Teal

An R-Shiny Framework to Unlock the Power of Interactive Data Exploration

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Agenda

1. Introduction to teal framework
2. Using teal as data scientist
3. Anatomy of teal and key features
4. Example app demo
5. Teal-verse product map

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

Shifting to an open-source Data Science platform

Talent out of university more likely to know R

Open source offered opportunities:

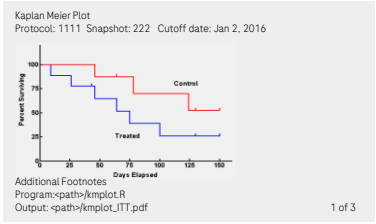
01 Get latest developments more rapidly

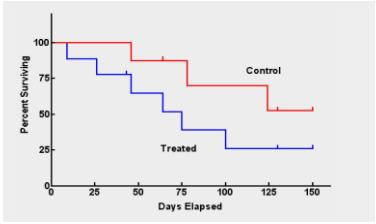
02 Be able to switch between languages and contexts more easily

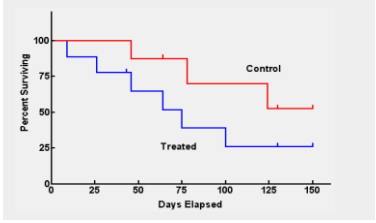
03 Collaboration with external partners

Improve efficiency in the way we work

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



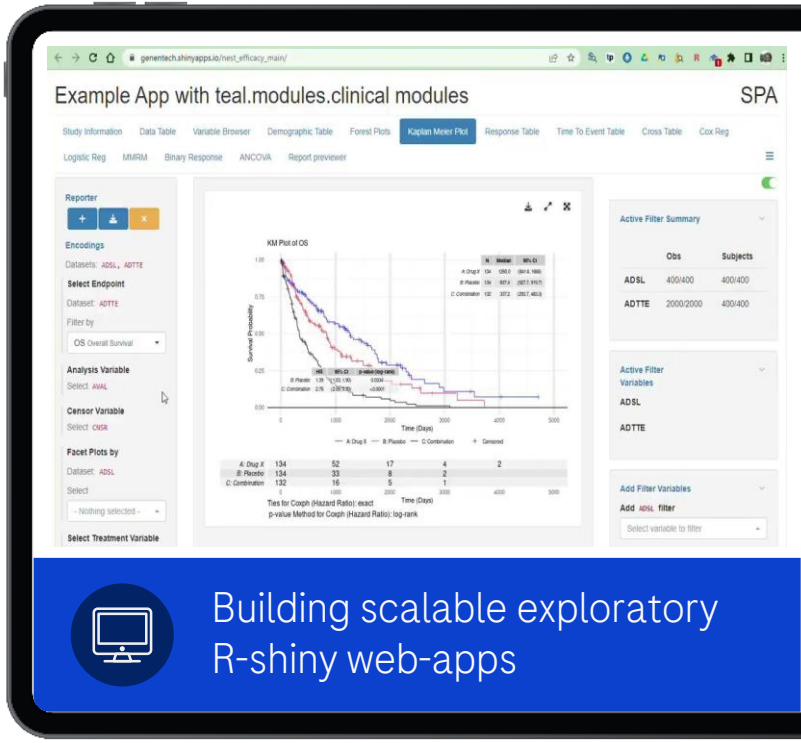




Per-SAP static output on **OS**

Ad-hoc analysis on **PFS**

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



SAP = Statistical analysis plan; OS = Overall survival; PFS = Progression-free survival

Building Scalable Exploratory Apps with {teal}

How to enable 600+ non-shiny developers to build exploratory apps for their clinical trials?

Build a **framework** centered around **reusable modules** that abstracts UI/server logic from the app developer

What is {teal}?

A Rshiny-based interactive data exploration framework

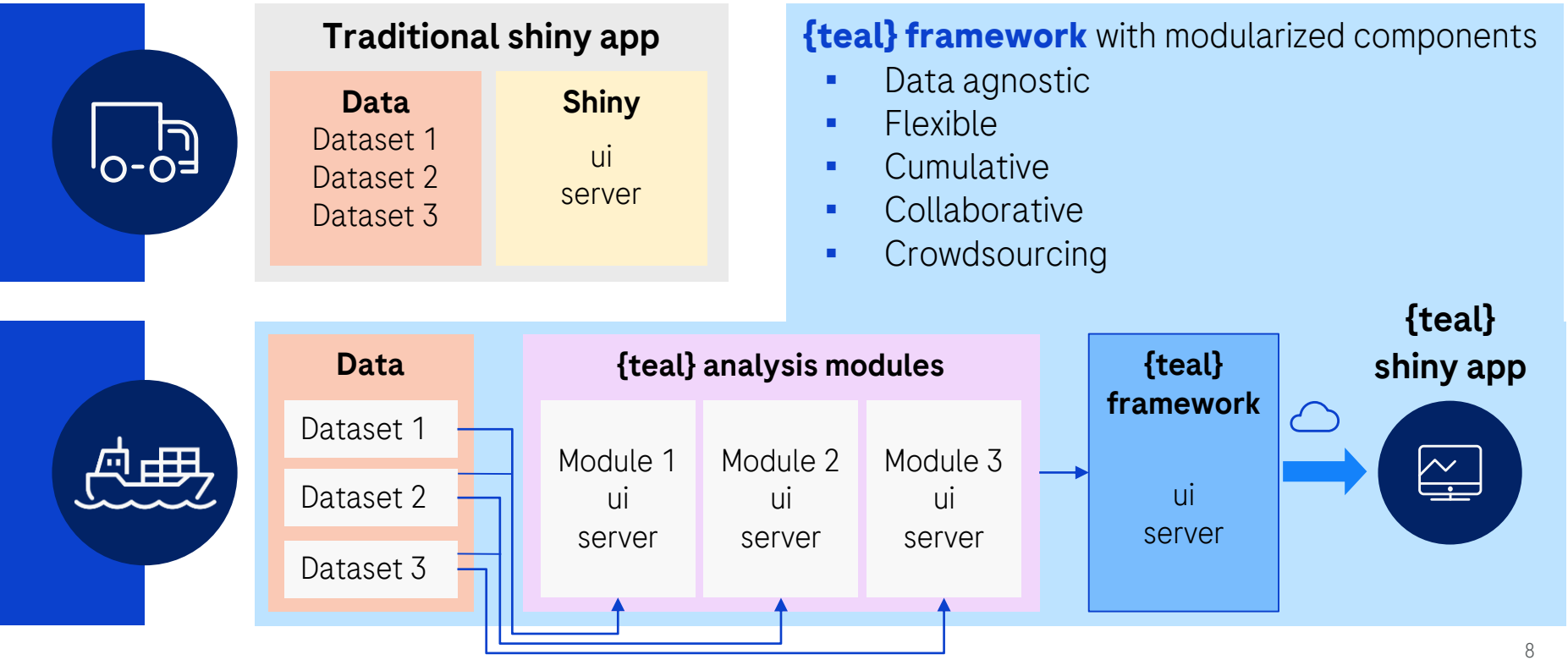
Modularized and standardized building blocks

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?



Application of {teal}

Clinical trial reporting

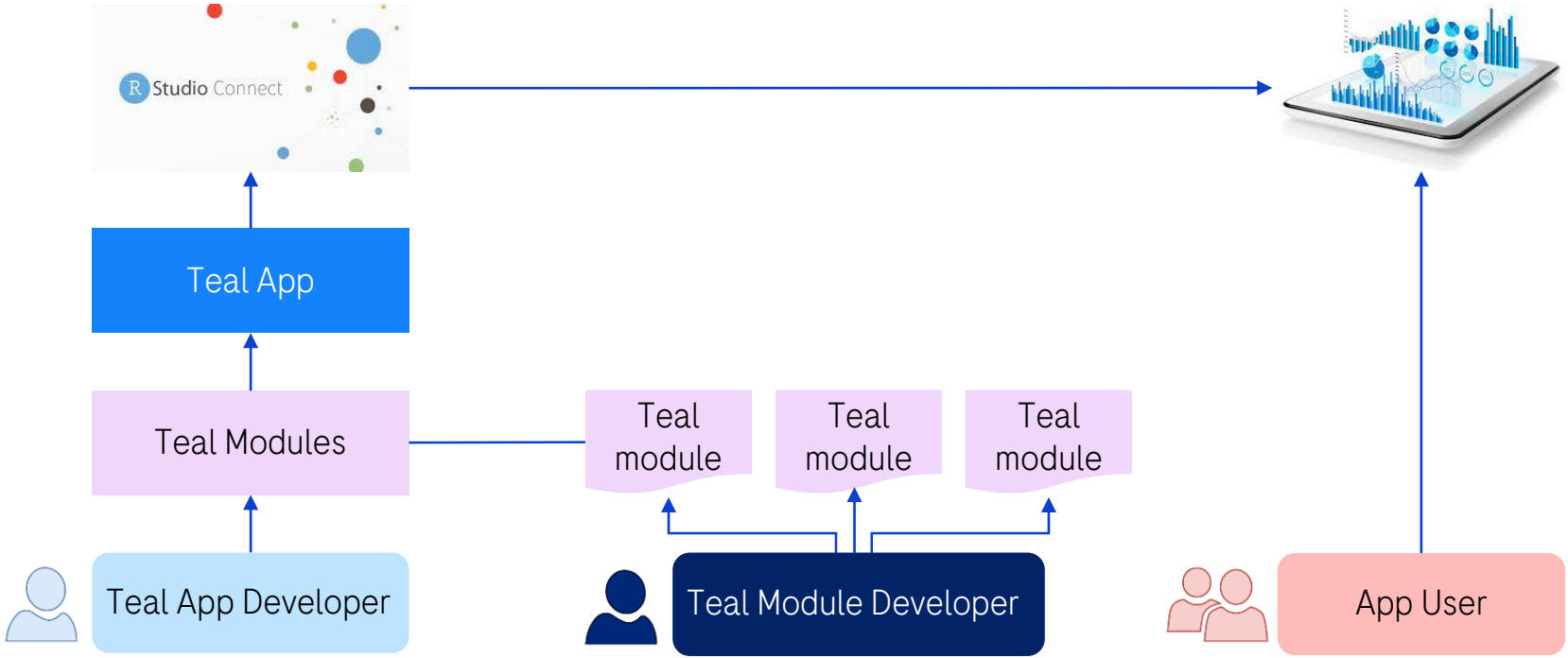
- QCing of clinical trial reporting outputs
- Trial monitoring
- Ad-hoc & exploratory analyses
- Content generation to support internal strategic decision meetings
- Complement study milestone events
- Pooled data analysis

Outside of trial reporting setting

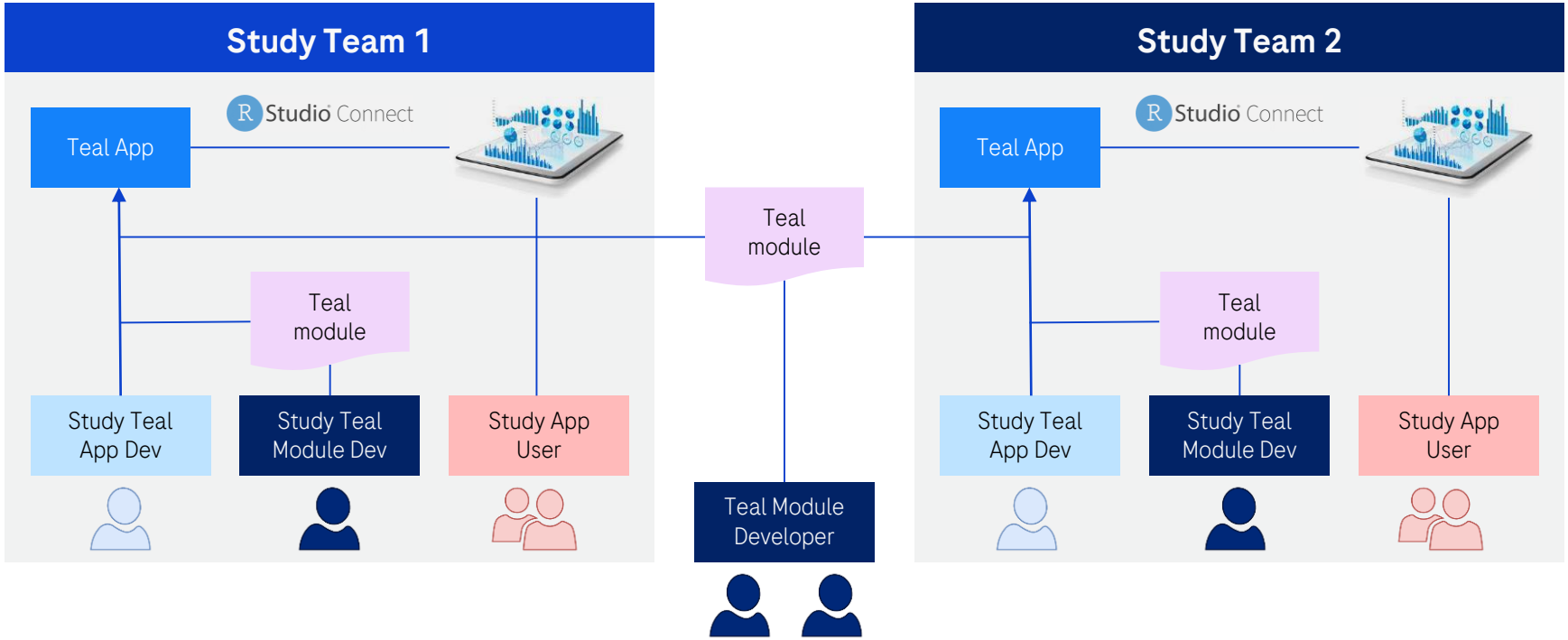
- Exploring high-dimensional biomarker
- Exploring real-world data off-label use
- Data quality monitoring
- Operations analytics

Using {teal} as a data scientist I

Using {teal} as a data scientist II



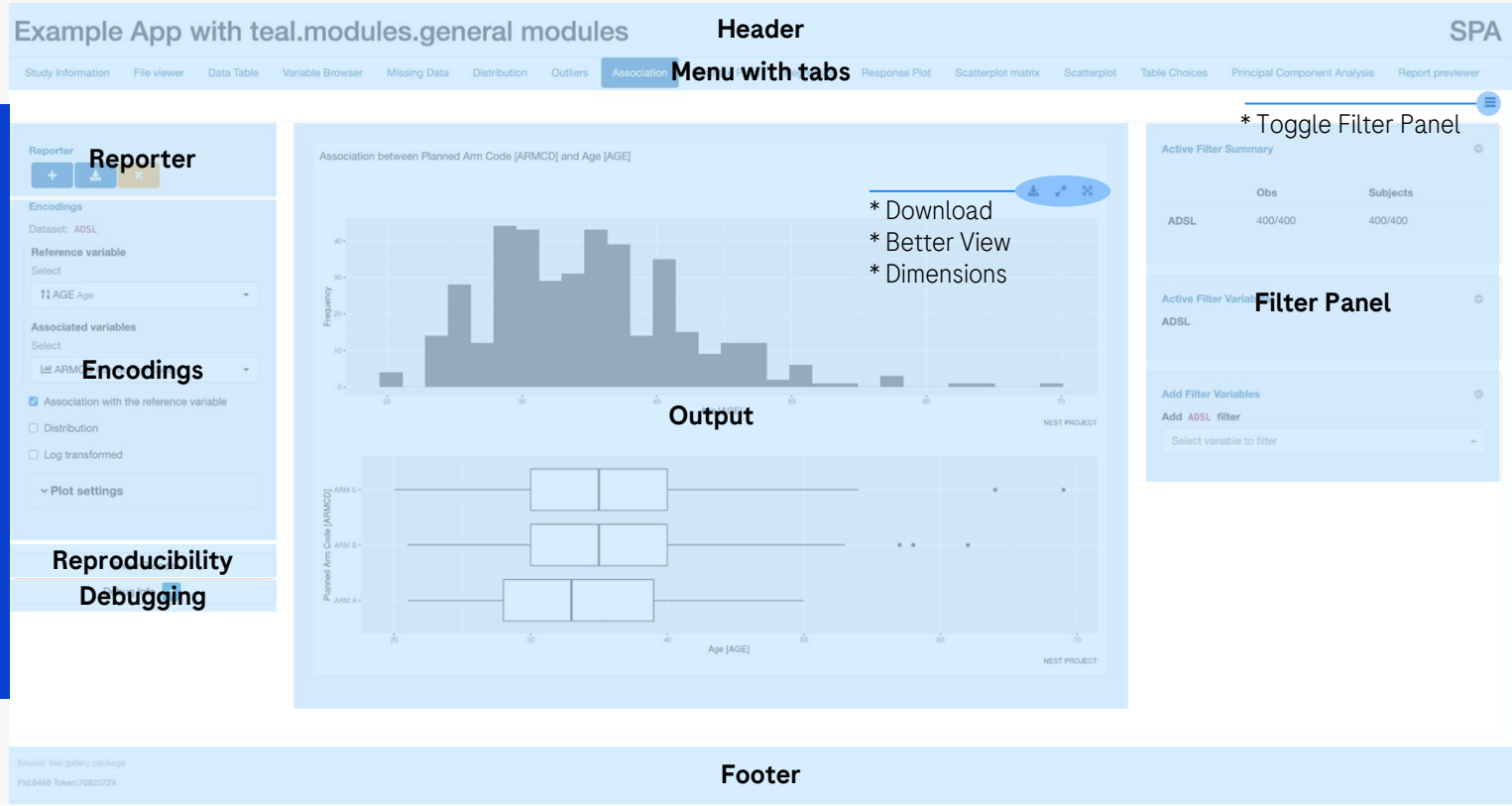
Using {teal} as a data scientist III



Installation

```
Sys.setenv(GITHUB_PAT = "your_access_token_here")
if (!require("remotes")) install.packages("remotes")
remotes::install_github("insightsengineering/teal@*release")
```

Anatomy of a teal app



LIVE DEMO

- Exploring teal features
- Creating a teal app

{teal} Playground

Posit Cloud Link:

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

Public Docker Image:

- https://github.com/insightsengineering/ci-images/pkgs/container/rstudio-local_4.2.2_bioc_3.16

Example apps

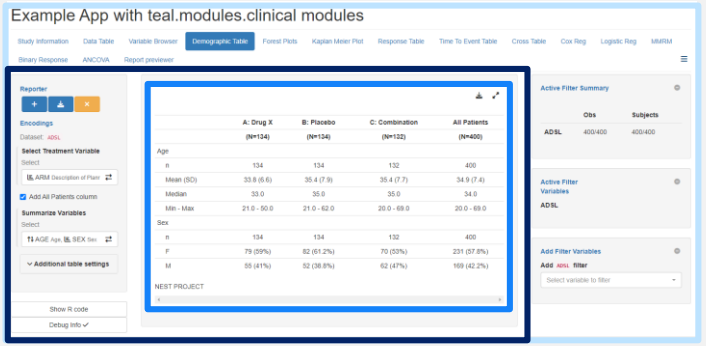
`library(teal.gallery)`

- `launch_app("efficacy")`
- `launch_app("exploratory")`
- `launch_app("safety")`

Public websites

- Efficacy analysis
- Exploratory analysis
- Safety analysis

{teal} Universe Products Map



Roche

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

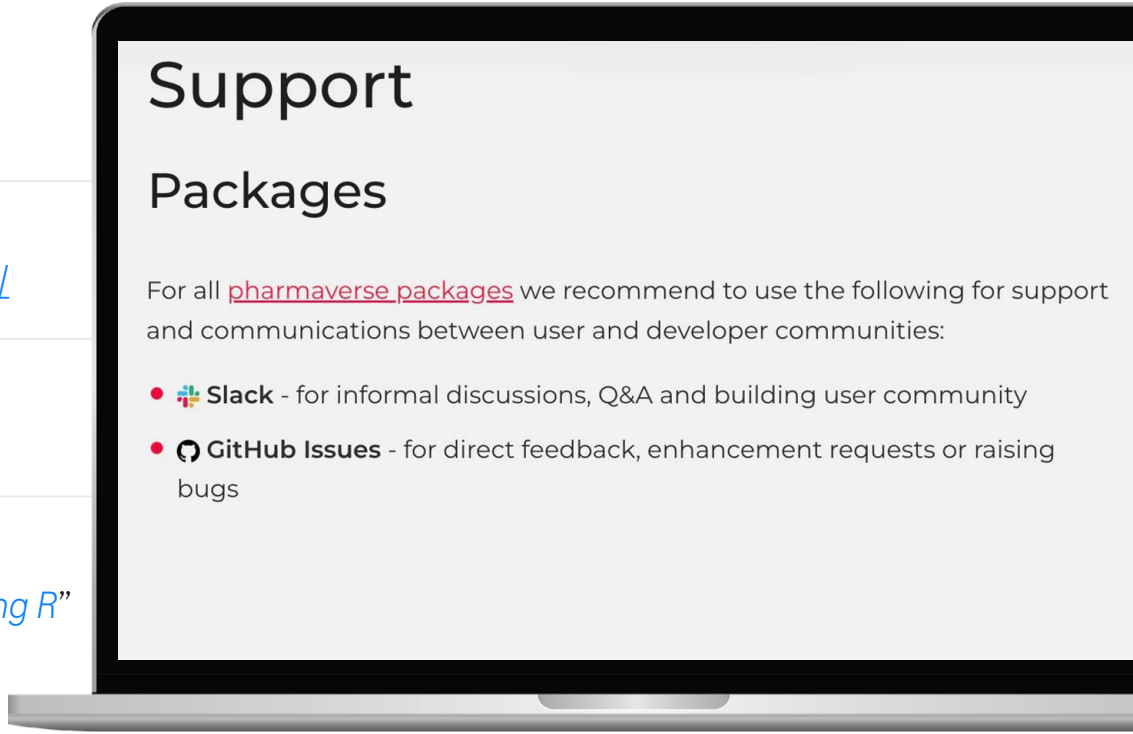
Additional Resources

{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 Q3 2023



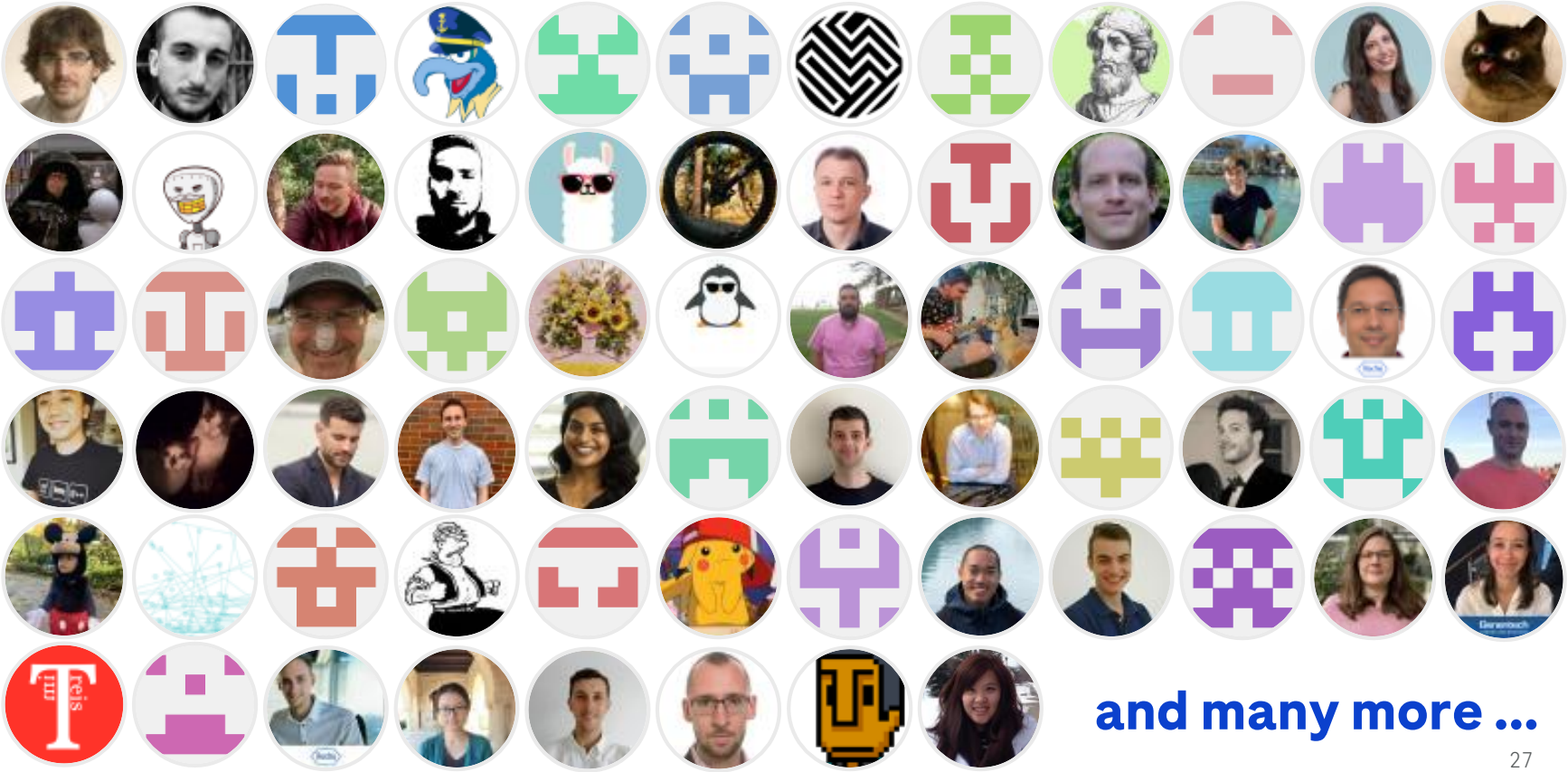
Collaborating on {teal}

We are looking for collaborators to develop this framework further!

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

If you're an organization wanting to adopt {teal} and co-develop it please get in touch with thomas.neitmann@roche.com

Acknowledgement



and many more ...

Doing now what patients need next