cars for make = BMW
- Table 6: Different label
- Figure 1: Class graphic

Table 1: By Group Report about shoes

Region=Canada

Product	Total Sales
Boot	\$17,720
Boot	\$40,213
Boot	\$7,892

SMILE - Smart SAS Macros



This Smart SAS Macros - an Intuitive Library Extension contains small makros for example to download files from URLs or creating flat PDF navigation panes for ODS PDF.

GitHub repository for SMILE - Smart SAS Macros. The page shows a list of files and folders, including macros, programs, results, and LICENCE. The main content area displays the README file, which provides an overview of the project and its macros.

SMILE - Smart SAS Macros

SMILE stands for Smart SAS Macros - an Intuitive Library Extension

SMILE contains various small SAS macros supporting various tasks of a SAS programmer. Some macros are inspired by other open source macros and some by available papers. A complete overview can be seen below.

Macro Overview

The following SAS macros are currently available:

SAS Scripts Programming

SAS Macros by Scott Bass



- Scott Bass, IT-SAS Consulting
 - RunAll (Asynchrony runs)
 - AlignDecimals (Decimal alignment)
 - Create_format (Format creation)
 - Delete_file (File deletion)
 - Excel2SAS (Read Excel)
 - Export_* (Export to CSV, Excel, ...)
 - Logparse (Performance statistics)
 - txt2rtf (Create RTF from text)
 - ...

SAS Macros by Scott Bass

Scott Bass has built up a (semi) large collection of utility macros over the years with 73 macros currently. These are put up on GitHub to make them available for anyone. Almost all are utility in nature, and not tied to any particular project.

The screenshot shows a GitHub repository profile for Scott Bass. The profile includes a bio: "Experienced IT professional and consultant, having worked across a broad range of industries." and location: "Sydney, Australia". Below the profile is a list of repository files:

File Name	Description
@TEMPLATE.sas	Update @TEMPLATE.sas
CreateTableOrView.sas	Add files via upload
IsNum.sas	Add files via upload
IsNumM.sas	Add files via upload
RunAll.sas	Add files via upload
age.sas	Add files via upload
align_decimals.sas	Add files via upload

At the bottom of the repository view, there are navigation tabs for "SAS", "Scripts", and "Programming", along with a share icon.

SAS Macros by Scott Bass



➤ Compare (Compare datasets or libraries)

```
%compare (
  base=adam,
  comp=adam_mod,
  by=usubjid);
```

Comparing adam.ADAE and adam_mod.ADAE datasets

```
Die Prozedur COMPARE
Vergleich von WORKSPDE__BASE_mit WORKSPDE__COMP_
(Methode=EXÄCT)

Dateizusammenfassung

Datei          Erstellt          Geändert  NVar
WORKSPDE__BASE_ 20JAN20:10:46:31 20JAN20:10:46:31 56
WORKSPDE__COMP_ 20JAN20:10:46:31 20JAN20:10:46:31 56
```

```
Zusammenfassung der Variablen
Anzahl der gemeinsamen Variablen: 56.
Anzahl der ID-Variablen: 1.
```

Anzahl der ID-Variablen: 1.

Anzahl der ID-Variablen: 1.

Anzahl der ID-Variablen: 1.

Library comparison report between adam and adam_mod libraries

Flags			Base			Compare			
Base	Compare	Matched?	Libname	Memname	# of Obs	Libname	Memname	# of Obs	Obs Diff?
1	1	MATCHED	ADAM	ADAE	1,191	ADAM_MOD	ADAE	1,191	
1	1	MATCHED	ADAM	ADSL	254	ADAM_MOD	ADSL	254	
1	1	MATCHED	ADAM	ADTTE	254	ADAM_MOD	ADTTE	241	<<<
1	1	MATCHED	ADAM	ADVS	32,139	ADAM_MOD	ADVS	32,139	
0	1	NO MATCH			.	ADAM_MOD	NEW	1	<<<
1	0	NO MATCH	ADAM	ADADAS	12,463			.	<<<
1	0	NO MATCH	ADAM	ADCIBC	730			.	<<<
1	0	NO MATCH	ADAM	ADLBC	37,132			.	<<<
1	0	NO MATCH	ADAM	ADLBCPV	37,132			.	<<<
1	0	NO MATCH	ADAM	ADLBH	24,966			.	<<<
1	0	NO MATCH	ADAM	ADLBHPV	24,966			.	<<<
1	0	NO MATCH	ADAM	ADLBHY	9,954			.	<<<
1	0	NO MATCH	ADAM	ADNPIX	31,140			.	<<<

Rolands SAS Macros



- Roland Rashleigh-Berry published many macros
- Focus own usage – less documentation
 - age (Age from Date)
 - allunique (Unique over a library)
 - char2num (Conversion)
 - combine (Combine data sets)
 - delmac (Remove macros from SASMACR)
 - dslabel (Get dataset label)
 - flatten (Reduce dataset to 1 per BY)
 - ... (243 Utility Macros)

Spectre (Roland's SAS® Macros)

A complete clinical reporting engine is provided as Spectre. It's a comprehensive macro framework. Additionally 244 useful utility macros are available.

	Placebo (N=86)	Xanomeline Low Dose (N=84)	Xanomeline High Dose (N=84)
Sex			
F	53 (61.6)	58 (59.5)	48 (47.6)
M	33 (38.4)	34 (40.5)	44 (52.4)
Pooled Age Group 1			
65-80	42 (48.8)	47 (56.0)	55 (65.5)
<65	14 (16.3)	8 (9.5)	11 (13.1)
>80	30 (34.9)	29 (34.5)	18 (21.4)

SAS

Scripts

Outputs



Agenda



- Introduction
 - Licenses
 - Available Solutions
 - **Tools**
 - Aspects to Consider
 - Summary
-





➤ Validation Framework

- Usage more as „tool“ and less „open source“
- High functionality & well documentation
- For quality checks and validations

SASUnit Examples		No.	010		
▼ Scenarios		Scenario	Tests for nob.sas - has to fail!		
▶ saspgm/assertexternal_example_test.sas		Program	saspgm/nobs_test.sas		
▶ saspgm/assertimage_example_test.sas		Last Run	12JUL2017:10:19:13		
▶ saspgm/asserttext_example_test.sas		Duration	2.5 s		
▶ saspgm/boxplot_test.sas					
▶ saspgm/comparison_test.sas					
▶ saspgm/crossreference_test.sas					
▶ saspgm/database_test.sas					
▶ saspgm/generate_test.sas					
▶ saspgm/getvars_test.sas					
▼ saspgm/nobs_test.sas					
▶ 001					
▶ 002					
▶ 003					
▶ 004					
▶ 005					
▶ 006					
▶ saspgm/programdocumentation_test.sas					
▶ saspgm/regression_test.sas					
▶ Units under Test					
▶ Program documentation					
		Test Cases			
No.	Test Case	Unit under Test	Last Run	Duration	Result
001	simple example with sashelp.class	nobs.sas	12JUL2017:10:19:14	0.1 s	✓
002	failed test - must be red!	nobs.sas	12JUL2017:10:19:15	0.1 s	✗
003	example with big dataset	nobs.sas	12JUL2017:10:19:15	0.3 s	✓
004	example with empty dataset	nobs.sas	12JUL2017:10:19:15	0.1 s	✓
005	dataset not specified	nobs.sas	12JUL2017:10:19:15	0.1 s	✓
006	invalid dataset	nobs.sas	12JUL2017:10:19:16	0.1 s	✓

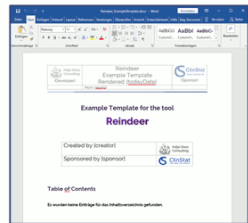
Reindeer – Render SAS Results



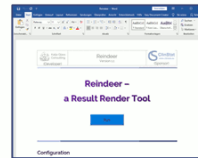
- VBA Macro Tool (Microsoft Word®)
 - Sponsored by ClinStat GmbH
 - Embed listing, RTFs & graphics



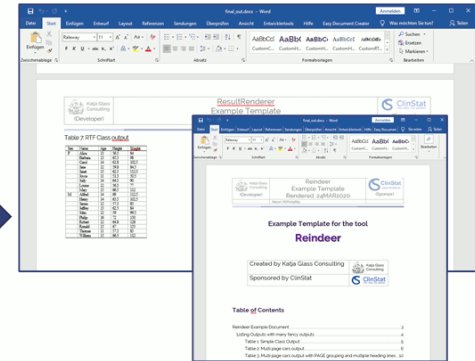
SAS Outputs



Word Template



Run Reindeer –
Render SAS Results
into a Word Template



Final Word Output

Reindeer – Render SAS Results



```
*content - Editor
Datei Bearbeiten Format Ansicht Hilfe
Replace;[todayDate];[todayDate]
Replace;[reportID];REPI025889
Replace;[creator];Katja Glass Consulting (2)
Replace;[sponsor];ClinStat GmbH
Header1;ResultRenderer Example Document According Content File
Header2;Listing Outputs Below
Listing;01;class;1st
```

 Katja Glass Consulting (Developer)	Reindeer Example Template Rendered: 14FEB2020 <small>Report: REPI025889</small>	 www.clinstat.eu (Sponsor)
--	--	---

Example Template for the tool

Reindeer



Created by Katja Glass Consulting	 Katja Glass Consulting
Sponsored by ClinStat	 ClinStat <small>Your data. Our passion.</small>

Table of Contents

Reindeer Example Document	2
Listing Outputs with many fancy outputs	3
Table 1: Simple Class Output	4
Table 2: Multi page cars output	5
Table 3: Multi page cars output with PAGE grouping and multiple heading lines	9

 Katja Glass Consulting (Developer)	ResultRenderer Example Template Rendered: 14FEB2020
--	---

Table 9: RTF - Multi page cars output with PAGE grouping and multiple heading lines

Make=Acura

Model	Type	MSRP
MDX	SUV	\$36,945
RSX Type S 2dr	Sedan	\$23,820
TSX 4dr	Sedan	\$26,990
TL 4dr	Sedan	\$33,195
3.5 RL 4dr	Sedan	\$43,755
3.5 RL w/Navigation 4dr	Sedan	\$46,100
NSX coupe 2dr manual S	Sports	\$89,765

Created as example.
This includes footnotes.

StatTag



➤ Plugin for Microsoft Word®

- Embed SAS, R or Stata code directly in Word
- Run programs, embed results

Education and anthropometrics in US adults: National Health and Nutrition Examination Study 2013-2014

Introduction: Education has been shown to be associated with body mass index (BMI). Gender, race, marital status and metabolic characteristics may alter this association.

Methods: This study included adult (≥ 30 years) participants from the 2013-2014 National Health and Nutrition Examination Study (NHANES). Demographics were self-reported and anthropometric measurements were taken by study personnel. Education was dichotomized based on matriculation to post-secondary education. Associations were estimated using T-tests or Wilcoxon rank sum tests for continuous data and chi-squared tests for categorical data. We examined the association between BMI and education level using multivariate linear regression.

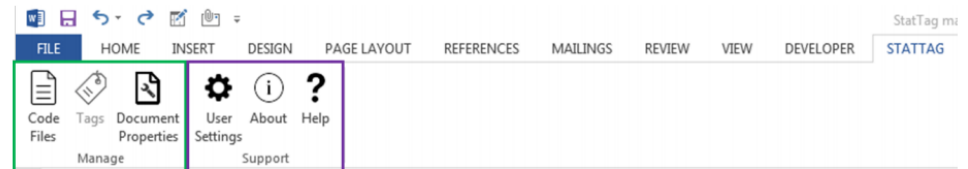
Results: Among 38114808 participants, 20322649 (53.54%) self-reported any post-secondary education. Participants with post-secondary education had lower BMI (Beta: -0.346 , 95% CI: -0.840 to 0.148) than those without post-secondary education. After adjusting for gender, race, age, marital status, fasting glucose and total cholesterol, post-secondary education no longer had significantly lower BMI (Beta: -0.242 , 95% CI: -0.408 to 0.894).

Table 1. Association of Education with Participant Characteristics among 2013-2014 NHANES Participants.

Characteristic	No Post-Secondary (n=17792359)	Post-Secondary (n=20322649)	P-value
Male (%)	873 (49.1 1079-450-0)	931 (45.8 1208-445-6)	0.048 0.003

The StatTag Word Toolbar

The StatTag toolbar has two groups of buttons which provide quick access to key functions



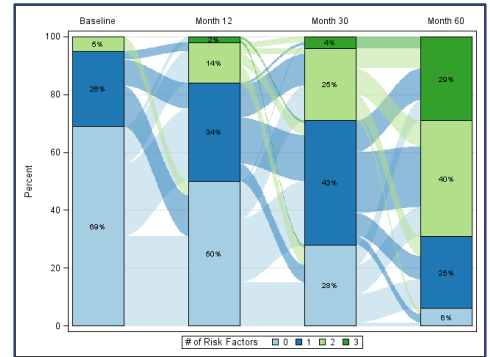
Manage Functions

	Code Files	Opens the Code Files Manager. See "Code Files Manager" below in Section 3.3 .
	Tags	Opens the Tag Manager. See "Tag Manager" below in Section 3.3 .
	Document Properties	Controls default formatting behavior applied to the active document, See "Document Properties" below.

Available Solutions



- Various solutions available
- Find and use them!
- Create new Open Source



		Post-Baseline Result							
		Low		Normal		High		Total	
Treatment	Baseline Result	n	%	n	%	n	%	n	%
Placebo (N = 81)	Low	2	(2.5)	2	(2.5)	0	(0.0)	4	(4.9)
	Normal	4	(4.9)	66	(81.0)	0	(0.0)	70	(86.0)
	High	0	(0.0)	4	(4.9)	0	(0.0)	4	(4.9)
	Total	6	(7.4)	72	(88.6)	4	(4.9)	82	(101.0)
Xanomeline Low Dose (N = 72)	Low	0	(0.0)	1	(1.4)	0	(0.0)	1	(1.4)
	Normal	2	(2.8)	66	(91.4)	0	(0.0)	68	(94.2)
	High	0	(0.0)	3	(4.2)	0	(0.0)	3	(4.2)
	Total	2	(2.8)	70	(97.1)	3	(4.2)	75	(104.1)
Xanomeline High Dose (N = 73)	Low	1	(1.4)	2	(2.7)	0	(0.0)	3	(4.1)
	Normal	2	(2.7)	64	(87.7)	0	(0.0)	66	(90.4)
	High	0	(0.0)	3	(4.1)	0	(0.0)	3	(4.1)
	Total	3	(4.1)	69	(94.2)	3	(4.1)	75	(102.5)

ods_document_flat1.pdf - Adobe Reader

Datei Bearbeiten Anzeige Fenster Hilfe

Öffnen

1 / 10 125%

Lesezeichen

- Table 1: By Group Report about shoes
- Table 2: Table Class Output
- Table 3: Multiple outputs - Cars for make = Acura
- Table 4: Multiple outputs - Cars for make = Audi
- Table 5: Multiple outputs - Cars for make = BMW
- Table 6: Different label
- Figure 1: Class graphic

SASUnit Examples	No.	Scenario	Program	Last Run	Duration
▼ Scenarios	010	Tests for nobis.sas - has t	saspgminobis_test.sas	12JUL2017:10:19:13	2:5 s
▶ saspgmiassertexternal_example_test.sas					
▶ saspgmiassertimage_example_test.sas					
▶ saspgmiasserttext_example_test.sas					
▶ saspgmiasserttable_test.sas					
▶ saspgmicomparison_test.sas					
▶ saspgmicrossreference_test.sas					
▶ saspgmidatabase_test.sas					
▶ saspgmigenerate_test.sas					
▶ saspgmigetvars_test.sas					
▼ saspgminobis_test.sas					
▶ 001	001	simple example with sashelp.c			
▶ 002	002	failed test - must be red			
▶ 003	003	example with big dataset			
▶ 004	004	example with empty dataset			
▶ 005	005	dataset not specified			
▶ 006	006	invalid dataset			
▶ saspgmiprogramdocumentation_test.sas					
▶ saspgmiregression_test.sas					
▶ Units under Test					
▶ Program documentation					

Table 1: By Group Report about shoes

Region=Canada

Product	Total Sales
Boot	\$17,720
Boot	\$40,213
Boot	\$7,892

Agenda



- Introduction
 - Licenses
 - Available Solutions
 - **Aspects to Consider**
 - Summary
-



Aspects to Consider



- Use open source – licenses
 - Checkout license (special licenses, e.g. „non-commercial“)
 - License Overview: <https://choosealicense.com/licenses/>
 - Most common ones (Unlicense, MIT, GNU (LGPL, GPL, AGPL))
 - Use them right away
 - GNU: when involving third parties, share alike

 - Warranty & Validation
 - Typically no warranty & validation
 - QA / Validation “in-house”
-



Aspects to Consider



- Challenges
 - (Creation)
 - Communication
 - Maintenance & Fixes
 - Enhancements
 - Documentation
 - Validation & Quality Control

 - Challenges due to motivation
-

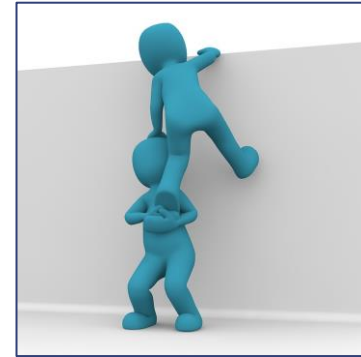


Aspects to Consider



- Enable more open source
 - Allow employees & contractors to publish open source
 - Join open collaborations
 - Invest in open source
 - Apply license to papers, blogs

- Why investments?
 - Investments enables high motivation



Aspects to Consider



➤ Create Open Source

➤ SAS License

- SAS® OnDemand for Academics/University edition (non-commercial)

➤ Apply license

- Recommend **MIT**, GNU

➤ Store online

- GitHub, ...

➤ Communication

- Conferences
- Social media
- Open Source Portal



Agenda



- Introduction
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 - **Summary**
-



Summary



- High potential to simplify work life
- Solutions are available
- Clinical Open Source Portal to find them



It's on us to exploit the potential!



It's on us to enhance the potential!

- Allow employees & contractors to publish open source
- Join open collaborations
- Invest in open source



Summary



- Additional Information
 - Katja Glass Consulting @YouTube
 - Open Source Portal (www.glacon.eu/portal)
 - Open Source Guides (<https://opensource.guide/>)

ÜBERSICHT VIDEOS PLAYLISTS KANÄLE DISKUSSION KANALINFO

Uploads ▶ ALLE WIEDERGEBEN

Video Title	Duration	Views	Time
Using an Open Source SAS Macro - How to do?	33:29	41 Aufrufe	vor 2 Monaten
Open Source Portal for Clinical Study Evaluations - ...	4:37	49 Aufrufe	vor 4 Monaten
Open Source for Pharma - Solutions, Challenges and...	17:09	85 Aufrufe	vor 6 Monaten
Open Source Collaborations in Clinical Study Evaluations	6:42	16 Aufrufe	vor 7 Monaten



Thank you!

katja.glass@glacon.eu

www.glacon.eu

www.glacon.eu/portal