

THE NEXT GENERATION OF VISUALIZATION:

USING SAS TO ANALYZE HEALTHCARE DATA

UTRECHT – PHUSE SDE (4FEB2016)

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HEALTH & LIFE SCIENCES (GLOBAL PRACTICE)



AGENDA

Using SAS to Analyze Healthcare Data

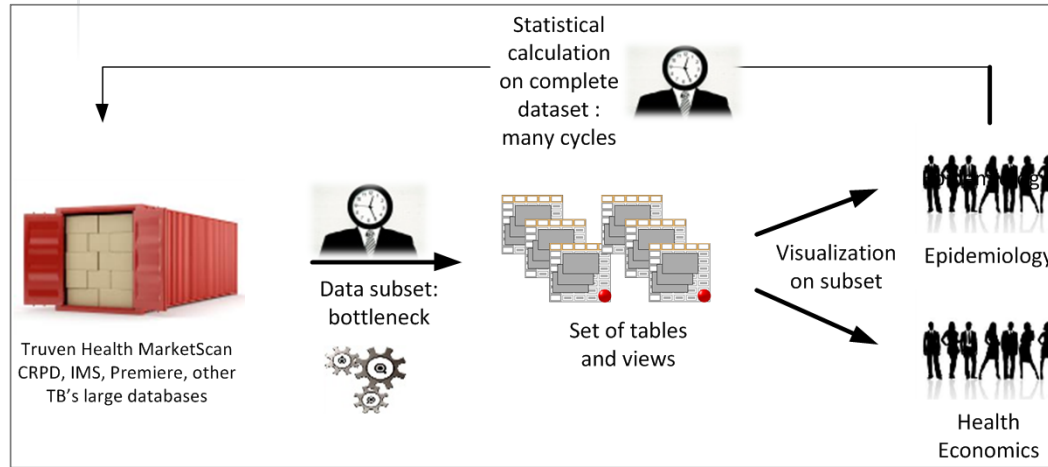
- Real World Data usage in Life Sciences
- What are we going to demonstrate ?
- What data are we using ?
- Demonstration
- Q&A

- Real world data will have a profound effect on the research, development, approval, marketing of new therapies and the improvement of the quality of life of patients.
- In the coming years, pharmaceutical companies are expected to invest in building out capabilities to manage and analyze real world data in the interest of :
 - Research & Development
 - Clinical Outcomes
 - Market Access
 - Registries
 - Pragmatic RCT's
 - Patient Reported Outcomes (PROs)

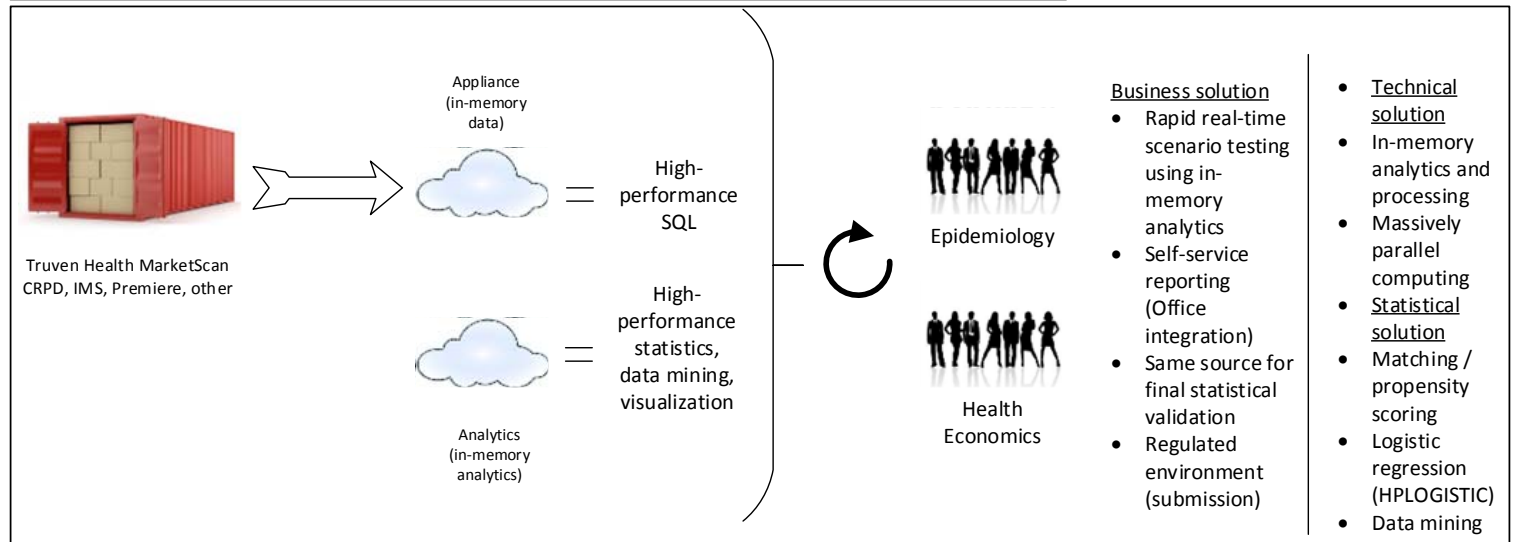
USING SAS TO ANALYZE HEALTHCARE DATA (UTRECHT/PHUSE SDE)

REAL WORLD DATA USAGE IN LIFE SCIENCES

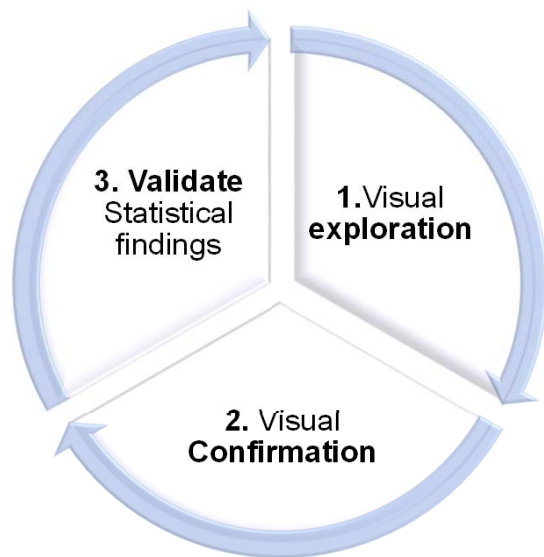
Current situation



Desirable solution



What are we going to demonstrate ?



- **Exploration** of the data to generate insights

How ? *using visual exploration capabilities*

- **Confirmation** of these insights statistically

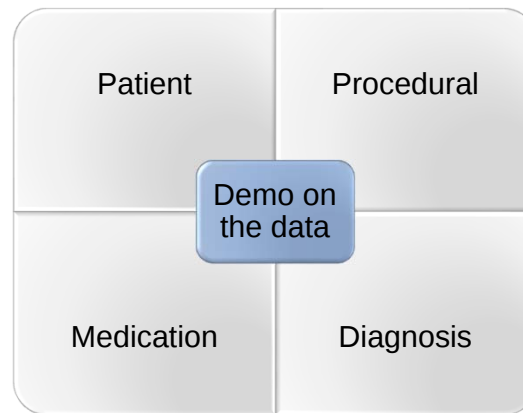
How ? *using visual statistics capabilities*

- Closing the loop – **Validate** Statistical findings

How ? *using in-memory statistics (code) in SAS Studio*

What data are we using ?

- Healthcare data (mixed EHR & Claims data)



- **IMPORTANT :**
 - ✓ Structure of the data is equal to Real World Evidence (Healthcare) data
 - ✓ Content is '**simulated**'
 - ✓ Data Preparation completed upfront

**USING SAS TO ANALYZE
HEALTHCARE DATA**
(UTRECHT/PHUSE SDE)

Demo on the data



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Validate Statistical Findings



Exploration Heart Failure x SAS Studio

https://waves.sas.com/SASStudio/main?locale=en_US&zone=GMT%252B01%253A00&https%3A%2F%2Fwaves.sas.com%2FSASStudio%2F=

SAS® Studio

Visual Programmer

Sign Out

Server Files and Folders

- hpametaswe.fra.sas.com
 - Folder Shortcuts
 - Files (Home)
 - Dossier_AUD
 - Dossier_BLC
 - Dossier_ERV
 - Dossier_FAR
 - Dossier_JGO
 - Dossier_msa
 - Dossier_SEP
 - DOSSIER_SYF
 - Folder_sbxml
 - Crosstab_nicardipin.sas
 - Program_rwc.sas
 - Program_rwc_xarelto.sas
 - TextParse.sas
 - JBD
 - JEC
 - LonghowLam
 - MFA
 - MGR
 - MonDossier
 - ODSEditorFiles
 - PAN
 - sasuser.v93
 - sasuser.v94
 - Test
 - TEST
- Tasks
- Snippets
- Libraries
- File Shortcuts
- SAS Folders (experimental)

Program_rwc_xarelto.sas

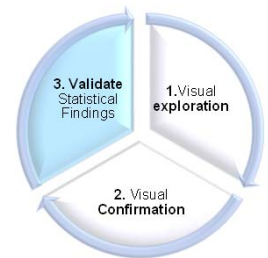
CODE LOG RESULTS

```
1 LIBNAME Lrosthls SASIOLA TAG=rost_hls
2 PORT=10017 SIGNER="http://hpamemoswe.fra.sas.com:7980/SASLASRAuthorization" HOST="hpamemoswe.fra.sas.com" ;
3
4
5 %let classification = rx_xarelto ;
6 %let continuous = smoking age_category diastolic_bp bmi avg_income;
7
8 proc contents data=lrosthls.MEDICATIONS_10PCT;
9 run;
10
11 data LROSTHLS.MEDICATIONS_10PCT_S;
12   attrib rx_xarelto length=8;
13   set LROSTHLS.MEDICATIONS_10PCT;
14   if USC_MED_DESC = "XARELTO 10 MG TABLET" then rx_xarelto=1; else rx_xarelto=0;
15 run;
16
17
18 proc imstat data=lrosthls.MEDICATIONS_10PCT_S;
19   crosstab age_category * rx_xarelto /
20     measures
21     chisq
22     ncmis;
23 quit;
24
25 proc imstat data=lrosthls.MEDICATIONS_10PCT_S;
26 logistic &classification = &continuous ;
27 /* VARSELECTION desc name = LogisModel sls=0.05 /*score(_ALL_)*/;
28 run;
29
30 proc datasets library=LROSTHLS;
31   delete MEDICATIONS_10PCT_S;
32 run;
```

Line 32, Column 5

USING SAS TO ANALYZE HEALTHCARE DATA (UTRECHT/PHUSE SDE)

Validate Statistical Findings



Program_rwe_xarelto.sas

CODE LOG RESULTS

LIKELIHOOD RATIO

LIKELIHOOD RATIO	515.7663	8	<.0001
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Parameter Estimates for ROST_HLS.MEDICATIONS_10PCT_S

Parameter	Estimate	Standard Error	z Value	Pr > z
Intercept	3.2398	0.3744	8.65	<.0001
smoking Current smoker	-0.00807	0.1401	-0.06	0.9540
smoking Never smoked	0.1012	0.1232	0.82	0.4112
smoking Not currently smoking	-0.04322	0.09263	-0.47	0.6408
smoking Previously smoked	0	.	.	.
age_category 25-44	-2.2789	0.1061	-21.48	<.0001
age_category 45-64	0.07933	0.08068	0.98	0.3255
age_category 65-79	0	.	.	.
diastolic_bp	-0.00403	0.004374	-0.92	0.3564
bmi	-0.00139	0.004484	-0.31	0.7574
avg_income	6.891E-7	2.723E-6	0.25	0.8002

Type III Tests of Model Effects for ROST_HLS.MEDICATIONS_10PCT_S

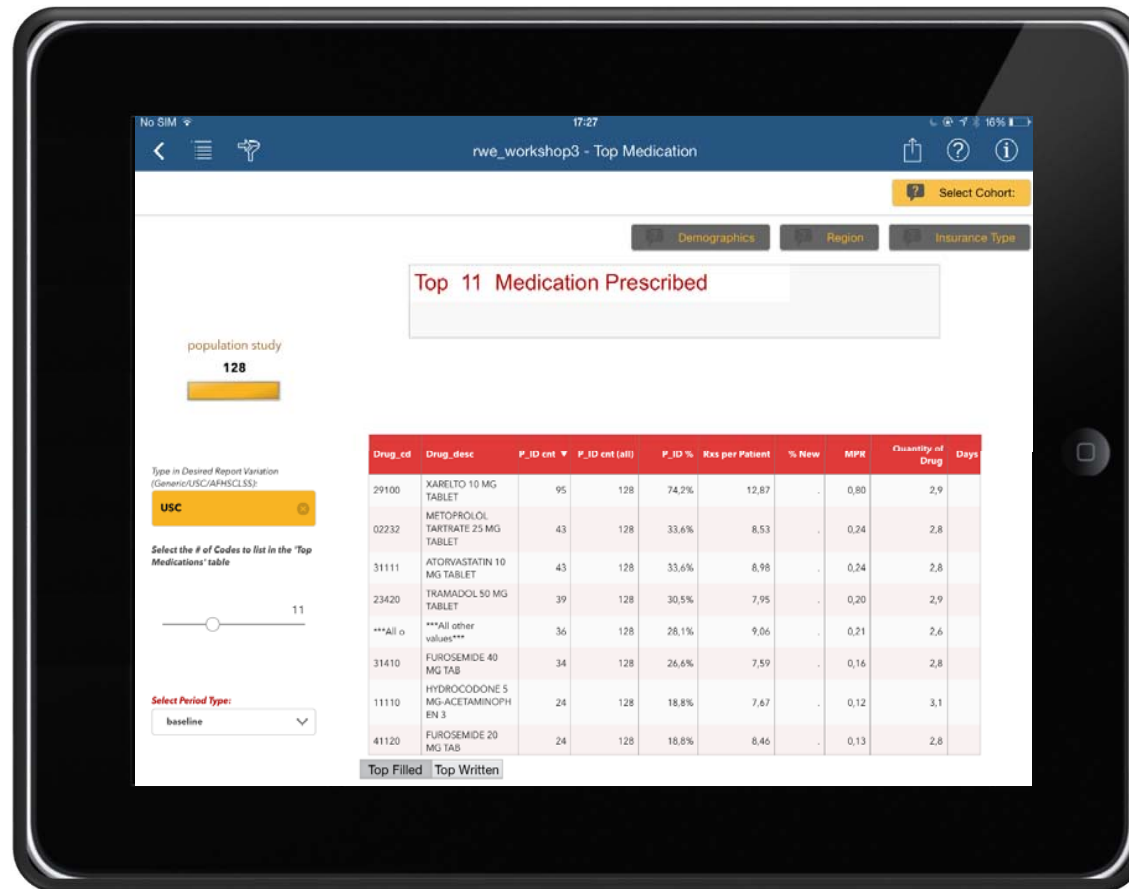
Effect	Num DF	Chi-Square	Pr > ChiSq
smoking	3	1.90	0.5932
age_category	2	651.09	<.0001
diastolic_bp	1	0.85	0.3564
bmi	1	0.10	0.7574
avg_income	1	0.08	0.8002

Dimensions Iteration History Convergence Fit Statistics Type III Test Parameter Estimates Response Profile

Effect	DF	Chi-Square	Pr > ChiSq
bodymass index	1	0.095431	0.7574
diastolic blood pressure	1	0.850678	0.3564
average income	1	0.064058	0.8002
age category	2	651.0934	<0.0001
smoking	3	1.901041	0.5932

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Mobile BI



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"Harris, when I said 'any questions' I was using only a figure of speech."

