Roche

Revolutionize Data Exploration with *Teal*

Pawel Rucki

August 29, 2023
@ useR China

Agenda

1. Introduction to teal framework
2. teal-verse product map
3. Example app demo
4. Additional resources

Product Development Data Sciences

Main task: reporting clinical trials

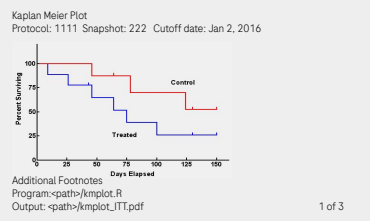
Summarising safety and efficacy data

Providing an accurate picture of trial outcomes

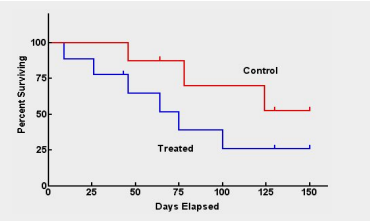
Managing data collection across international sites

Improve efficiency in the way we work

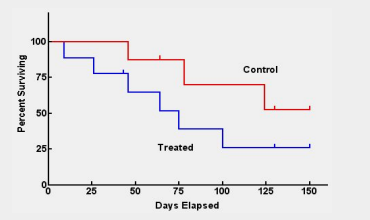
Analyzing clinical trial data requires multiple ways of presenting and interacting with our data



Per-SAP static output
on **OS**



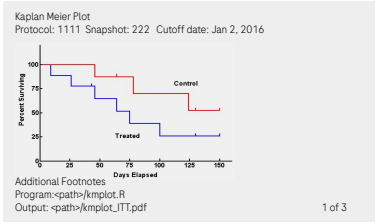
Ad-hoc analysis
on **PFS**

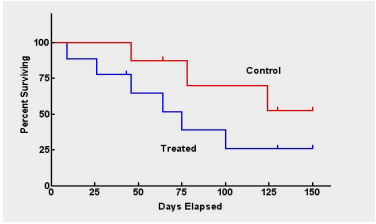


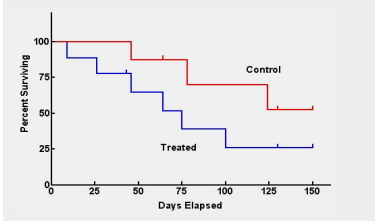
Ad-hoc analysis on **PFS**
in **subpopulation**

Improve efficiency in the way we work

Analyzing clinical trial data requires multiple ways of presenting and interacting with our data



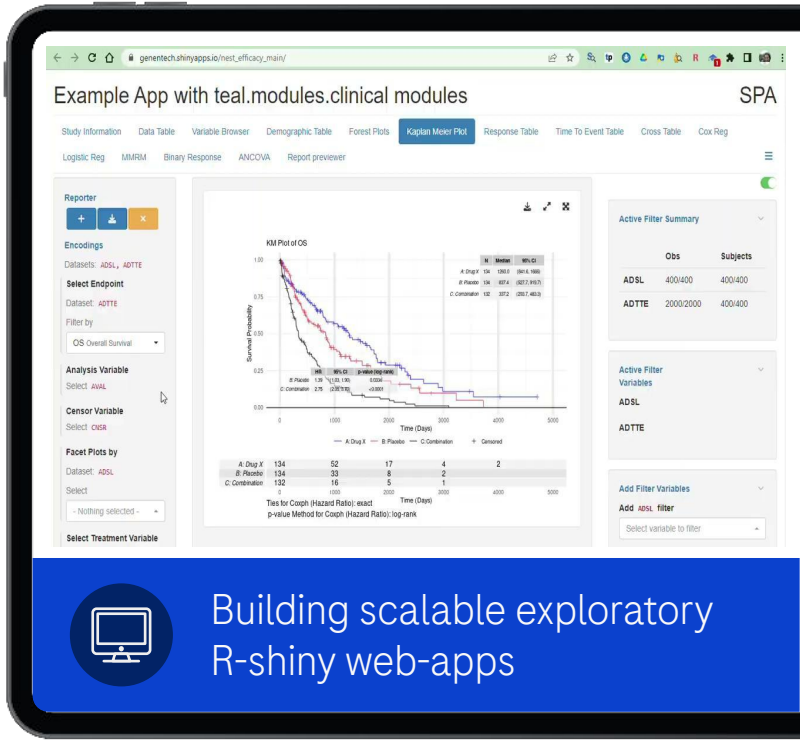




Per-SAP static output on **OS**

Ad-hoc analysis on **PFS**

Ad-hoc analysis on **PFS** in **subpopulation**



What is {teal}?

A Rshiny-based interactive data exploration framework

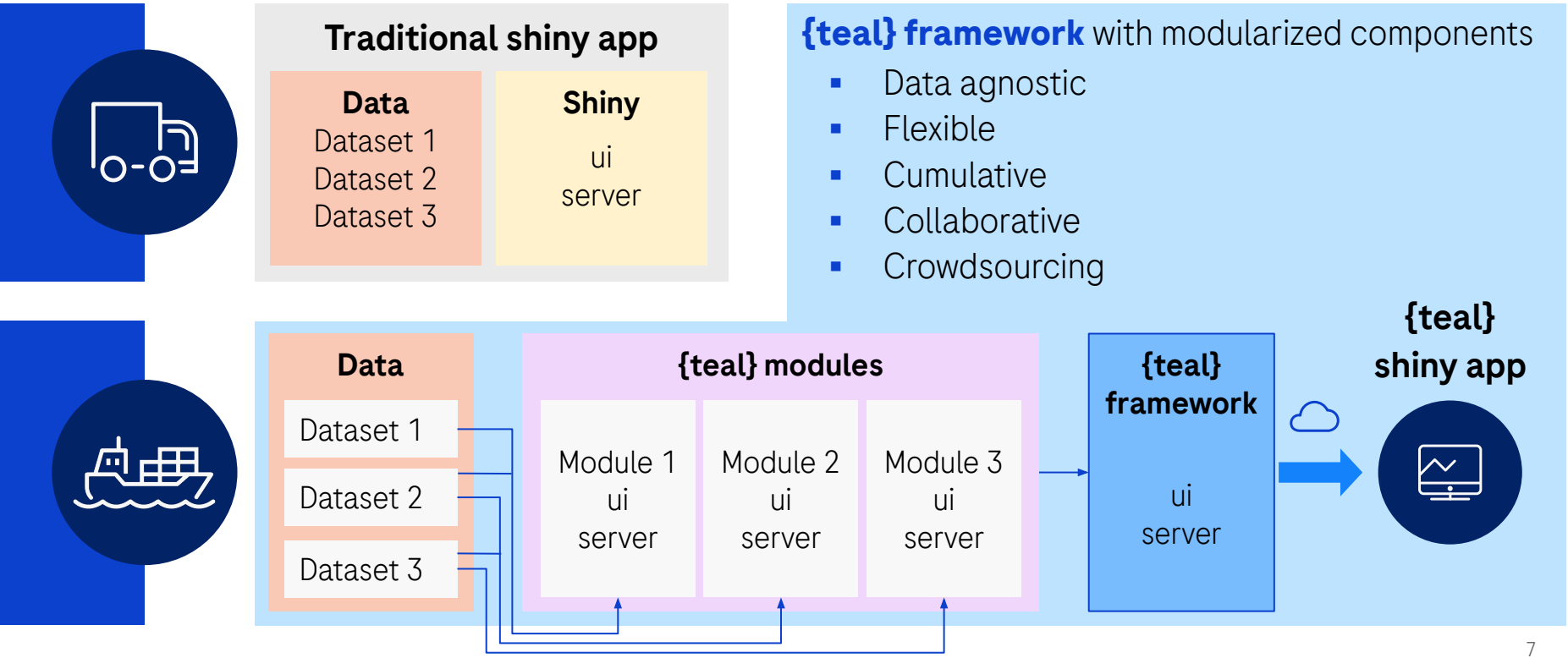
Modularized and standardized building blocks

Collection of specialized R packages

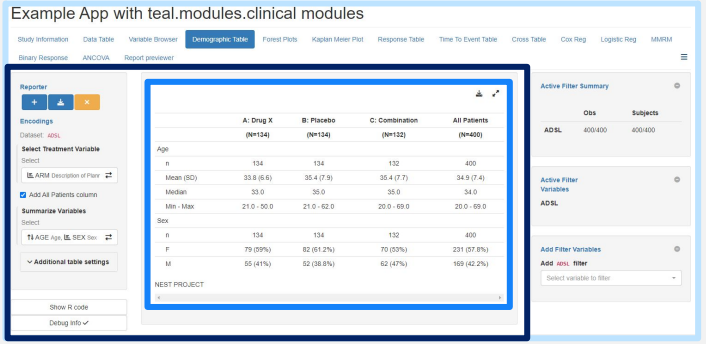
Streamlines creation of web-apps that offers:

- Dynamic filtering facility
- Code reproducibility
- Reporting engine
- Many data summarization and visualizations

How does {teal} work?



{teal} Universe Products Map



Teal framework

teal

teal.gallery
teal.reporter
teal.widgets
teal.slice
teal.data
teal.transform
teal.logger
teal.code

Teal modules

teal.modules.general
teal.modules.clinical
teal.osprey
teal.goshawk
teal.modules.hermes

Calculations

tern
osprey
goshawk
hermes

Teal Framework R Packages

- teal: shiny-based interactive exploration framework for analyzing data.
- teal.gallery: gallery of sample teal apps.
- teal.widgets: shiny components used within teal.
- teal.reporter: allows teal applications to generate reports.
- teal.slice: provides a filtering panel to allow subset of data.
- teal.data: creating and loading the data needed for teal applications.
- teal.code: handles reproducibility of outputs.
- teal.transform: standardizes extracting and merging data
- teal.logger: standardizes logging within teal framework.

Teal Modules R Packages

- teal.modules.general: general analysis modules for exploring any data types
- teal.modules.clinical: modules for analyzing CDISC data and clinical trial reporting with tern R package
- teal.osprey: modules for analyzing and reporting early-phase clinical trial data with osprey R package
- teal.goshawk: modules for analyzing and visualizing biomarker data with goshawk R package
- teal.modules.hermes: modules for analyzing and visualizing RNAseq data with hermes R package

Application of {teal} in clinical trial

Clinical trial reporting

- QCing of clinical trial reporting outputs
- Trial monitoring
- Ad-hoc & exploratory analyses
- Content generation to support internal strategic decision meetings
- Complement study milestone events
- Pooled data analysis

Outside of trial reporting setting

- Explorating high-dimensional biomarker
- Explorating real-world data off-label use
- Data quality monitoring
- Operations analytics

Demo Apps via {teal} Gallery

https://insightsengineering.github.io/teal.gallery/demo.html

Links on *shinyapps.io*	APP_NAME
Exploratory analysis on general data frames	"exploratory"
Safety analysis on clinical trial data	"safety"
Efficacy analysis on clinical trial data	"efficacy"

LIVE DEMO

{teal} Playground

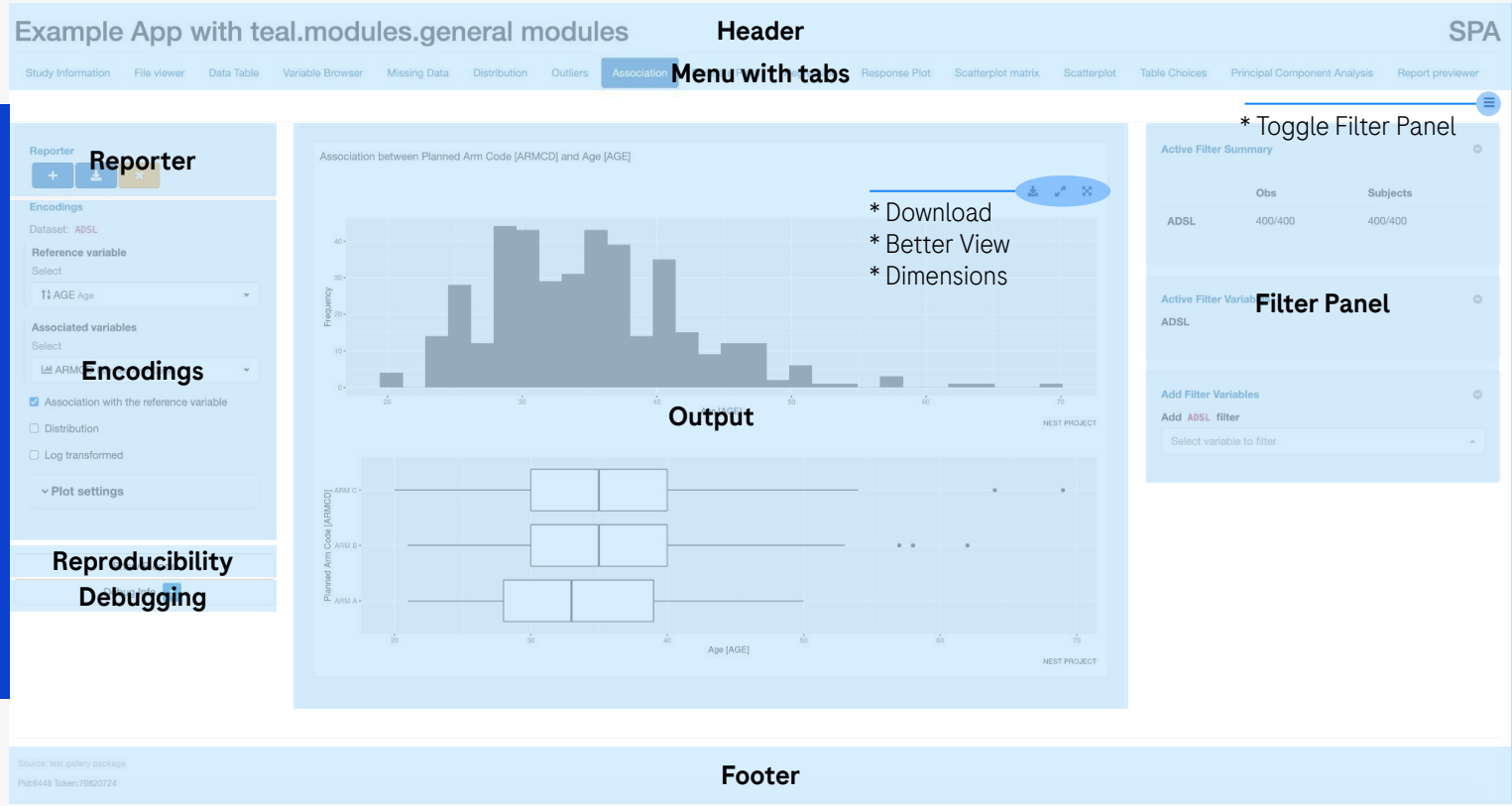
Posit Cloud Link:

- https://posit.cloud/spaces/340990/join?access_code=M52ibtFP2ASLLL1MItA-dThXpPzJvRqnxdNOqejA

Public Docker Image:

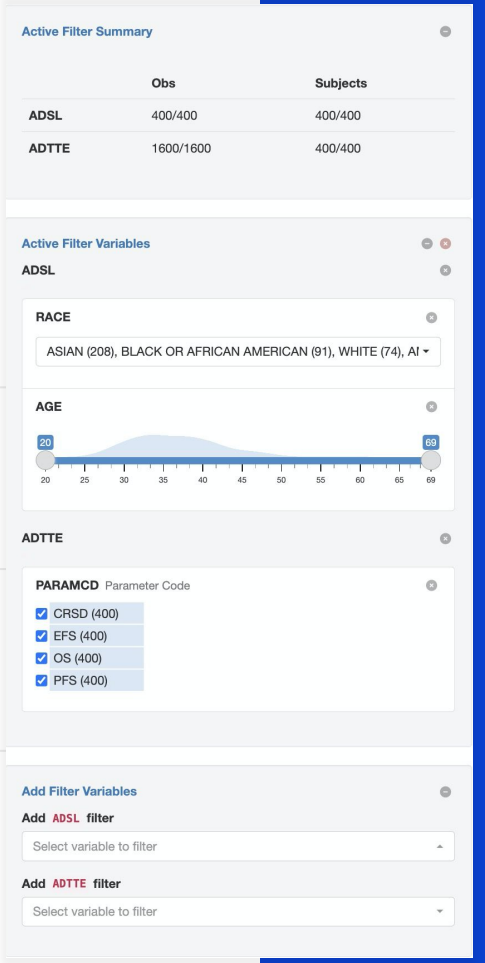
- https://github.com/insightsengineering/ci-images/pkgs/container/rstudio_4.3.1_bioc_3.17

Anatomy of a teal app



Key Features: Filter Panel

- Ability to subset your dataset
- Out of the box from teal framework
- Active filter summary
- Pre-defined filter state



Key Features: Show R Code

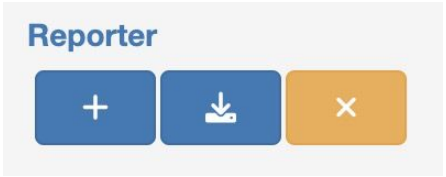
- Reproducible code when you see the desired output in analysis
- Include any filters added
- Include library ( ) calls

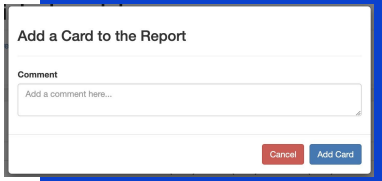
Key Features: teal Reporter

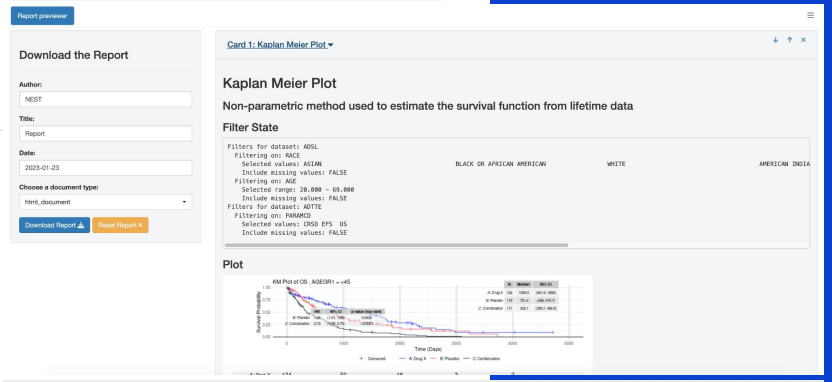
Create a report for your analysis

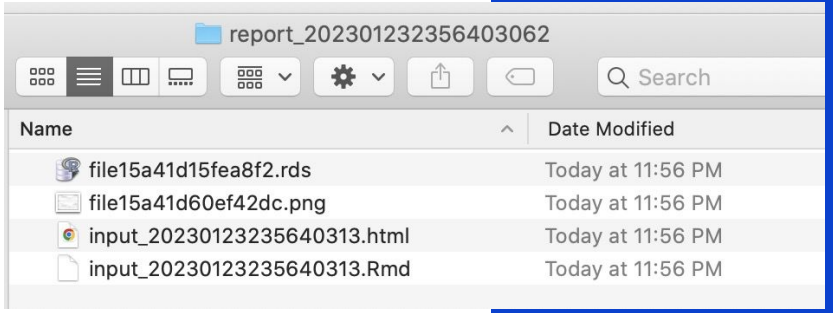
Zip file that contains:

- .Rmd
- .rds
- .png
- And the requested report type (html, pdf, or ppt)



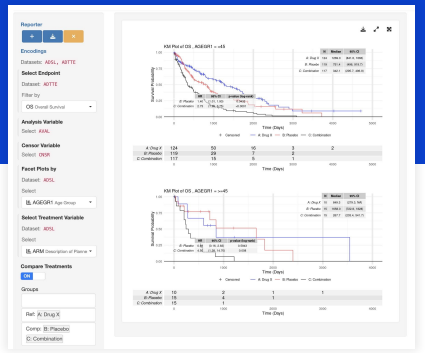


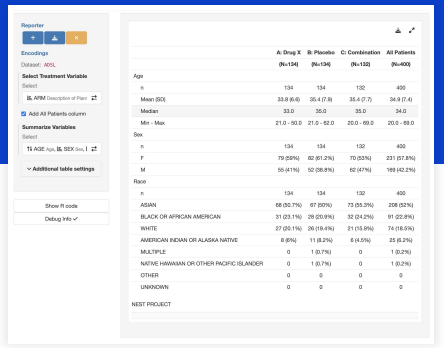




Key Features:
Curated sets of teal modules for targeted purposes

- Actively developed and maintained centrally by a dedicated team
- Purposefully designed, e.g. for clinical trials reporting or biomarker analysis
- 50+ common analysis modules available for use



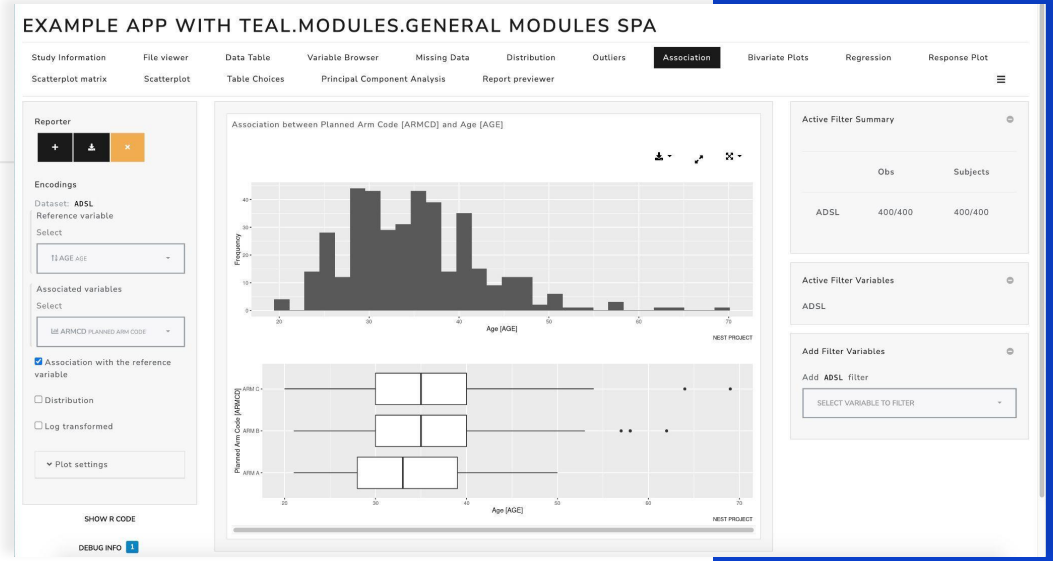


Key Features: teal bootstrap theme

Customize the look of your teal app, powered by bslib

Custom and real-live theming

- https://insightsengineering.github.io/teal/main/articles/teal-bs-themes.html



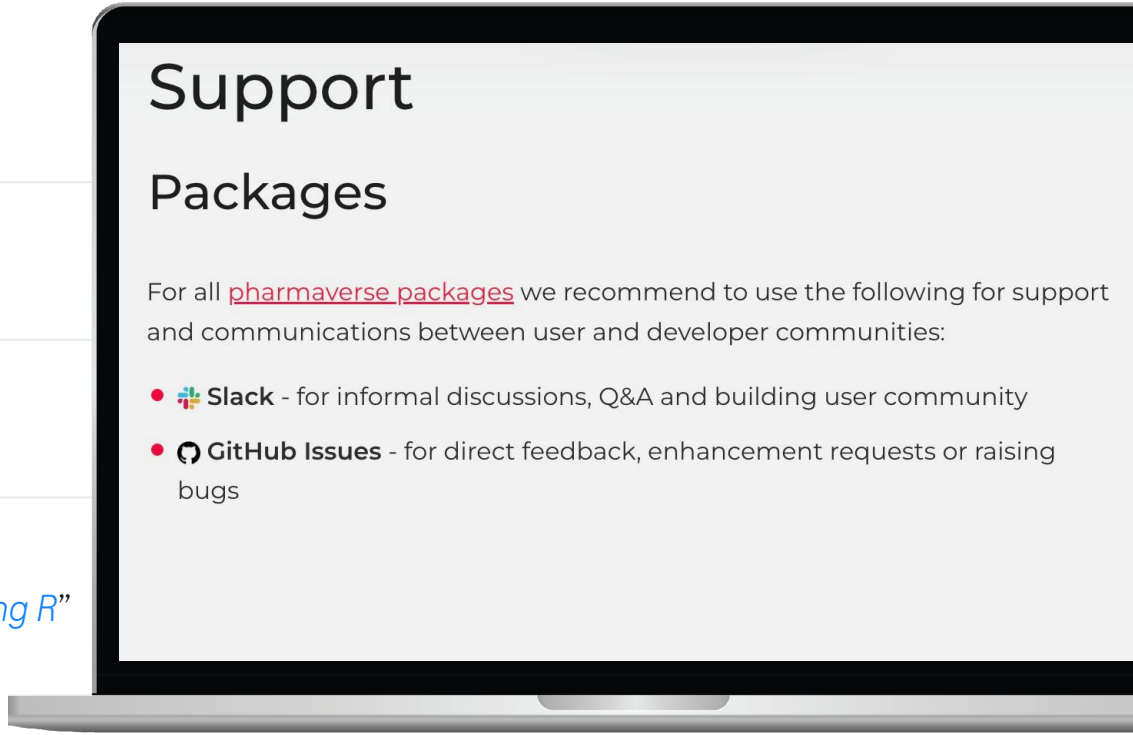
Additional Resources

{teal} is part of pharmaverse: https://pharmaverse.org/

More information about support: https://pharmaverse.org/support/

Slack channel *#teal* under pharmaverse workspace

Upcoming course on Coursera "*Hands On Clinical Reporting Using R*" in Q4 2023



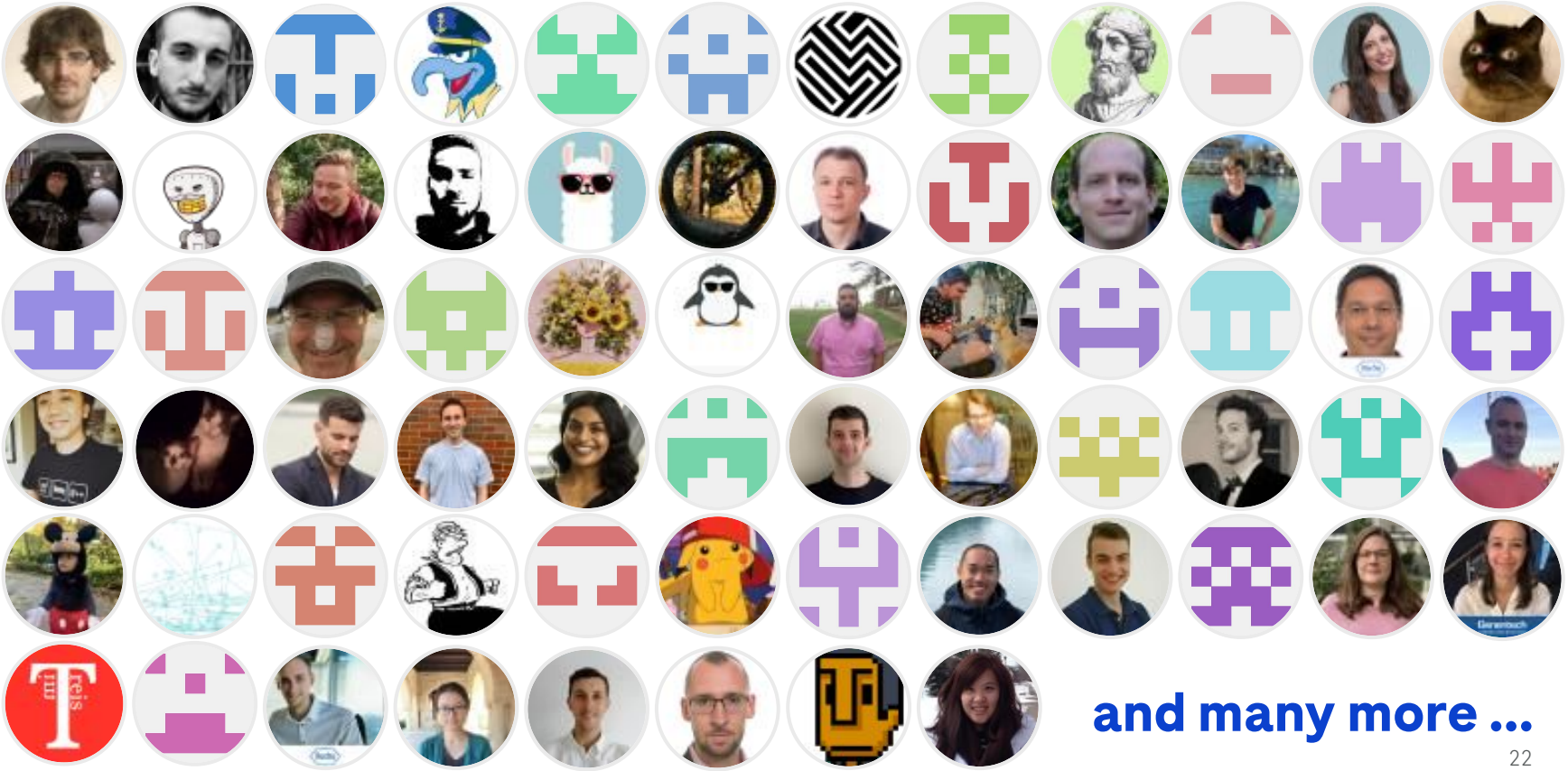
Collaborating on {teal}

We are looking for collaborators to develop this framework further!

If you're an individual, please contribute on GitHub and join us via pharmaverse Slack *#teal* channel

If you're an organization wanting to adopt {teal} and co-develop, please get in touch with our Product Owner chendi.liao@roche.com

Acknowledgement



and many more ...

Doing now what patients need next