



Rise and Shine

Using R Shiny to explore
insomnia clinical trial data

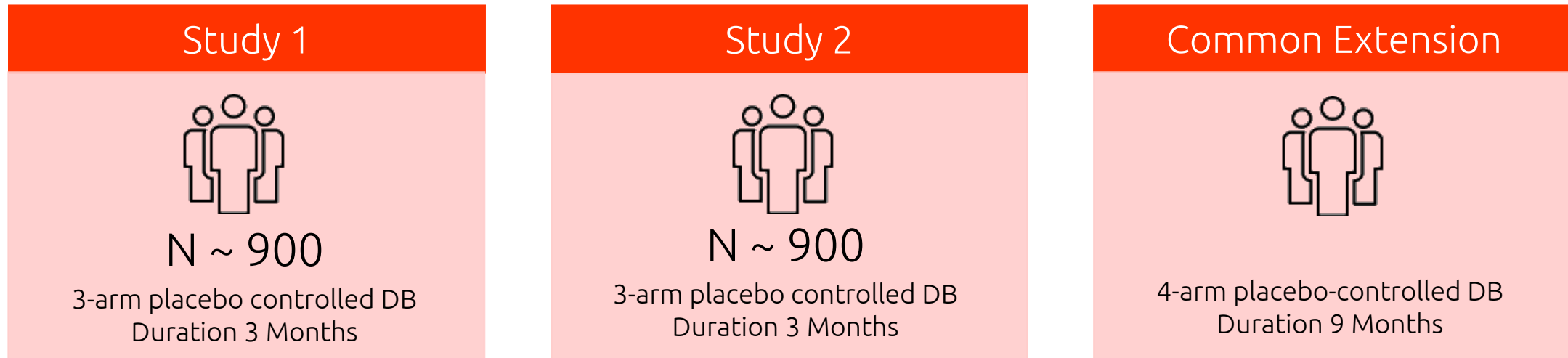
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PHUSE EU CONNECT 2020



Background

This year Idorsia completed its first Phase III trials in Insomnia



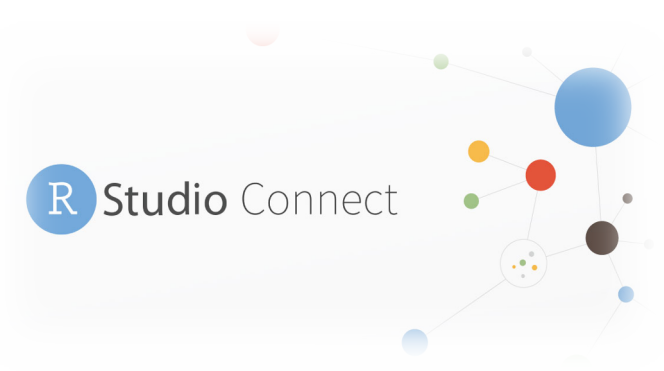
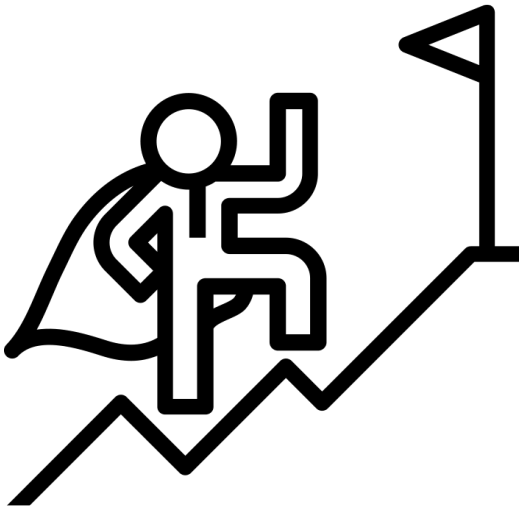
- Pilot use of R Shiny Apps to be used once unblinded ADaM data released
- 3 months development time until first trial results available

→ Aims: **accelerate data exploration, generate faster insights**

Building the foundations

App Development & Deployment

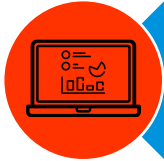
- App developed by one developer
- Weekly review and discussion meeting with project statistician
- Used dry-run data and outputs for checking results during development



- Deployment using RStudio Connect
- Out-of-the-box solution for hosting R Shiny apps
- I.T. can easily install RStudio Connect
- One-click deployment from RStudio IDE for Apps and R Markdown documents
- Controlled access for colleagues in Biometry

Know your data

Why we focused on efficacy analyses



Objective sleep parameters from sleep lab



Subjective daily sleep diary data



Multiple repeated questionnaires to assess day-time functioning and sleep quality

- ➡ Many efficacy parameters collected + protocol defined and exploratory subgroups
- ➡ High potential for usefulness of a Shiny App

Adding value

Deciding on content for maximum impact

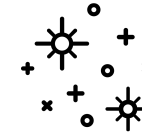
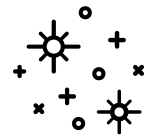
Data review dynamic data filtering to review specific sets of patients

Demographics check balance across subgroups

Adverse Events view key CSR tables, split by subgroups, custom summaries

Efficacy analyses MMRM models, plots over time, forest plots, box plots

Exploratory analyses Scatter plots, ECDF plots and dynamic response rate tables



→ Don't reproduce CSR outputs for the sake of it

→ Focus on analyses that can add context or alternative visual representations of central or complex reports

→ Anticipate questions users might have



Time to shine

How were the apps used?

First reported results meeting

- Preparation for questions

Full day CSR results review meeting

- Real-time analysis: Supplementing prepared slides with immediate answers to questions

Meeting with external insomnia experts

- Plots of questionnaire data beyond CSR coverage

Ad-hoc cross-functional meetings

- Directly answer questions from clinicians/medical writing/safety

Routinely by project and study statisticians

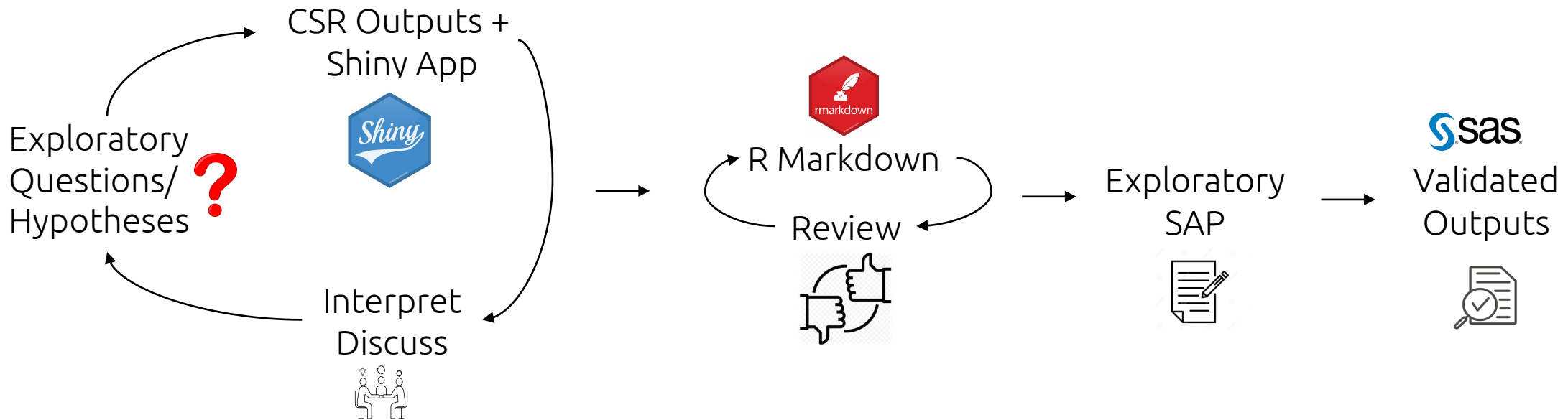
- Review, explore and gain deeper understanding of data

Preparation of R Markdown reports

- Take app content and add contextual comments for creation of exploratory analysis reports

Looking at more, producing less

Reimagining the exploratory analysis workflow



➡ Stats programming shielded from initial exploratory requests

➡ Use R Markdown for QC/Acceptance checking SAS outputs

Reporting success

R Markdown used extensively

Easy to take functions driving 'business logic' of the shiny app, and create R Markdown documents

Supplement content with additional plots, listings and explanations

Make frequent use of tabbed content and code folding options

One-click deployment with RStudio Connect for easy sharing within Biometry

- Change Log
- Intro
- Parameter 1
 - Study 1
 - MMRM model output
- Model diagnostics**
- Study 2
- Pooling
- Parameter 2
- Parameter 3
- Appendix



Untransformed Parameter (CSR)

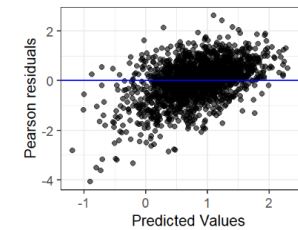
Log transformed Parameter

Code

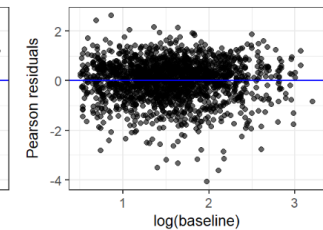
Diagnostic plots

Fit statistics DoF:1748 sigma:0.56 AIC:4021.41

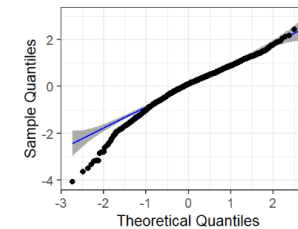
Residual Plot - Fitted values



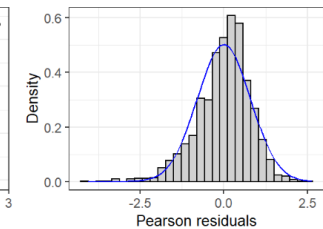
Residual Plot - Baseline values



Q-Q plot



Histogram



Study 2

MMRM model output

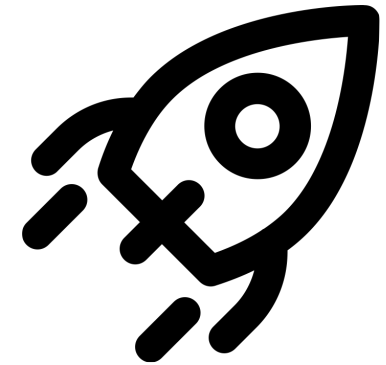
Untransformed Parameter (CSR)

Log transformed Parameter

Code

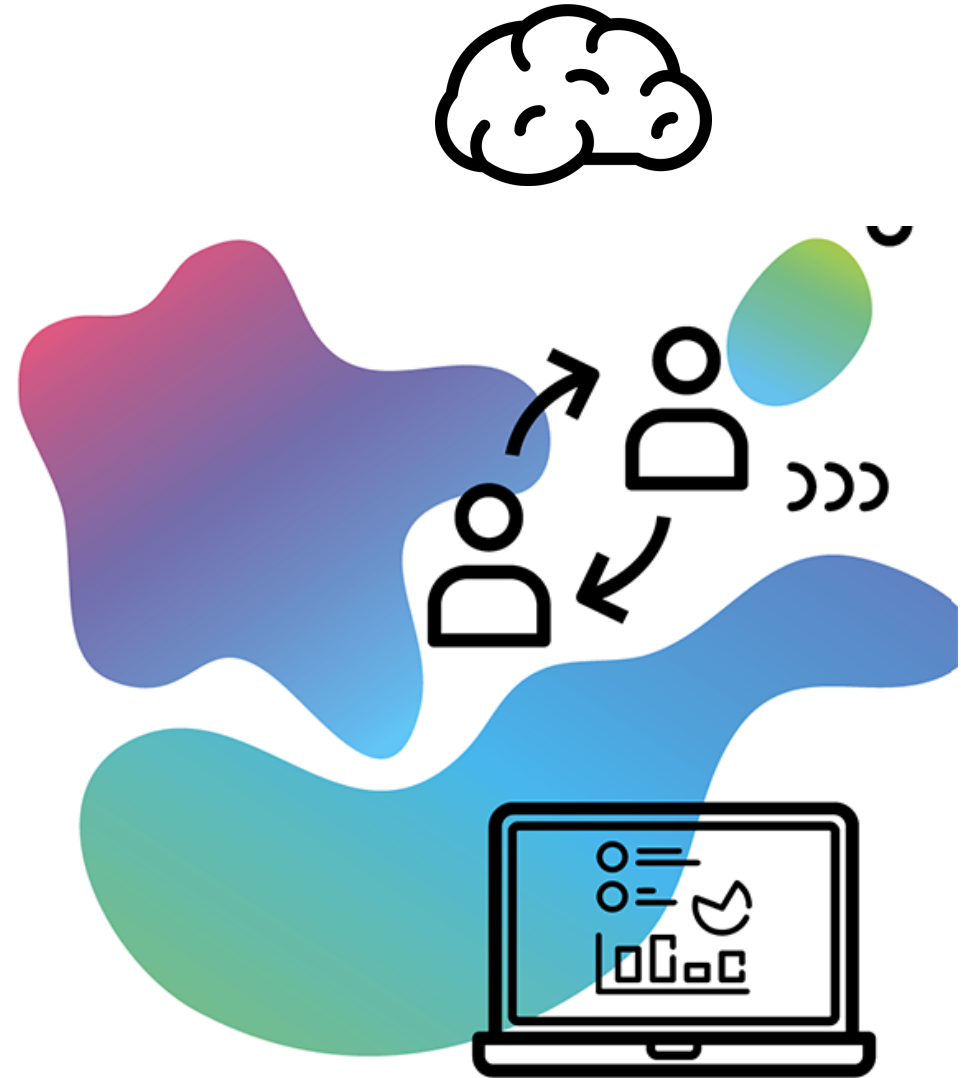
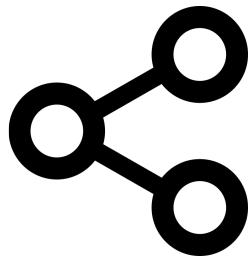
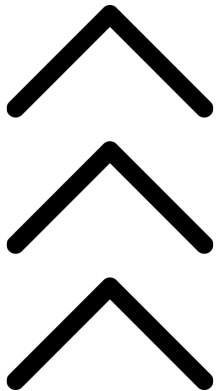
Tips for a successful app

- Design and prioritise content with app purpose in mind
- Dazzle the project statistician early on
- Embed developer(s) within study team
- Use {golem} and shiny modules for code organization
- Separate business logic code from app code
- Use consistent UI throughout the app
- Aim to be able to answer any question your team may ask, but not more!



Acknowledgments

- Scott Pain – Idorsia Biometry
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Thank you!

Questions?

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