

An introduction for the NEST project

A collection of open-sourced R-package development at Roche

Joe Zhu, NEST SME engineering lead, on behalf of the NEST team

<https://www.github.com/insightsengineering/>



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 - a. History and structure of NEST packages
 - b. NEST package use case
2. NEST operation
 - a. Agile framework
 - b. Automation
 - i. Standard package creation
 - ii. Staged.dependencies
 - iii. CI/CD
3. How to install NEST packages

What is the NEST



tern



teal



osprey



dunlin



goshawk

What is the NEST

Roche



tern



teal



dunlin

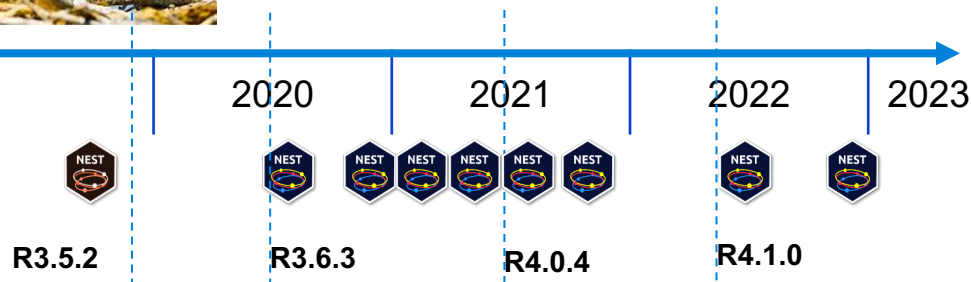


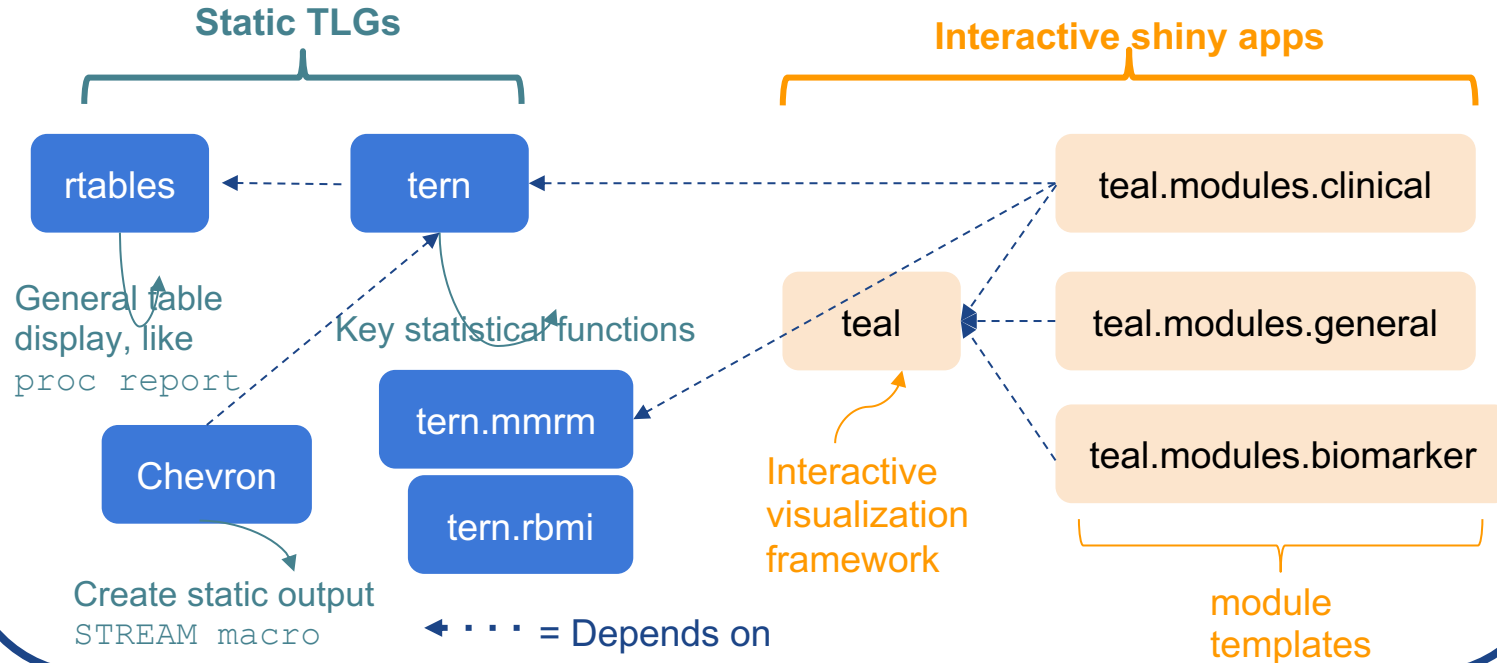
osprey



goshawk

NEST
cohort
releases





Supported by many back-end packages: `staged.dependencies`, `formatters`, `scda`, `scda.202*`, `teal.data`, `teal.logger`, `teal.reporter` ...

NEST product showcase

Interactive

1. [Safety app](#)
 - a. Demographic table (basic summary of the patient cohort)
 - b. Adverse event summary
2. [Efficacy app](#)
 - a. KM-plots
 - b. Time to event tables
3. [Patient profile app](#)
 - a. Patient medical history
 - b. Patient lab results
4. [RNA-seq app](#)
 - a. Volcano plot
 - b. Reporter cards

Example Safety App with teal.modules.clinical modules

SPA

Study Information

Data Table

Variable Browser

Demographic Table

Adverse Events

Lab Tables

Exposure

Vital Signs Abnormality

Concomitant Medication

ECG Shift Table by Arm

Line Plot

Report previewer

Info about data source

Random data are used that have been created with the 'scda' R package

NEST packages used

Packages
teal.modules.general
teal.modules.clinical
scda
scda.2022

Example App with teal.modules.clinical modules

SPA

- Study Information
- Data Table
- Variable Browser
- Demographic Table
- Forest Plots
- Kaplan Meier Plot
- Response Table
- Time To Event Table
- Cross Table
- Cox Reg
- Logistic Reg
- MMRM
- Binary Response
- ANCOVA
- Report previewer

Reporter

+

Download

×

Encodings

Datasets: ADSL, ADTTE

Select Endpoint

Dataset: ADTTE

Filter by

OS Overall Survival

Analysis Variable

Select AVAL

Censor Variable

Select CNSR

Facet Plots by

Dataset: ADSL

Select

AGEGR1 Age Group

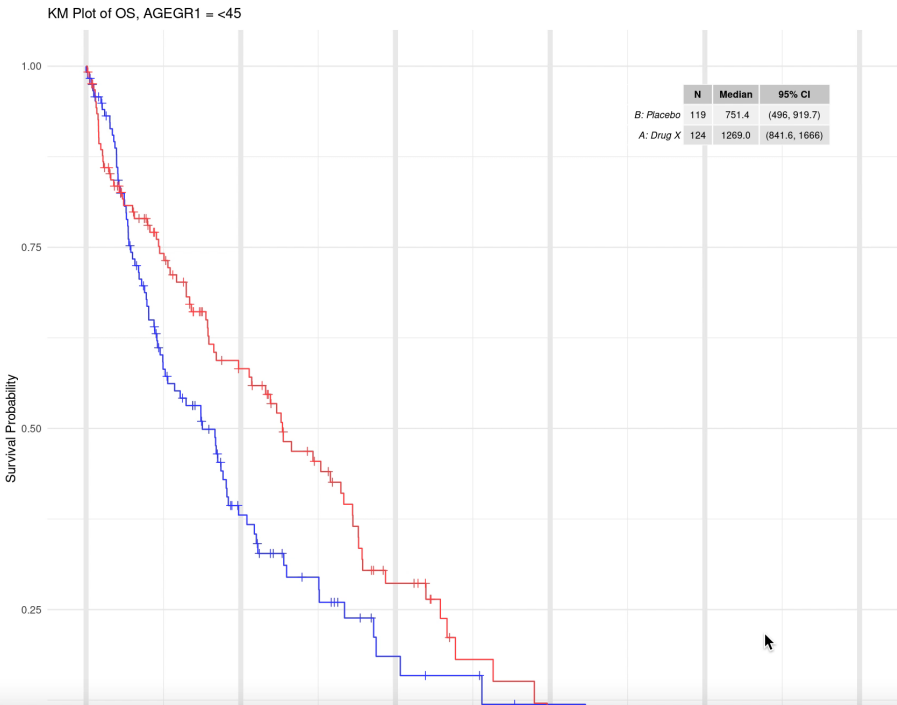
Select Treatment Variable

Dataset: ADSL

Select

ARM Description of Planned Arm

Compare Treatments



Active Filter Summary

	Obs	Subjects
ADSL	400/400	400/400
ADTTE	2000/2000	400/400

- Active Filter Variables
- ADSL
- ADTTE

Add Filter Variables

Add ADSL filter

Select variable to filter

Add ADTTE filter

Select variable to filter

Example Patient Profile App

SPA

- Study Information
- Basic info
- Medical history
- Prior medication
- Vitals
- Therapy
- Adverse events
- Lab values
- Patient timeline
- Report previewer
-

Info about data source

Random data are used that have been created with the 'scda' R package

NEST packages used

Packages
teal.modules.general
teal.modules.clinical
scda
scda.2022

SPA

Report previewer

Analysis of MAE: MAE

hd2 

Top Genes Plot

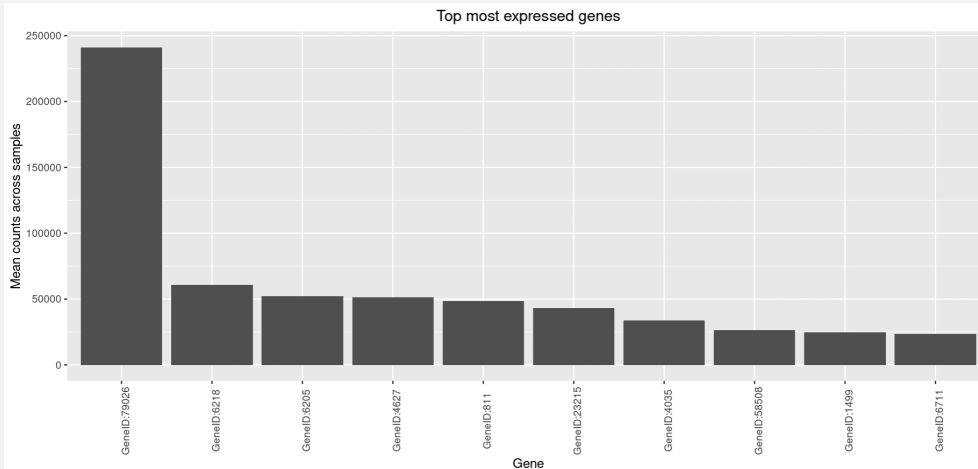
counts ▼

ON

17 201,525

17 22,407 44,797 89,576 134,356 179,135

- Nothing selected -



	Obs	Subjects
MAE		18/18
- hd1	5/5	5/5
- hd2	9/9	9/9
- hd3	6/6	4/4

MAE

► Add subjects filter

► Add **hd1** filter

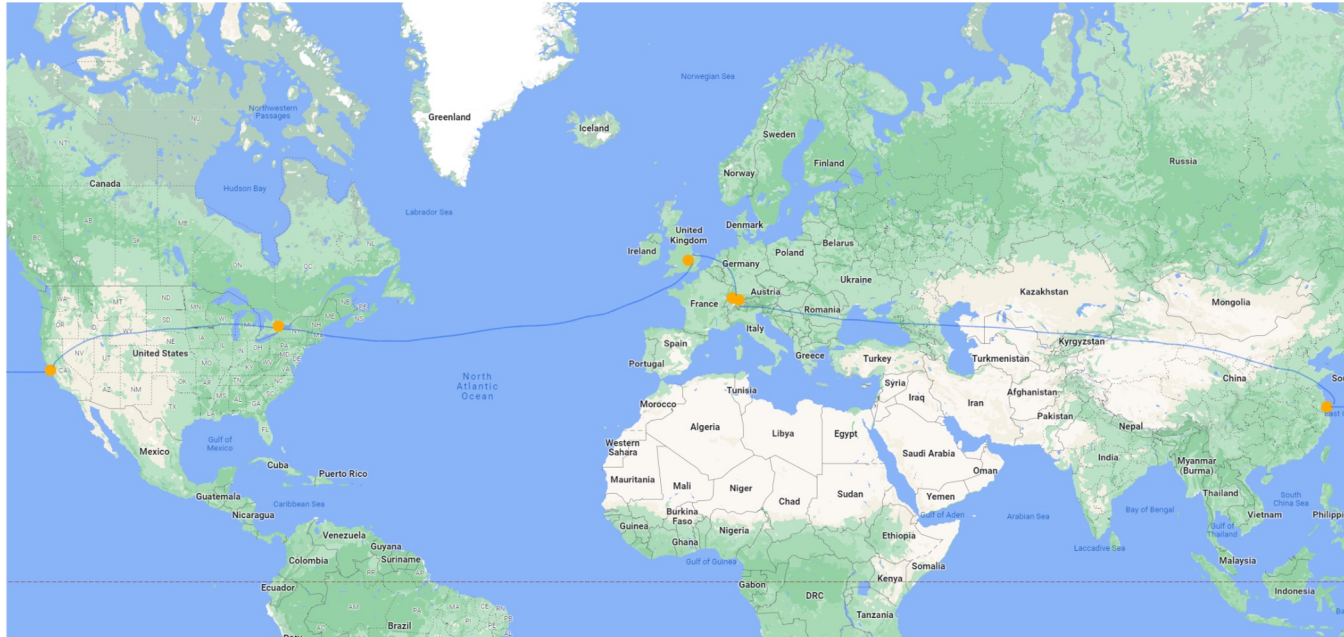
► Add **hd2** filter

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 - iii. CICD
3. How to install NEST packages

Agile, scalable operating model

Team structure



Git repo:
<https://www.github.com/insightsengineering/>

Development cycles:
 4 sprints
 (3 development + 1 UAT,
 2 weeks per sprint)

Release less often

SME team operation (new team since 2022 Jan)

NESTDevs

Current Sprint | Backlog | Backlog per Sprint | ChangeLog | ADD SP!!! | ADD SME_SP!!! | add sprint!! | Add team label! | View 22 | DUOpenIssue | DUWorkload | + New view

sprint:@current label:sme 80 x

Todo 2

- random.cdsc.data #203
ADAB refactoring random cdsc dataset
sme
- random.cdsc.data #204
Add LD05EDTM to adae
sme

In Progress 7

- sme-tasks #62
New TLGC Entry: Listing of Individual Efficacy Data (ONCL01)
sme
- sme-tasks #369
Test PKCL02 with Real data
sme
- sme-tasks #423
Update tm_t_ancova to add interaction mode in teal module
sme
- sme-tasks #297
[Onboarding] Steven Dang (pat 2)
sme
- teal.modules.clinical #11
(tm_a_mmm) Name of the column could be improved
core low-priority sme
- teal.modules.clinical #589

PRs 1

- sme-tasks #454
TLG-C - PR for Add LBL02A, LBL02A_RLS, LBL02B
sme tig

PRs reviewed 1

- sme-tasks #451
TLG-C PR for ael02, ael02_ed, ael03
sme

In Review 8

- sme-tasks #60
New TLGC Entry: Listing of Laboratory Abnormalities (constant units) (LBL02A), (LBL02A_RLS) & (LBL02B)
sme
- sme-tasks #96
tlg-c devel · TLG-C design ADAL01
hypercare pk sme
- sme-tasks #97
tlg-c devel · TLG-C design ADAL02
hypercare pk sme
- teal.modules.clinical #588
Adding "stratified by" to subtitle
sme #594
- sme-tasks #52
New TLGC Entry: Listing of Adverse Events (AEL02), (AEL02_ED) & (AEL03)
sme
- teal.modules.clinical #594

Done 61

- tern #701
698 Remove deprecated tern functions
sme 1 reviewer
- sme-tasks #53
New TLGC Entry: Listing of Patient Deaths (AEL04)
sme
- random.cdsc.data #200
Add ADTHAUT to adsl
sme 1 reviewer
- random.cdsc.data #199
Add ADTHAUT to adsl
sme #200
- tern #703
Solution for data and library loading in testthat
automation core discussion priority
refactor sme #704
- teal.modules.clinical #563

SME team operation (new team since 2022 Jan)

For example, <https://github.com/insightsengineering/tern/issues/384>



shajoezhu commented on 1 Mar • edited by yli110-stat697



Motivation

`rtables` implements a new string formatter where the decimals always show to the precision `s`. For example for the number `4` the label `xx.x` in previous `rtables` was formatted in to `"4"` and `"4.0"`. This breaks a lot unit tests that need to be fixed to use to the new formatting rule.

ToDo

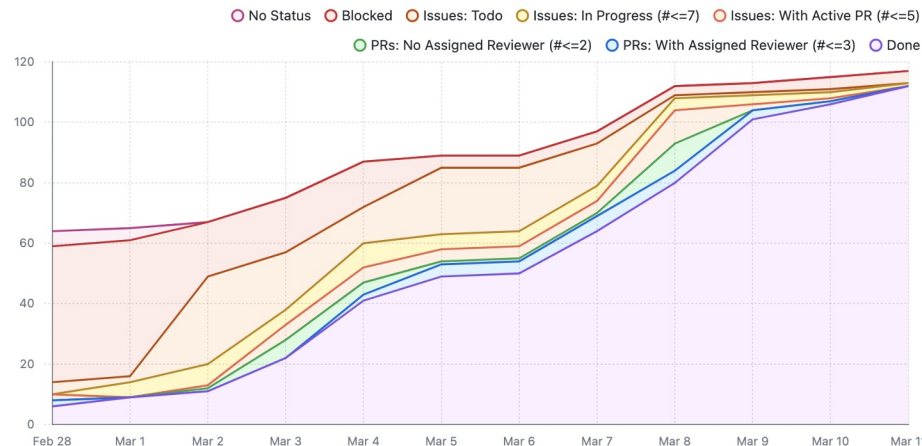
- ☒ remove `skip_if_fail_rtables_refactor` in `tests/testthat/test-table_mmrmt01.R`
- ☐ Update the strings for the `expected_matrix` object in `test-table_mmrmt01.R`

Definition of done

- test `LS` means table is produced correctly works
- test `Fixed effects` table is produced correctly works
- test `Covariance matrix` table is produced correctly works
- test `Model diagnostics` table is produced correctly works
- function call `skip_if_fail_rtables_refactor()` has been removed

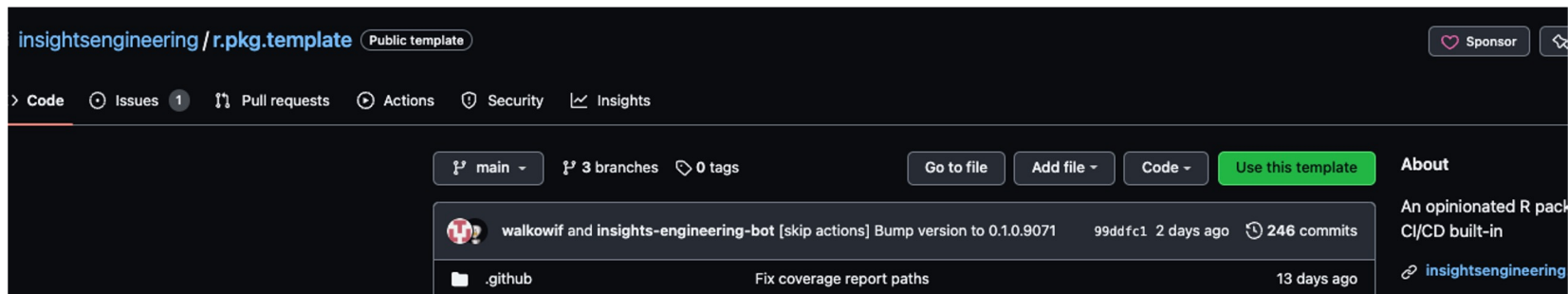
2W 1M 3M Max

Feb 28 - Mar 11



Automation in NEST

1. Standardized package creation process <https://github.com/insightsengineering/r.pkg.template>

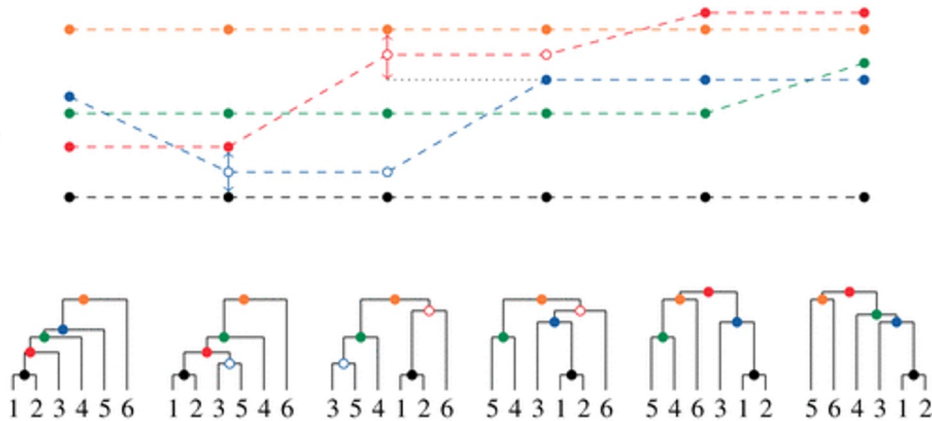
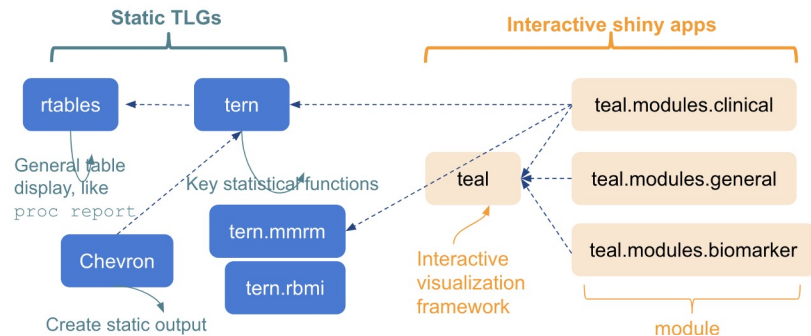


1. Staged.dependencies

1. CICD

Staged.dependencies

- Roche package
- <https://github.com/openpharma/staged.dependencies>

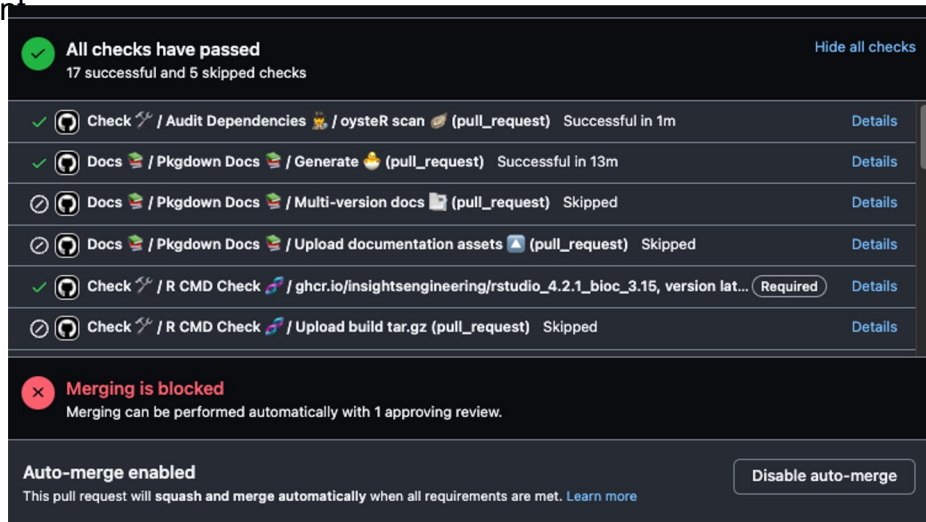


- Let x-axis be the time,
- Let 1-6, each node represent a repo, they can have their own development history (version controlled)
- The shared code-base structure can captured by the trees at different time points.



CICD application in NEST

1. What is CICD?
 - a. continuous integration and continuous delivery/deployment
2. Why CICD?
 - a. Developers can focus on the actual programming part
 - b. Smooth team collaboration
 - c. Early detection of breaking changes
3. How we apply CICD in NEST package development
 - a. Check spells – with auto correction
 - b. Check coding styles
 - c. Automatic version bump



All checks have passed [Hide all checks](#)
17 successful and 5 skipped checks

✓	Check / Audit Dependencies / oysteR scan (pull_request)	Successful in 1m	Details
✓	Docs / Pkgdown Docs / Generate (pull_request)	Successful in 13m	Details
⌛	Docs / Pkgdown Docs / Multi-version docs (pull_request)	Skipped	Details
⌛	Docs / Pkgdown Docs / Upload documentation assets (pull_request)	Skipped	Details
✓	Check / R CMD Check / ghcr.io/insightsengineering/rstudio_4.2.1_bloc_3.15, version lat...	Required	Details
⌛	Check / R CMD Check / Upload build tar.gz (pull_request)	Skipped	Details

✗ Merging is blocked
Merging can be performed automatically with 1 approving review.

Auto-merge enabled
This pull request will squash and merge automatically when all requirements are met. [Learn more](#)

[Disable auto-merge](#)

How to install NEST packages

Go to <https://github.com/insightengineering/depository>

The following releases are available in this repository:

- 2022_06_09
- 2022_10_13

Set the repository options in R to point to a specific release in this repository:

```
# Assuming you want to use the 2022_10_13 release
release_date <- "2022_10_13"
options(
  repos = c(
    insightengineering = paste0(
      "https://insightengineering.github.io/depository/",
      release_date
    ),
    CRAN = "https://cloud.r-project.org/"
  )
)
```

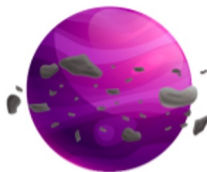
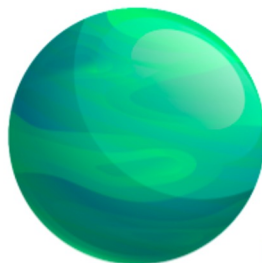


```
install.packages("teal.modules.clinical")
```

Summary

1. NEST packages support static and interactive output generation for regulatory and exploratory studies at Roche.
2. The teal shiny app framework can be extended to other data science work beyond clinical research.
3. NEST project automation is enabled by Github CICD, internal package staged.dependencies and git repo templates.
4. NEST project is now open-source!

Summary



NEST project developing next generation tools for data scientists in PDD and beyond to facilitate analytical insights generation and quicker filling



Adrian Waddell, Daniel Sabanés Bové, Dinakar Kulkarni, Heng Wang, Jaime Pires, Jana Stoilova, Joe Zhu, Juha-Pekka Perttola, Nick Paszty, Nina Qi, Oluwole Adedipe, Pawel Rucki, Tadeusz Lewandowski, Vincent Shen, Xiaoying Yang



Doing now what patients need next