
Use Cases of Google Sheets in Programming Applications

PHUSE EU 2020 - Carina Hillenbach



Agenda

- Background & Motivation
- Technical: Some high level how-to
- Three Use Cases
- Summary and Outlook

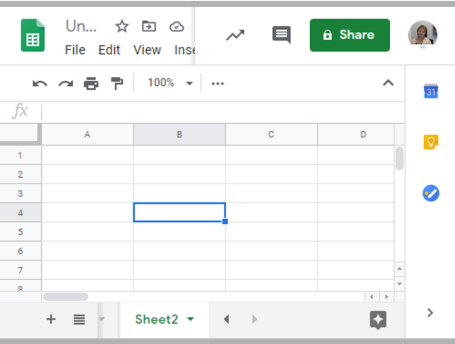
Background

Tasks of the Statistical Programmer

- The department “Statistical Programming” primarily performs statistical analysis of clinical trials
- SAS® is one of the primary tools
 - Ideal for data analysis, but...
- ...but sometimes you might need to
 - Run tasks or analyses driven by **metadata**
 - Metadata owned by several people
 - Metadata changing or updated often
 - => Need to collect input from people:
Review, comment, reply, track... In short: **COLLABORATE!**

Background

Synergy of Two Tools



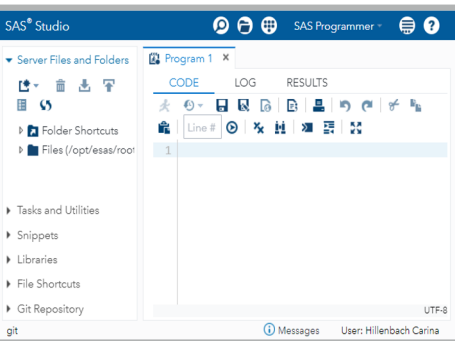
Google Sheets

Strengths:

- Easy use
- Multi concurrent users, change tracking, notifications etc.

Limitations:

“Gray area” for analysis of Clinical Trials: e.g. security, documentation



SAS

Strengths:

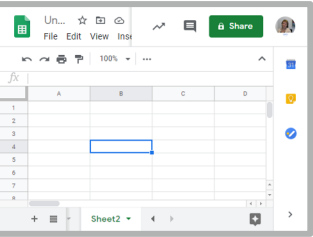
- Strong tool for data analysis
- One of the primary analysis tools used at Roche

Limitations:

- Manual capture and maintenance of metadata

Technical

Connecting the Tools

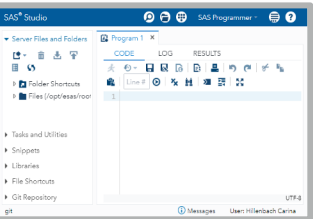
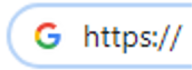


Google cloud-based services

Google application programming interfaces (APIs) for automated data access

Read Google sheets **anytime, securely** with SAS:

```
proc http url=...;  
    ...  
run;
```



Program and run analyses in SAS using data collected in Google Sheets

Technical

The Set-up in a Nutshell

- **Create a Google 'Project'** on the [Google API Console](#)
 - Select the APIs: Google Drive API and Google Sheets API
 - Create credentials enabling “OAuth” access from SAS to Google Sheets ('client ID' and 'client secret')
- **SAS access:** As described in [Show Off Your OAuth, J. Henry, 2017](#)
 - Of note: Each user has to give ONCE their consent that the API acts on their behalf. This is managed via a personal, confidential 'refresh token'
- **Start working!** Read and use the data via SAS procedure PROC HTTP
 - Examples in SAS-source above
 - [Google API syntax documentation](#) is very good
 - Wealth of information on the internet

Use Case 1

Collect Study Information and Send Standardized Emails

- **Background:**
 - DSUR: Annual safety reporting event for each molecule
 - Effort across departments, study-teams and molecule-teams
 - A centralized team has to **coordinate** activities, produce and deliver outputs
- **Input:**
 - List of studies to be included
 - Delivery date for outputs
- **Requirement:** Standard emails to several teams, containing
 - Activities and timelines (derived relative to the delivery date)
 - Information, e.g. a table of studies for a molecule-team
 - Email lists for to: and cc: fields

Use Case 1

Google Sheets to Collect Study Information

2 Google sheets for molecule and study info

- Gray cells pre-filled and write-protected
- “Data entry” involved nearly the whole department! High quality!
- Similar ‘molecule’-sheet not shown

	A	B	C	D	
1	Molecule	Study ID	Study Programmer	Study Data Manager	...
2	RO1111111	BN12345	xyz@roche.com	ccc@roche.com	...
3	RO1111111	BN23456	uvw@roche.com		
4	RO1234567	BN88888	aaa@roche.com		
5	RO1234567	BN99999	bbb@roche.com		
6	...				

Use Case 1

Prepare and Send Standardized Emails

SAS:

Read the sheets, merge, pick information, date derivations etc.

Send html email:

Report Type	DSUR
Product	ASO HTT (R07234292)
Reporting Period	15 April 2019 to 14 April 2020

Dear Colleagues

Your support is needed to provide information for studies

```
options emailhost=mymailhost emailport=25;
FILENAME outbox email
  to = ("myemail@roche.com")
  subject = "mytitle"
  content_type = "text/HTML";
data _null_;
  file outbox;
  put "
  <!DOCTYPE html>

  ...
  </body></html>
  ";
run;
```

Use Case 2

Study Metadata as Basis for Derivations

- **Background:** Also DSUR reporting
- **Requirement:** Derive number of patients exposed to
 - The ‘target’ molecule
 - Any other Investigational Medicinal Product (IMP)
 - Placebo
- **Input:**
 - SDTM data: Number of patients per *planned treatment arm*
 - Protocol: IMPs given in each *treatment arm*
- **Google Sheet for Study Metadata:** Convert protocol information into a spreadsheet, i.e. exposed yes/no by IMP and *treatment arm*

Use Case 2

Study Metadata as Basis for Derivations

	A	B	C	D
1	Molecule	Study ID	Treatment Arm	Exposed
2	RO1111111	BN12345	Arm 1	YES
3	RO1111111	BN12345	Arm 2	NO
4	RO2222222	BN12345	Arm 1	YES
5	RO2222222	BN12345	Arm 2	YES
6	...			

Metadata via Google Sheets:

Central Team prepared the whole table

Study info protected when finalized

	A	B	C	D
1	Study	Exposed to RO1111111, n	Exposed to Other IMPs, n	Exposed to Placebo, n
2	BN12345	11	22	0
3	BN11111	33	44	0
4	...			

Output via SAS:

- Read the sheet
- **Save with SDTM for documentation**
- **Merge** with SDTM data **by Treatment Arm**
- Derive number of exposed patients
- Output format EXCEL

Use Case 3

Check Outputs for Completeness

- **Background:** Project specific list of standard safety outputs
- **Requirement:** Compare outputs to the standard
 - Completeness
 - Up to date
- **Input:**
 - Project specific list of standard safety outputs (output name and title)
 - Tables, listings and graphs in a folder
- **Output:** HTML sheet
 - List of missing / additional outputs
 - Comparison of titles

Summary and Outlook

Synergies of SAS and Google Sheets

- Both tools have strengths that complement each other
- Efficiently connected via APIs
- Changing and co-owned metadata
 - Can be maintained in Google Sheets
 - Dynamically accessed by SAS
- Regulatory reporting needs special attention
- Efficient solution, the initial effort paid off!
- Future might include
 - Writing to google sheets
 - Other Google tools: Analytics, machine learning ...

References & Links

- SAS with simple Google Sheets:
[“There’s an App for That”: It’s Called SAS® ODS! Mobile Data Entry and Reporting via SAS ODS](#)
- SAS, Google and OAuth authentication:
[Show Off Your OAuth, J. Henry, 2017](#)
- Google API Syntax Reference: [developers.google.com](#) ([drive API](#), [sheets API](#))

Contact

- In case of questions, you can contact me at carina.hillenbach@roche.com

Doing now what patients need next