



Making Health Economic Models Shiny: Our experience helping companies transition from Excel to R & shiny

R Consortium 2025 | 18th November 2025



rsmith@darkpeakanalytics.com



<https://github.com/dark-peak-analytics>



<https://www.linkedin.com/company/dark-peak-analytics>

Introduction



Dr Robert Smith

Director, Dark Peak Analytics

PhD Public Health Economics & Decision Science
UKHSA during pandemic (2020 - 2022)
Director of R-4-HTA consortium



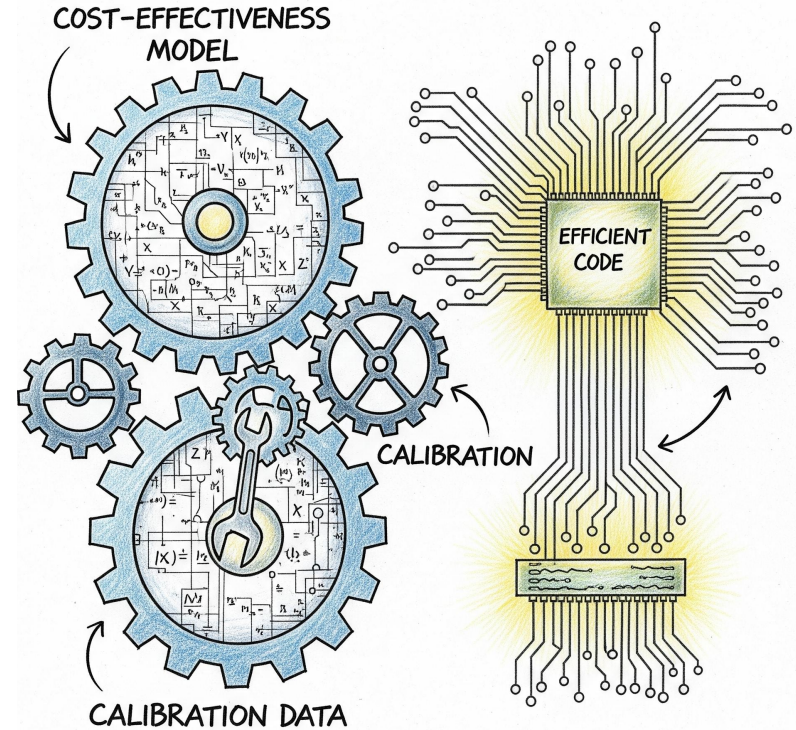
Introduction



Dr Wael Mohammed

Principal Health Economist, Dark Peak Analytics

PhD Public Health Economics & Decision Science
University of Sheffield (2025)
University of Newcastle (2019)

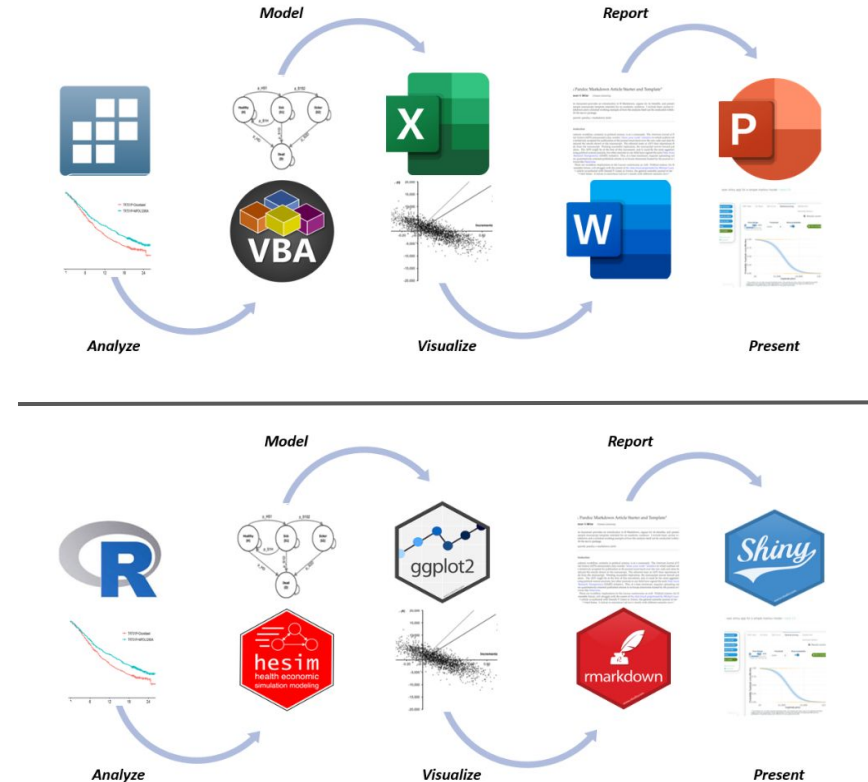


Background



Overarching aim

Shift the health economic modelling pipeline from spreadsheet software (e.g. MS Excel) to script based programming languages (e.g. R).



Spreadsheets vs R (python / others)



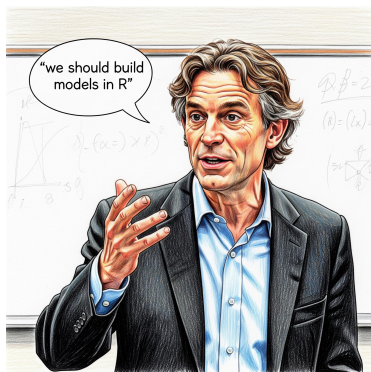
			Comments
1 Capabilities	●●	●●●●●	R is more flexible
2 Engagement & Visualisation	●●●●	●●●●●	... looks better
3 Computational Speed	●	●●●●●	... faster
4 Development & Iteration speed	●●	●●●●●	... easier to scale
5 Transparency	●●	●●●●●	... more transparent
6 Familiarity Barriers to entry	●●●●●	●	But coding in R is hard

An entirely personal, and very biased set of estimates!



History

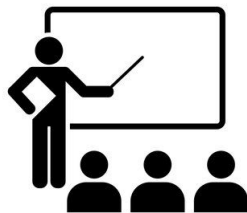




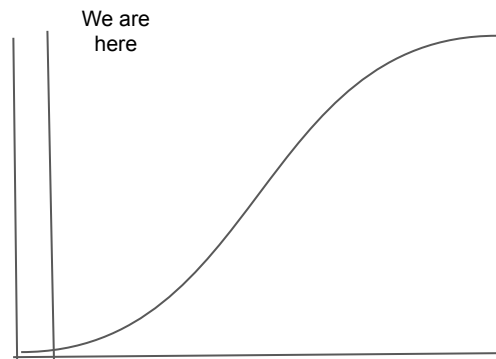
pre-2020



Publications



Training



Adoption

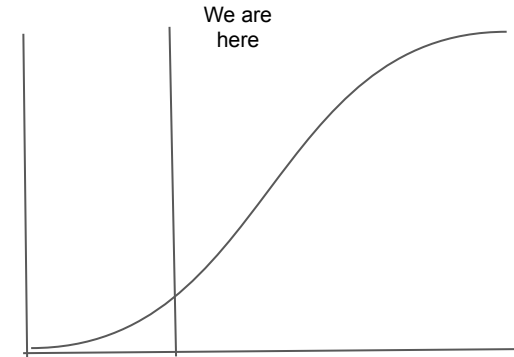
2020-2023



Publications



Training

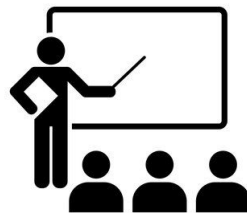


Adoption

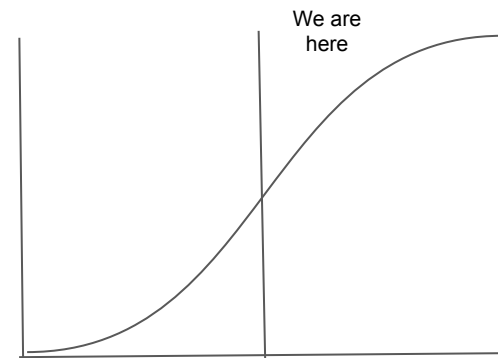
2024-2025



Publications

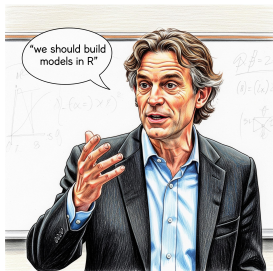
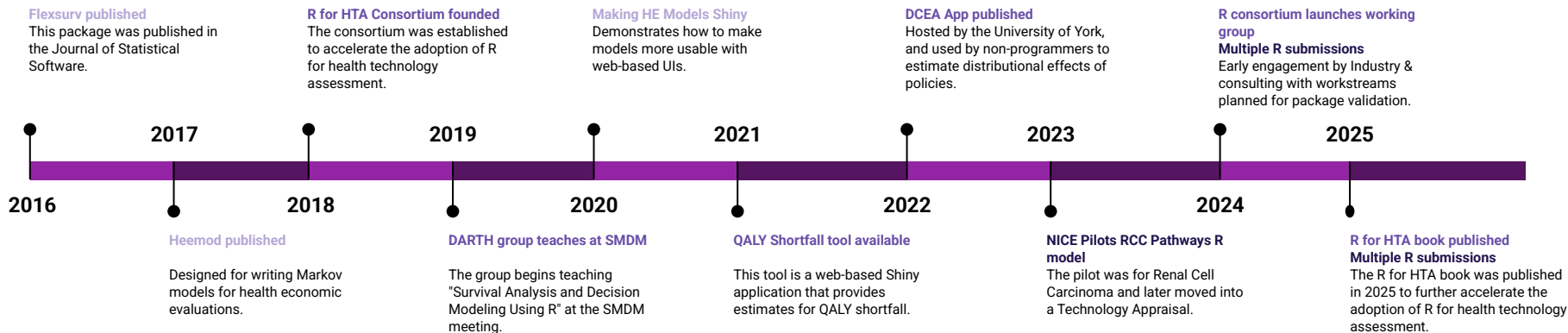


Training

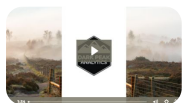


Adoption

Timeline



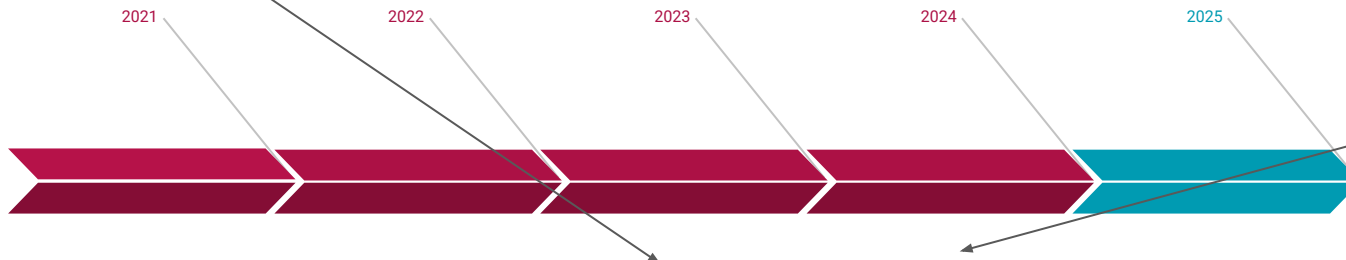
Now an unpopular course



Timeline - our small role.



Now on CRAN



Making Health Economic Models Shiny: A tutorial

Smith & Schneider. Making health economic models Shiny: A tutorial. *Wellcome Open Res* 2020, **5**:69 (<https://doi.org/10.12688/wellcomeopenres.15807.2>)

Living HTA: Automating Health Economic Evaluation with R

Smith, Schneider and Mohammed. Living HTA: Automating Health Economic Evaluation with R. *Wellcome Open Res* 2022, **7**:194 (<https://doi.org/10.12688/wellcomeopenres.17933.2>)

R Packages for health economic evaluation: A tutorial

Smith RA, Mohammed W and Schneider PP. R Packages for health economic evaluation: A tutorial. 2023. (<https://wellcomeopenresearch.org/articles/8-419>)

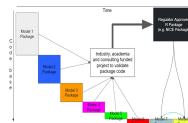
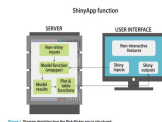
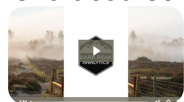
assertHE: an R package to improve quality assurance of health economic models

Smith, Samyshkin, Mohammed et al. assertHE: an R package to improve quality assurance of health economic models. 2024. (<https://wellcomeopenresearch.org/articles/9-701>)

Automating Health Economic Evaluation with R (+genAI)

Smith, Lamrock, Dolin, Lewis, McQueen. R we almost there? Applying the advantages of modern software tools to the ICER Severe Asthma Model. In progress

Now a popular short course



Bibby
Open Source on
GitHub



Tutorial Papers



Early Publications



Our Tutorial Papers (and related courses)

Wellcome Open Research Wellcome Open Research 2020, 5:69 Last updated: 05 JUL 2022

METHOD ARTICLE

REVIEW Making health economic models Shiny: A tutorial [version 2; peer review: 2 approved]

Robert A. Smith¹, Paul Schneider²

¹School of Health and Related Research, University of Sheffield, Regent Court, Sheffield, S1 4DA, UK

²Equal contributors

V2 First published: 14 Apr 2020, 5:69
https://doi.org/10.12688/wellcomeopenres.15807.1
Latest published: 31 Jul 2020, 5:69
https://doi.org/10.12688/wellcomeopenres.15807.2

Open Peer Review

Approval Status **✓✓**

	1	2
version 2 (revision)	✓	✓
version 1	?	✓

1. Tatjana L. Feenstra, University of Groningen, Groningen, The Netherlands

2. Yvonne M. University of Glasgow, Glasgow, UK

Any reports and responses or comments on the article can be found at the end of the article.

Abstract
Health economic evaluation models have traditionally been built in Microsoft Excel, but more sophisticated tools are increasingly being used as model complexity and computational requirements increase. Of all the programming languages, R is most popular amongst health economists because it has a plethora of user created packages and is highly flexible. However, even with an integrated development environment such as R Studio, it lacks a simple point and click user interface and therefore requires some programming ability. This might make the switch from Microsoft Excel to R seem daunting, and it might make it difficult to directly communicate results with decisions makers and other stakeholders.

The R package Shiny has the potential to resolve this limitation. It allows programmers to embed health economic models developed in R into interactive web browser based user interfaces. Users can specify their own assumptions about model parameters and run different scenario analyses, which, in the case of regular Markov model, can be computed within seconds. This paper provides a tutorial on how to wrap a health economic model built in Shiny application. We use a four state Markov model based Decision Analysis in Health Technologies in Health (DARTH) case study to demonstrate main principles and basic functions.

A more extensive tutorial, all code, and data are provided repository.

Keywords
Health Economics, R, RShiny, Decision Science

Making Health Economic Models Shiny

Course

This course teaches delegates to create interactive web applications for health economic models. Based on peer reviewed literature, it shows how...

Wellcome Open Research Wellcome Open Research 2022, 7:194 Last updated: 24 OCT 2022

METHOD ARTICLE

REVIEW Living HTA: Automating Health Economic Evaluation with R [version 2; peer review: 2 approved]

Robert A. Smith^{1,3}, Paul P. Schneider^{1,3}, Wael Mohammed^{1,3}

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³Dark Peak Analytics, Sheffield, S11 7BA, UK

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https://doi.org/10.12688/wellcomeopenres.17933.1
Latest published: 11 Oct 2022, 7:194
https://doi.org/10.12688/wellcomeopenres.17933.2

Open Peer Review

Approval Status **✓✓**

	1	2
version 2 (revision)	✓	✓
version 1	?	✓

1. Mohsen Sadeghifard, University of British Columbia, Vancouver, Canada

2. Devin Incerti, Entylis Inc., Princeton, USA

Any reports and responses or comments on the article can be found at the end of the article.

Abstract
Background: Requiring access to sensitive data can be a significant obstacle for the development of health models in the Health Economics & Outcomes Research (HEOR) setting. We demonstrate how health economic evaluation can be conducted with minimal transfer of data between parties, while automating reporting as new information becomes available.

Methods: We developed an automated analysis and reporting pipeline for health economic modelling and made the source code openly available on a GitHub repository. The pipeline consists of three parts: An economic model is constructed by the consultant using pseudo data. On the data-owner side, an application programming interface (API) is hosted on a server. This API hosts all sensitive data, so that data does not have to be provided to the consultant. An automated workflow is created, which calls the API, retrieves results, and generates a report.

Results: The application of modern data science tools and practices allows analyses of data without the need for direct access to the need to send sensitive data. In addition, the entire process is largely automated: the analysis can be scheduled at time points (e.g. monthly, or when triggered by an event) or update to the underlying data or model code; results generated automatically and then be reported into a Documents no longer need to be revised manually.

Conclusions: This example demonstrates that it is possible to HEOR setting, to separate the health economic model and automate the main steps of the analysis pipeline.

Keywords
HEOR, HTA, APIs, R, plumber

Automating Health Economic Evaluation with R

Course

This course covers the skills necessary to create automated health economic evaluation reports which always reflect the...

Wellcome Open Research Wellcome Open Research 2023, 8:419 Last updated: 24 OCT 2023

METHOD ARTICLE

REVIEW Packaging cost-effectiveness models in R: A tutorial. [version 1; peer review: 2 approved with reservations]

Robert Smith^{1,2}, Wael Mohammed^{1,2}, Paul Schneider^{1,2}

¹SchARR, The University of Sheffield, Sheffield, England, S1 4DA, UK

²Dark Peak Analytics, Sheffield, UK

V1 First published: 21 Sep 2023, 8:419
https://doi.org/10.12688/wellcomeopenres.19556.1
Latest published: 21 Sep 2023, 8:419
https://doi.org/10.12688/wellcomeopenres.19556.1

Open Peer Review

Approval Status **?**

	1	2
version 1	?	?

1. Isaac Corro Ramos, Erasmus University Rotterdam, Rotterdam, The Netherlands

2. Joe Moss, York Health Economics Consortium, York, UK

Any reports and responses or comments on the article can be found at the end of the article.

Abstract
Background: The use of programming languages such as R in health economics and decision science is increasing, and brings numerous benefits including increasing model development efficiency, improving transparency, and reducing human error. However, there is limited guidance on how to best develop models using R. So far, no clear consensus has emerged.

Methods: We present the advantages of creating health economic models as R packages - structured collections of functions, data sets, tests, and documentation. Assuming an intermediate understanding of R, we provide a tutorial to demonstrate how to construct a basic R package for health economic evaluation. All source code used in or referenced by this paper is available under an open-source licence.

Case Study: We use the Sick Sicker Model as a case study applying the steps from the tutorial to standardise model development, documentation and aid review. This can improve the distribution of code, thereby streamlining model development, and improving methods in health economic evaluation.

Conclusion: R packages offer a valuable framework for the quality and transparency of health economic evaluation. Embracing better, more standardised software development practices, while fostering a collaborative culture, has the significant impact of improving the quality of health economic model ultimately, support better decision making in healthcare.

Keywords
HTA, R, Open-source, Health Economics

Packaging Cost-effectiveness Models in R

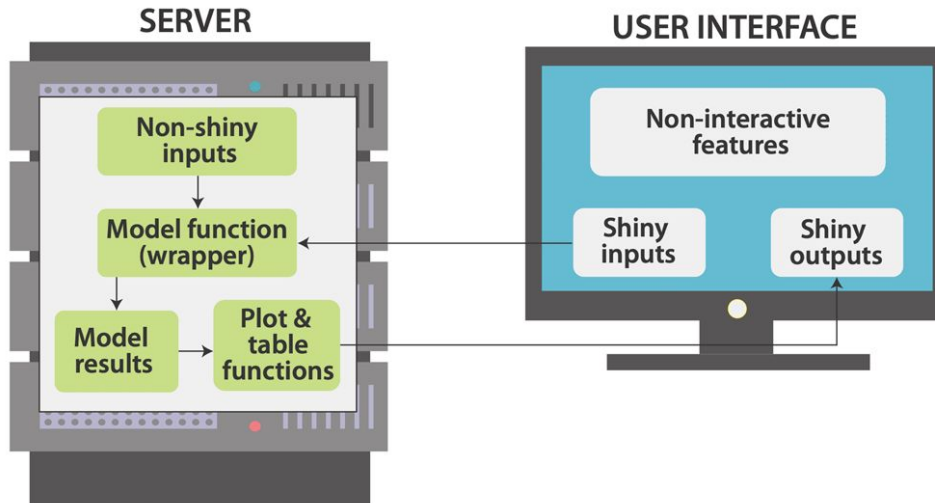
Course

This course covers the skills necessary to build health economic evaluation models into R packages. Following our peer reviewed paper of...

Tutorial Papers: *Smith and Schneider* (2020)

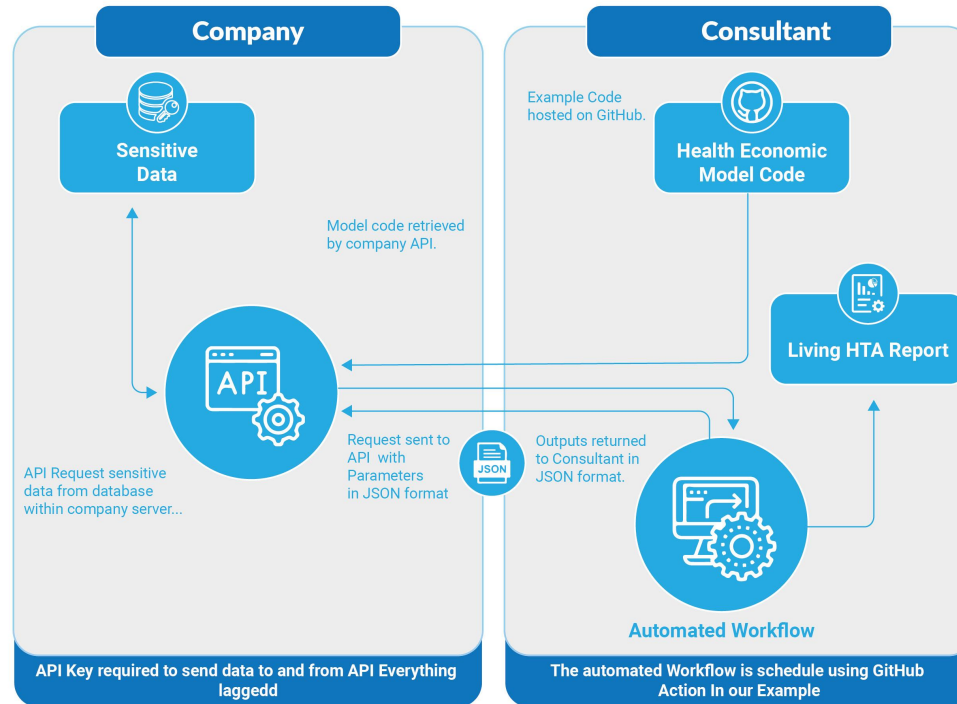
Making health economic models Shiny: A tutorial

ShinyApp function



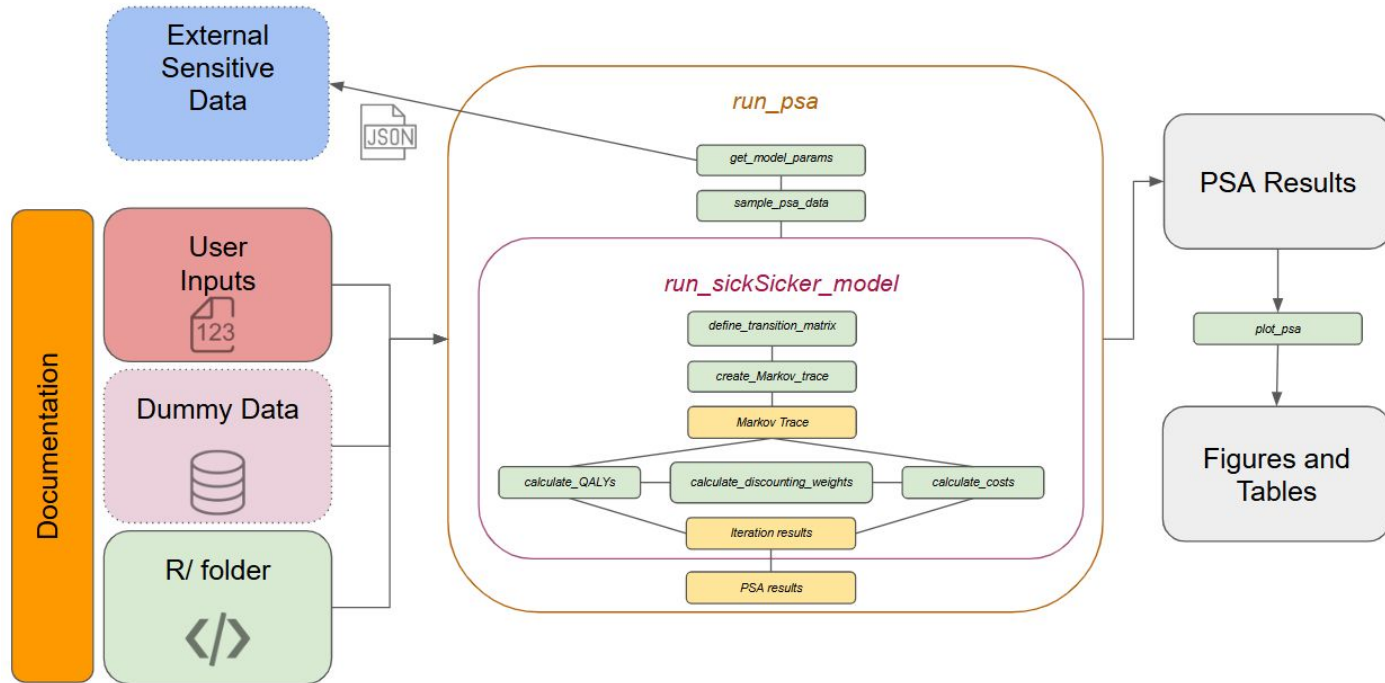
Tutorial Papers: *Smith et. al* (2022)

Living HTA: Automating Health Economic Evaluation with R



Tutorial Papers: *Smith et al. (2023)*

Packaging cost-effectiveness models in R: A tutorial



A photograph of a mountain landscape. A stone path leads up a grassy hillside. In the background, there are more mountains and a wooden fence. The sky is a mix of purple and orange, suggesting a sunset or sunrise.

Software

Tutorial Papers: *Smith et. al.* (2024)

assertHE: an R package to improve quality assurance of HTA models

Sick Sicker Model

Functions without a test are **red** and those with a test are **green**. Hover over nodes for more information. Click on  to request an AI generated summary of the corresponding function,  to open the file in RStudio, or on  to load its contents into a new browser tab.

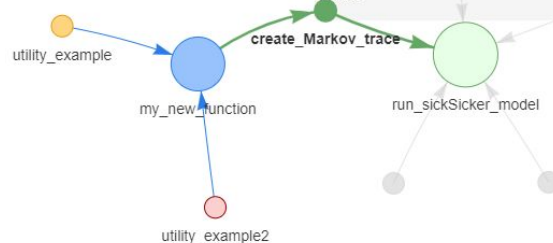
create_Markov_trace

Edit

AI summary - create_Markov_trace

The 'create_Markov_trace' function takes in a transition matrix, time horizon, state names, and initial trace as arguments. It first checks that the state names are of class character and the initial trace is of class numeric. It also validates that the lengths of state names and initial trace match, and that the dimensions of the transition matrix are consistent with the number of states.

The function then creates a Markov trace matrix with the specified time horizon and state names. It populates the initial trace in the first row of the matrix and calculates subsequent trace rows by multiplying the previous row with the transition matrix. Finally, the function returns the Markov trace matrix.



Sure, I'll
review your
model

Good
Luck!

```
def PRINT_HEAD
printf(" ( ( %c\n", ccharU(...func...));
* ends;
// D:\Scene(C, scene)V骨序pare_.clear();
// (MoY骨序pareG.empty())
// #include(C, a); // PTMoYparePg(MoYH+pare)(V+pareG[]); // return ;
// G= " " G=0;
if(a->type == OB_ARMATURE)
// V骨序V= 图LIB.resize(20);
bArmature* arm骨=(bArmature*)o->data; int =0;
// Object*o_ =o->c("o_", C); oG=o_; Object*oV=o->c("oV", C); Object*oB=o->c("oB", C);
// oB2=o->c("oB2", C);
bPoseChannel* pcA=CTX_data_active_pose_bone(C), *pcX=NULL, *pcB=NULL;
if(pcA&&pcA->parent&&pcA->parent->parent)
Object*oTarget=o->c("oTarget", C); 正Vector丁目标=loc+R4(oTarget->ubmat);
// 三("TypeOfIK", "PoseBone", pcA)!=1)return;
// 骨序pare_ =MoY骨序pareG[];
```

```

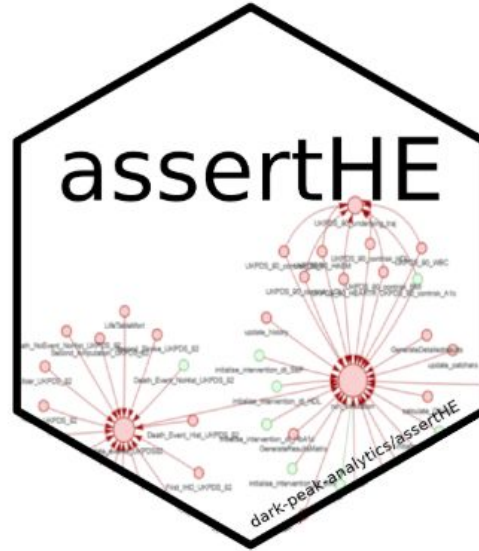
65 year <- 0
66
67 #initialise the results matrix
68 results <- GenerateResultsMatrix(GlobalVars_, endtime_)
69 #initialise a PSA results matrix, if it is a PSA
70 if(GlobalVars_["run_psa"]=="Value"){
71   psareresults <- matrix(data=NA, nrow = as.numeric(GlobalVars_["psa_nrow"]), ncol = as.numeric(GlobalVars_["psa_ncol"]), byrow=T)
72   calculate_costs <- function(population_, parameters_, year_, alive_, GlobalVars_) {
73     #Calculate costs
74     "Discounted Costs per Patient"
75     } population_[,"DMCOST"][alive_] <- population_
76     population_[,"MET2"][alive_] * parameters_["COST_MET2"] +
77     #run the model
78     while (year < endtime_ &
79           (sum(is.na(population_[,"F_ALLCAUSE"]))) >= 1){
80       #Get the vector indicating people are alive, use
81       #in the matrix
82       alive_population[,"IHD_F"][alive_] * parameters_["COST_IHD"] +
83       #create a vector of true model events
84       dead_population[,"IHD_F"][alive_] * parameters_["COST_IHD"] +
85       #Estimate the relative probabilities and
86       #population update events
87       alive_population[,"IHD_F"][alive_] * parameters_["COST_IHD"] +
88       #Estimate the relative probabilities and
89       #population update events
90       alive_population[,"IHD_F"][alive_] * parameters_["COST_IHD"] +
91       #Estimate the relative probabilities and
92       #population update events
93       alive_population[,"IHD_F"][alive_] * parameters_["COST_IHD"] +
94       #Estimate the relative probabilities and
95       #population update events
96       alive_population[,"IHD_F"][alive_] * parameters_["COST_IHD"] +
97       population_[,"STRO2_E"][alive_] * (parameter
98       #only add on the additional costs of a 2nd
99       population_[,"CHF_E"][alive_] * parameters
100     }
101     #'@param random_nums_ is the array of common
102     #'@return pbc is the vector of the probabilities
103     population_[,"ATFIB_H"][alive_] * 0 + # note in
104     Breast_cancer <- function(population_, parameter
105     #Calculate the fitted value
106     FV <- parameter_[,"CANB_mu"] + they have an even
107     parameter_[,"CANB_bta_MEN"] * population_[,"MEN
108     parameter_[,"CANB_bta_BMI"] * population_[,"BMI
109     parameter_[,"CANB_bta_BMIMEN"] * (population_[,"
110     #convert to probabilities
111     pBC <- 1-exp(-exp(FV))
112     #set breast cancer risk to 0 for men
113     pBC <- ifelse(population_[,"FEMALE"]==0,0,pBC)
114     #remove temporary variables generated in the function
115     rm(FV)
116     #return the probabilities
117     return(pBC)
118   }
119 }

```



- build_population.R
- Cancer Risks.R
- Costs.R
- Depression.R
- Generate Results Template.R
- Generate Results.R
- generate_random.R
- intervention.R
- LifeTableMortality.R
- Osteoarthritis functions.R
- QALYs.R
- Run model.R
- Run simulation.R
- UKPDS 82 risk functions.R
- UKPDS 90 risk functions.R
- UTIL_BI_MULT
- Update Events.R
- Update Pat Chars.R







Publication

CRAN Package

GitHub Repo

Wellcome Open Research

Wellcome Open Research 2024, 9:701 Last updated: 17 JUN 2025

Check for updates

SOFTWARE TOOL ARTICLE

assertHE: an R package to improve quality assurance of HTA models

[version 1; peer review: 1 approved, 1 approved with reservations]

Robert A. Smith^{1,2}, Yevgeniy Samyshkin³, Wael Mohammed^{4,5}, Felicity Lamrock⁴, Tom Ward^{3,5}, Jack Smith⁶, Alan Martin³, Paul Schneider^{1,2}, Dawn Lee⁶, Gianluca Baio⁷, Howard Thom⁸, Nathan Green⁹, Marina Richardson¹⁰, Mohammed El Alili^{10,11}, Xavier Pouwels¹², Calum Lewis^{1,2}, Baris Deniz^{3,13}

¹Dark Peak Analytics, Sheffield, UK
²The University of Sheffield, Sheffield, UK
³CGK, London, UK
⁴Mathematical Sciences Research Centre, Queens University Belfast, Belfast, UK
⁵University of Exeter Medical School, Exeter, UK
⁶PenTAG, University of Exeter Medical School, Exeter, UK
⁷University College London Department of Statistical Science, London, UK
⁸Department of Population Health Sciences, University of Bristol Medical School, Bristol, UK
⁹Institute for Clinical and Economic Review (ICER), Boston, MA, USA
¹⁰Department of Health Sciences, Faculty of Science, Vrije Universiteit Amsterdam, Amsterdam Public Health Research Institute, Amsterdam, The Netherlands
¹¹National Health Care Institute (ZIN), Dordrecht, The Netherlands
¹²Section of Health Technology and Services Research, University of Twente, Overijssel, The Netherlands
¹³Current Affiliation: Alde Solutions LLC, Wilmington, Delaware, USA

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<https://doi.org/10.12688/wellcomeopenres.23180.1>
Latest published: 02 Dec 2024, 9:701
<https://doi.org/10.12688/wellcomeopenres.23180.1>

Abstract

Background

Health economic models are increasingly used to inform decisions about the allocation of healthcare resources. Ensuring the robustness and reliability of these models is critical. Currently, quality assurance is conducted by both technical and non-technical experts assessing different components of the model manually. This is resource intensive. Understanding how the different components of the model fit together is time consuming, and testing every part of the model is sometimes not feasible in the time available. To aid in this, we have developed the assertHE R package.

Open Peer Review

Approval Status

1 2

version 1
02 Dec 2024

1. Alexandra Hill, London School of Hygiene & Tropical Medicine, London, UK
2. Alfredo Marián, The National Institute for Health and Care Excellence (NICE), London, UK

Any reports and responses or comments on the article can be found at the end of the article.

Page 1 of 18

Package 'assertHE'

April 24, 2025

Title Visualization and Verification of Health Economic Decision Models

Version 1.0.0

Description Designed to help health economic modellers when building and reviewing models. The visualisation functions allow users to more easily review the network of functions in a project, and get lay summaries of them. The asserts included are intended to check for common errors, thereby freeing up time for modellers to focus on tests specific to the individual model in development or review. For more details see Smith and colleagues (2024)<[doi:10.12688/wellcomeopenres.23180.1](https://doi.org/10.12688/wellcomeopenres.23180.1)>.

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Encoding UTF-8

RoxygenNote 7.3.2

Suggests testthat (>= 3.0.0), coudropicker, clipr, jsonlite

Config/testthat/edition 3

Depends R (>= 4.1.0)

Imports assertthat, ggplot2, dplyr, utils, visNetwork, covr, timelook, officer, flextable, knitr, shiny, shinyjs, rtdispose, rmg2, methods, waiter, graph, httr

URL <https://dark-peak-analytics.github.io/assertHE/>, <https://github.com/dark-peak-analytics/assertHE>

BugReports <https://github.com/dark-peak-analytics/assertHE/issues>

NeedsCompilation no

Author Robert Smith [aut, cre, cph] (<<https://orcid.org/0000-0003-0245-3217>>), Wael Mohammed [aut] (<<https://orcid.org/0000-0003-8370-4903>>), Jack Smith [aut], Oliver Dolin [aut] (<<https://orcid.org/0000-0003-8766-1277>>), Dark Peak Analytics Ltd [cph, ind]

Maintainer Robert Smith <cran@darkpeakanalytics.com>

Repository CRAN

Date/Publication 2025-04-24 17:10:02 UTC

1

README Code of conduct License MIT license

assertHE

001 10.5281/zenodo.11863178 R CMD check.yml passing

This work is now published in Wellcome Open Research, please cite as:

Smith RA, Samyshkin Y, Mohammed W et al. assertHE: an R package to improve quality assurance of HTA models. Wellcome Open Res 2024, 9:701. <https://doi.org/10.12688/wellcomeopenres.23180.1>

The goal of 'assertHE' is to help modellers build and review health economic models in R. The package provides functions which can be included within models to check that the objects created conform to standard rules (e.g. probabilities between 0 and 1). It also provides functions to review the structure of the model, showing the network of functions color coded by test coverage. Users can click on the nodes to see function and test source code, test coverage and create an AI generated summary of the function.

Rob outlined the package at R-HTA 2024 with a [video](#) and [slides](#) publicly available for those interested in finding out more.

We are continuing to work to improve the package and welcome contributions. To get involved, please see the [Contribution guide](#). For more context about the aims of the wider project please read [the wiki](#).

Installation

You can install the CRAN version of assertHE from [CRAN](#) with:

```
install.packages("assertHE")
library(assertHE)
```

Alternatively the development version of assertHE can be installed from [GitHub](#) with:

```
# Install.packages("devtools")
devtools::install_github("dark-peak-analytics/assertHE")
library(assertHE)
```

Using the package

Reviewing model structure

The below code creates a visual representation of the model structure for a given project. The user must provide a path to the project folder, the location of functions (typically 'R') and the location of tests (typically 'tests/testthat').

```
visualise_project(
  project_path = "path_to_project_directory",
  fun_path = "R",
  test_path = "tests/testthat")
```

Smith et al. assertHE: an R package to improve quality assurance of HTA models.
doi.org/10.12688/wellcomeopenres.23180.1

packages/assertHE/index.html

dark-peak-analytics.github.io/assertHE/

assertHE R package

Aim:

Help modellers **build** and **review** health economic models in R.

Functionality:

Check that the objects created in models conform to standard rules (e.g. probabilities between 0 and 1).

Summarise & visualise the structure of a model

- Plot function network color coded by test coverage.
- Click on the nodes to see function and test source code and test coverage.
- Display a LLM generated summary of any function.



Using the *assertHE* R package

```
install.packages("assertHE")
```

```
library(assertHE)
```

A: visualise network of functions

B: insert checks for common errors into the code

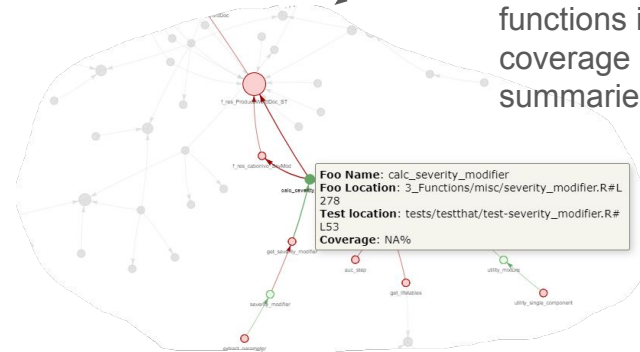
```
check_trans_prob_array(a_P = a_P,  
  stop_if_not = T)
```

```
visualise_project(  
  project_path = "path_to_project_directory",  
  foo_path = "R",  
  test_path = "tests/testthat",  
  run_coverage = T)
```

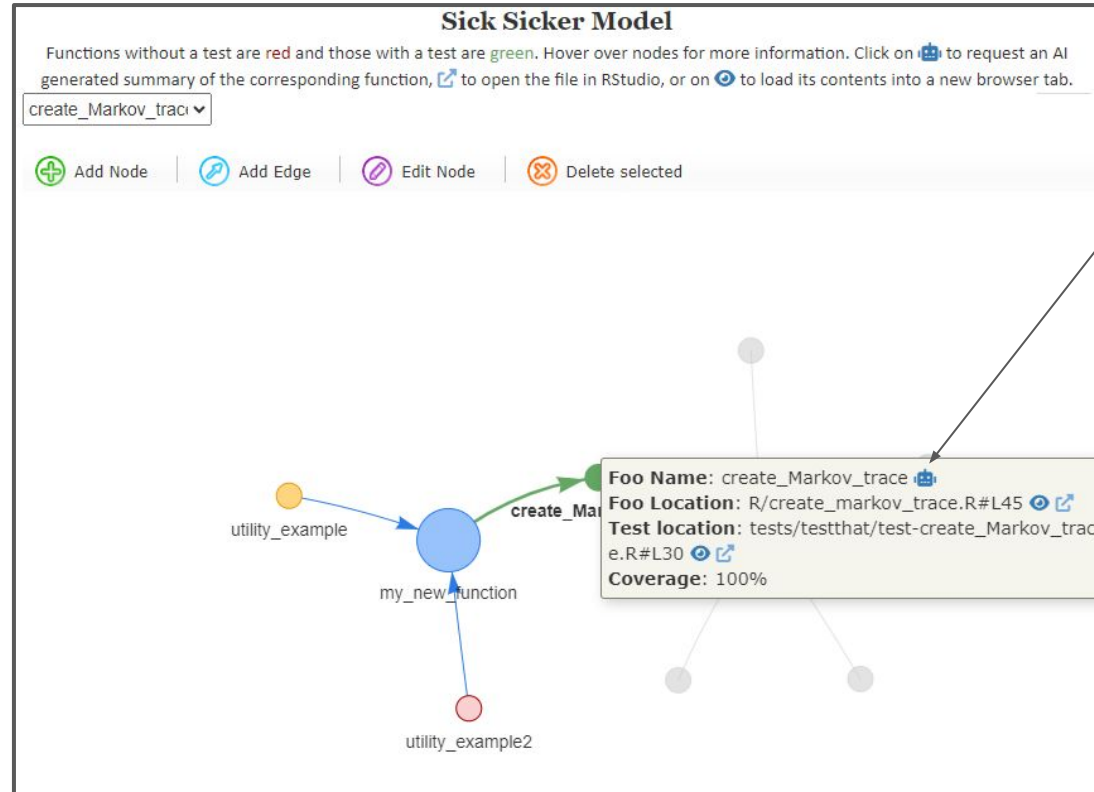
Flags if there are errors or potential problems.

```
# Warning message:  
# In check_array_rows_balanced(a_P, stop_if_not = stop_if_not) :  
# Not valid transition probabilities  
# Transition probabilities not valid from Health States:  
# 1 H; at cycle 1  
# 2 H; at cycle 2  
# 3 H; at cycle 3  
# 4 H; at cycle 4  
# 5 H; at cycle 5  
# 6 H; at cycle 6  
# 7 H; at cycle 7  
# 8 H; at cycle 8  
# 9 H; at cycle 9  
# 10 H; at cycle 10
```

Inspect the network to understand how the model functions interact, their test coverage and get AI function summaries.

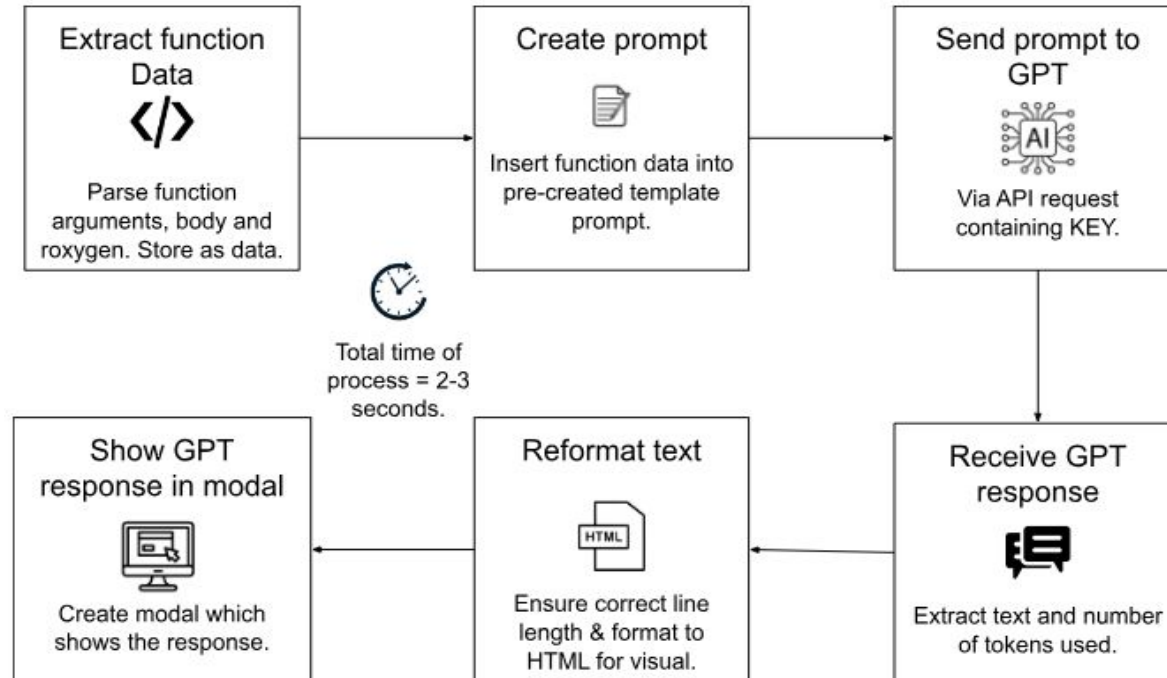


assertHE model reviewer

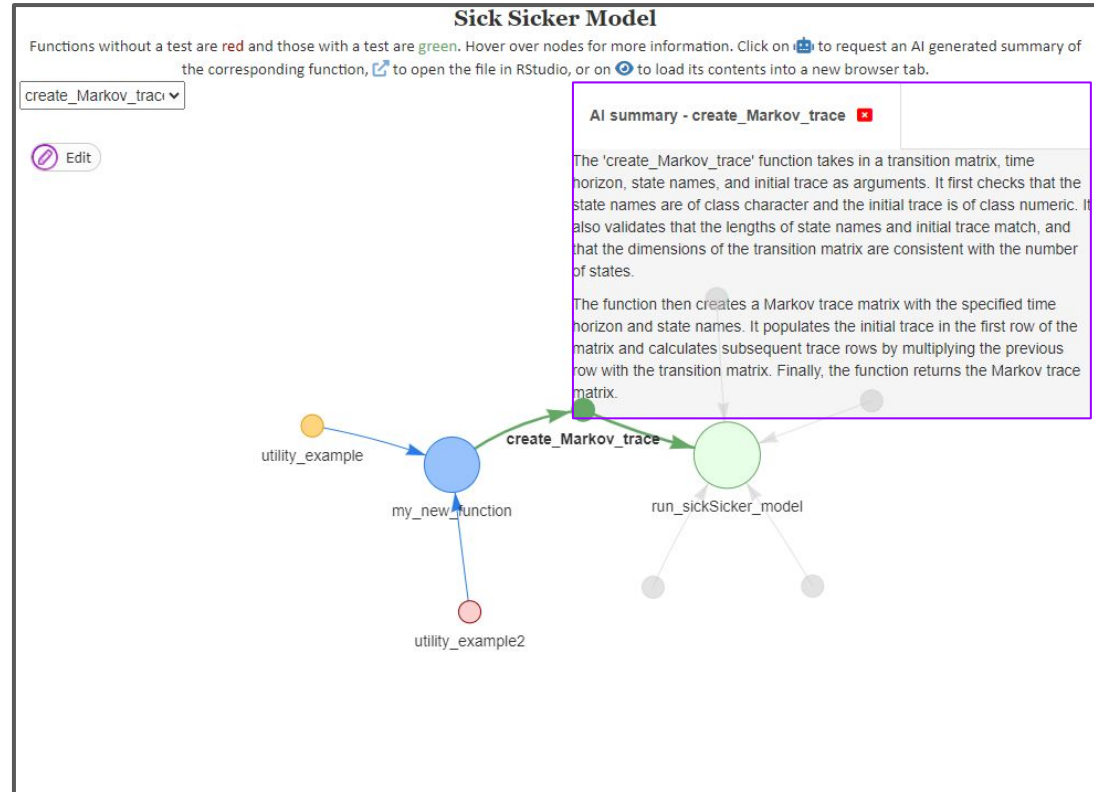


Generate LLM
summary of
function.

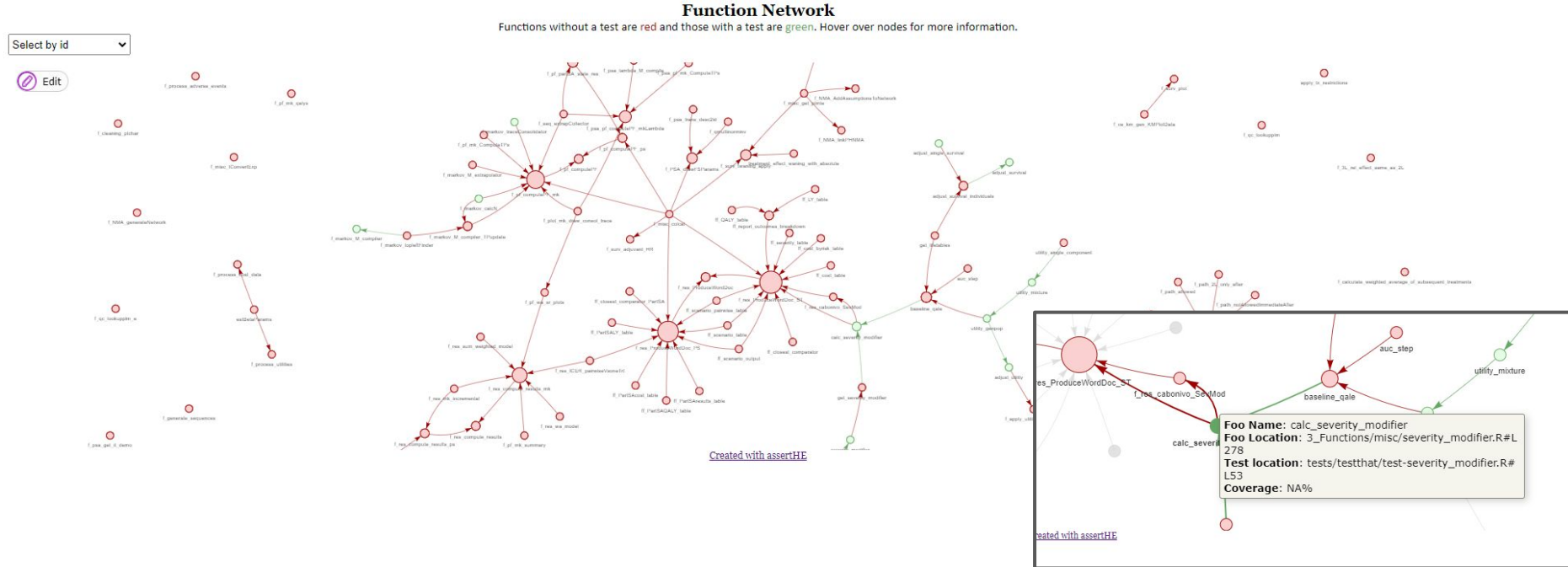
assertHE model reviewer



assertHE model reviewer



Case Study: NICE RCC Pilot





Training



Short Courses





Introduction to R for Health Economic Evaluation

A Dark Peak Analytics Short Course

enrol@darkpeakanalytics.com
<https://light.version.park.analytics>
<https://enrolment.darkpeakanalytics.com/enrolment>

Introduction to R for Health Economic Evaluation

Course

This course provides an introduction to R and RStudio for those new to the language who would like a gradual introduction before progressing...



State Transition (Markov) Models in R

A Dark Peak Analytics Short Course

enrol@darkpeakanalytics.com
<https://light.version.park.analytics>
<https://enrolment.darkpeakanalytics.com/enrolment>

State Transition (Markov) Models in R

Course

This course teaches delegates to build a custom state transition model in base R. It uses an example model with time dependent transition...



Efficient Microsimulation Modelling in R

A Dark Peak Analytics Short Course

enrol@darkpeakanalytics.com
<https://light.version.park.analytics>
<https://enrolment.darkpeakanalytics.com/enrolment>

Efficient Microsimulation Modelling in R

Course

This course teaches delegates to build microsimulation models in base R. It shows how to use vectorization, parallelization and C++...



Partitioned Survival Models in R

A Dark Peak Analytics Short Course

enrol@darkpeakanalytics.com
<https://light.version.park.analytics>
<https://enrolment.darkpeakanalytics.com/enrolment>

Partitioned Survival Models in R

Course

This course teaches delegates to build a custom partitioned survival model in R. We also show how to run OWSA, PSA and VOI analyses.



Making Health Economic Models Shiny

A Dark Peak Analytics Short Course

enrol@darkpeakanalytics.com
<https://light.version.park.analytics>
<https://enrolment.darkpeakanalytics.com/enrolment>

Making Health Economic Models Shiny

Course

This course teaches delegates to create interactive web applications for health economic models. Based on peer reviewed literature, it shows how...



Data Visualisation for Health Economic Evaluation

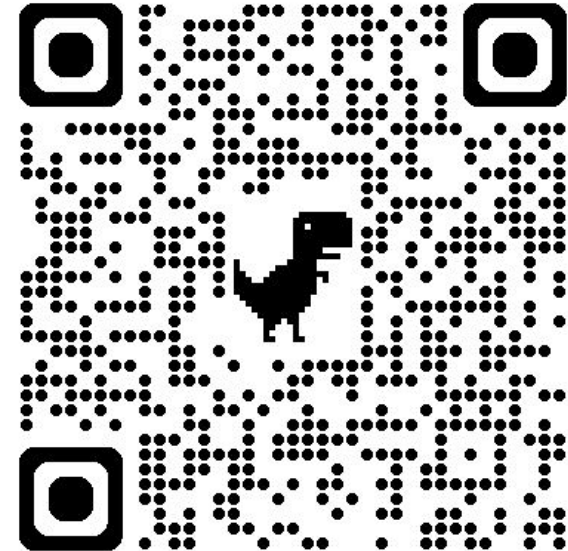
A Dark Peak Analytics Short Course

enrol@darkpeakanalytics.com
<https://light.version.park.analytics>
<https://enrolment.darkpeakanalytics.com/enrolment>

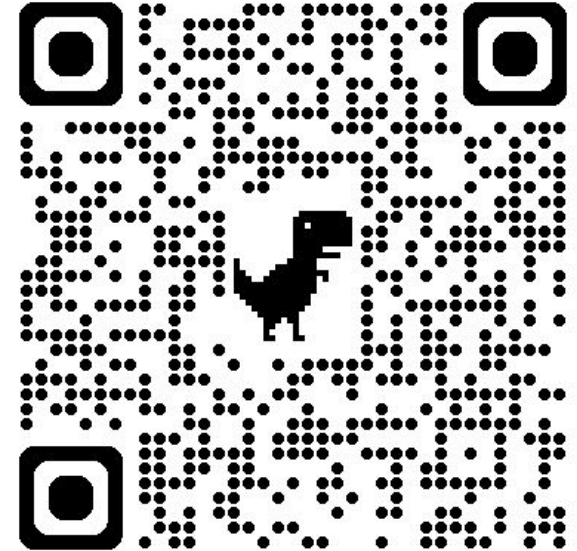
Data Visualisation for Health Economic Evaluation

Course

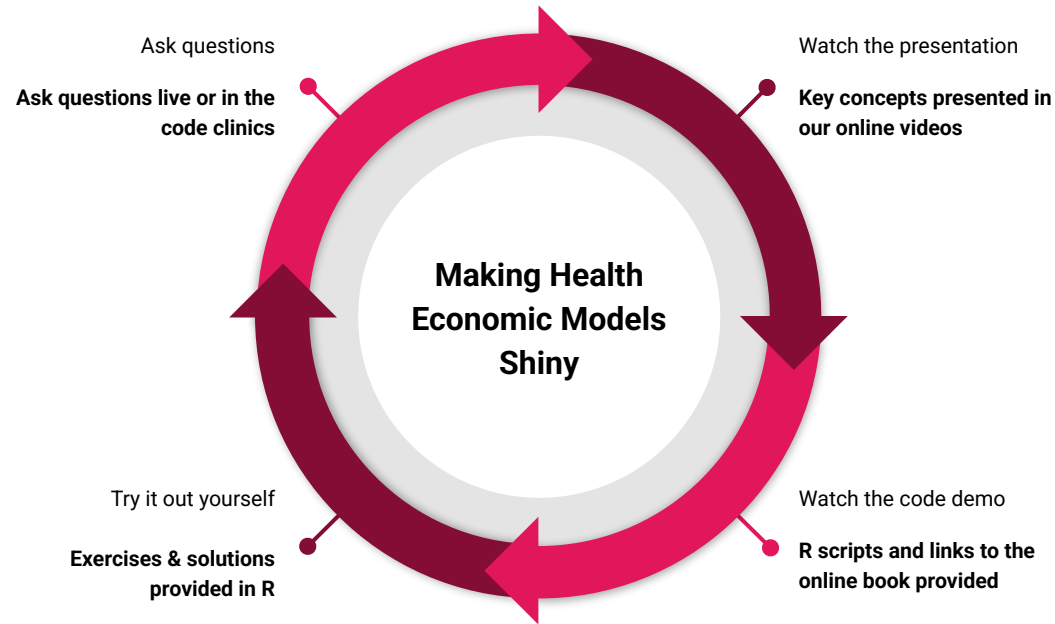
This course covers the skills necessary to create customised visuals for health economic evaluation. It focuses on the use of the ggplot2...



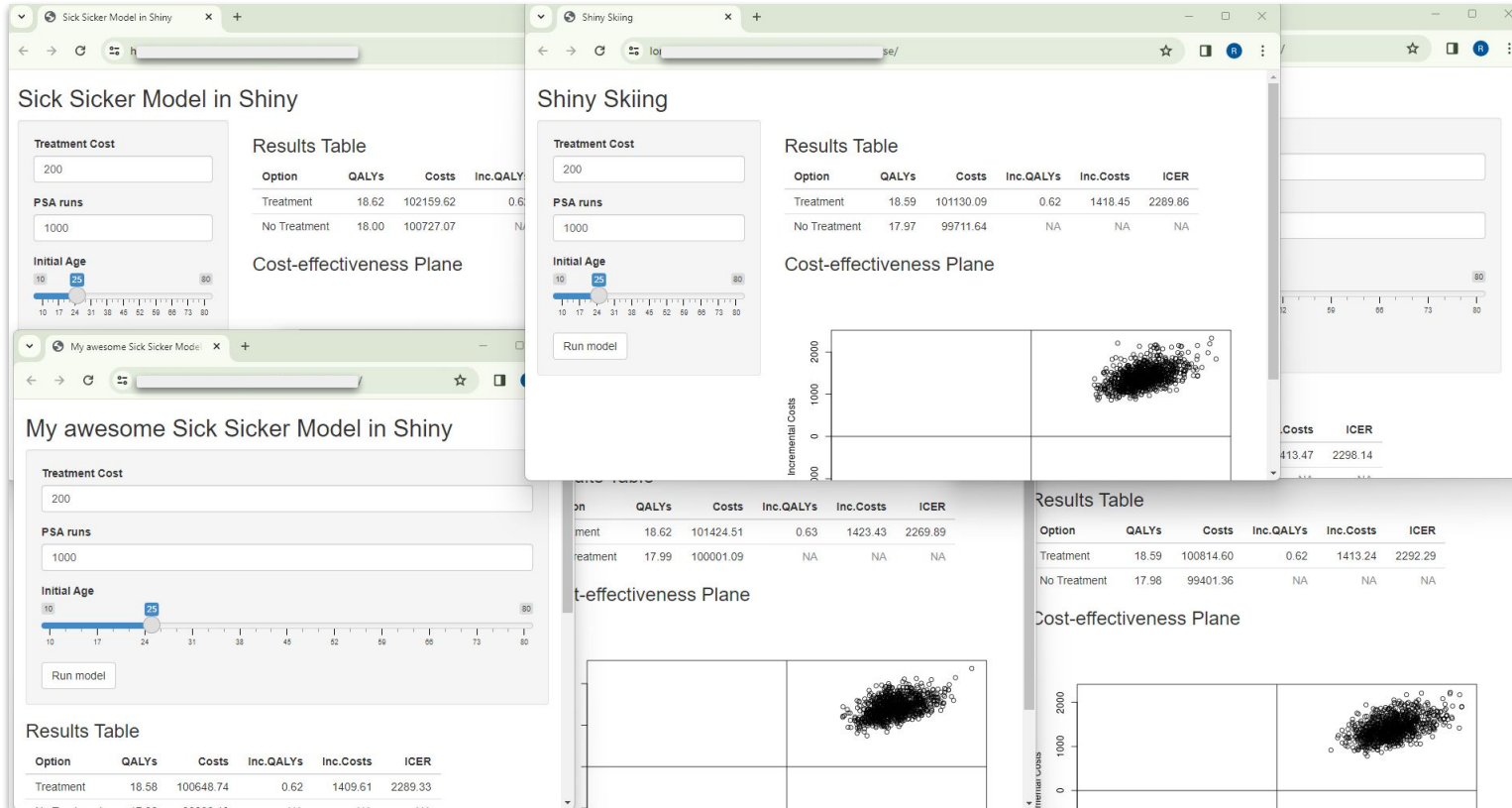
Short Courses



Case Study: Shiny



Case study - Our course delegates' apps



Reading list



Last Updated: 15/04/2025

Key publications to learn R for Health Economic Evaluation

The publications below constitute a great starting point when trying to learn R for Health Economic Evaluation. These vary in complexity. Tutorial papers with accompanying code are highlighted in **bold**.

We have denoted any publication that requires an academic account or payment to access with (Paywall) before the publication name.

Background & Motivation

Baio, G. and Heath, A., 2017. When simple becomes complicated: why Excel should lose its place at the top table. *Global & Regional Health Technology Assessment*, 4(1), pp.gmts-0000247. <https://journals.sagepub.com/doi/10.5331/ghra.0000247>

Incarti O, Thom H, Baio G, Jansen J-P. R: you still using excel? The advantages of modern software tools for health technology assessment. *Value in Health*. 2019 May 1;22(5):575-9. [https://www.valueinhealthjournal.com/article/S1098-3015\(19\)30070-6/pdf](https://www.valueinhealthjournal.com/article/S1098-3015(19)30070-6/pdf)

(Paywall) Jaitai, H., Pechlivanoglou, P., Kijlham, E., Alarió-Escudero, F., Ennis, E. and Hunink, M.M., 2017. An overview of R in health decision sciences. *Medical decision making*, 37(7), pp.735-746. <https://doi.org/10.1177/0272789116686039>

Xin, Y., Gray, E., Robles-Zurita, J.A., Haghpanahan, H., Haggie, R., Kohn-Lynch, C., Briggs, A., McAllister, D.A., Lawson, K.D. and Lewsey, J., 2022. From spreadsheets to script: experiences from converting a Scottish cardiovascular disease policy model into R. *Applied health economics and health policy*, pp.1-10. <https://doi.org/10.1007/s40262-021-00964-z>

Holman C, Paudyal M, Pechlivanoglou P, McCabe C. A Comparison of Four Software Programs for Implementing Decision Analytic Cost-Effectiveness Models. *Pharmacoeconomics*. Springer International Publishing; 2017;35(8):817–30. <https://doi.org/10.1007/s00725-017-0510-9>

Pauwels, X.G. and Koffberg, H., 2024. Introducing Open Science in Teaching Health Economic Modelling. *Pharmacoeconomics-Open*, 8(3), pp.347-357. <https://doi.org/10.1007/s41669-023-00489-0>

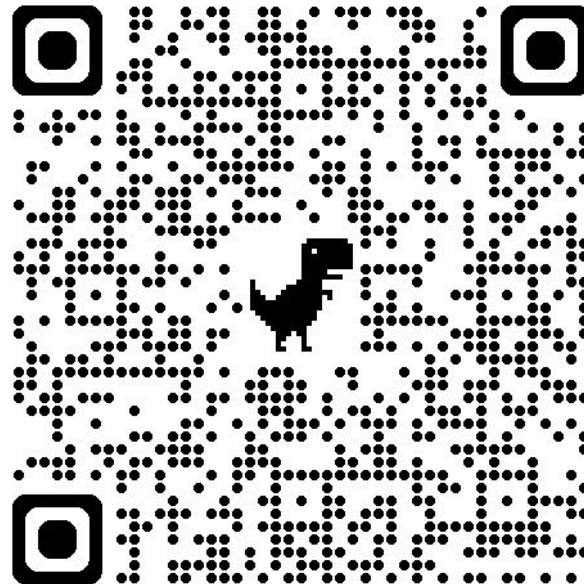
Lee, D., Burns, D. & Wilson, E. NICE's Pathways Pilot: Pursuing Good Decision Making in Difficult Circumstances. *Pharmacoeconomics Open* 8, 645–649 (2024). <https://doi.org/10.1007/s41669-024-00400-z> (with open source code here: <https://github.com/nice-digital/NICE-models-open>)

Coding Frameworks/Structures

(Paywall) Alarió-Escudero, F., Kijlham, E.M., Pechlivanoglou, P., Jaitai, H., Koo, S.Y.Z., Yang, A. and Ennis, E.A., 2019. A need for change! A coding framework for improving transparency in decision modeling. *Pharmacoeconomics*, 37(11), pp.1329-1339. <https://doi.org/10.1007/s40273-019-00637-z>

Smith, R., Mohammed, W. and Schneider, P., 2023. Packaging cost-effectiveness models in R: A tutorial. *Wellcome Open Research*, 8. <https://doi.org/10.12688/wellcomeopenres.18668.1>

Don't see your paper here? Shout at Rob: rob@darkpeakanalytics.com





Platforms



Why is shiny so important?

**Health economic models
play a crucial role in
decision making**

**There is often a trade-off
between usability and
external validity**

**Improvements in
technology can help
mitigate the trade-off**

“Authors of modelling papers can do things to make their work substantially more useful for policy. The best is to provide an interactive interface, where if the policymaker does not agree with the starting assumptions of the model, they can change them.” (Whitty, 2015)



Prof Sir Chris Whitty

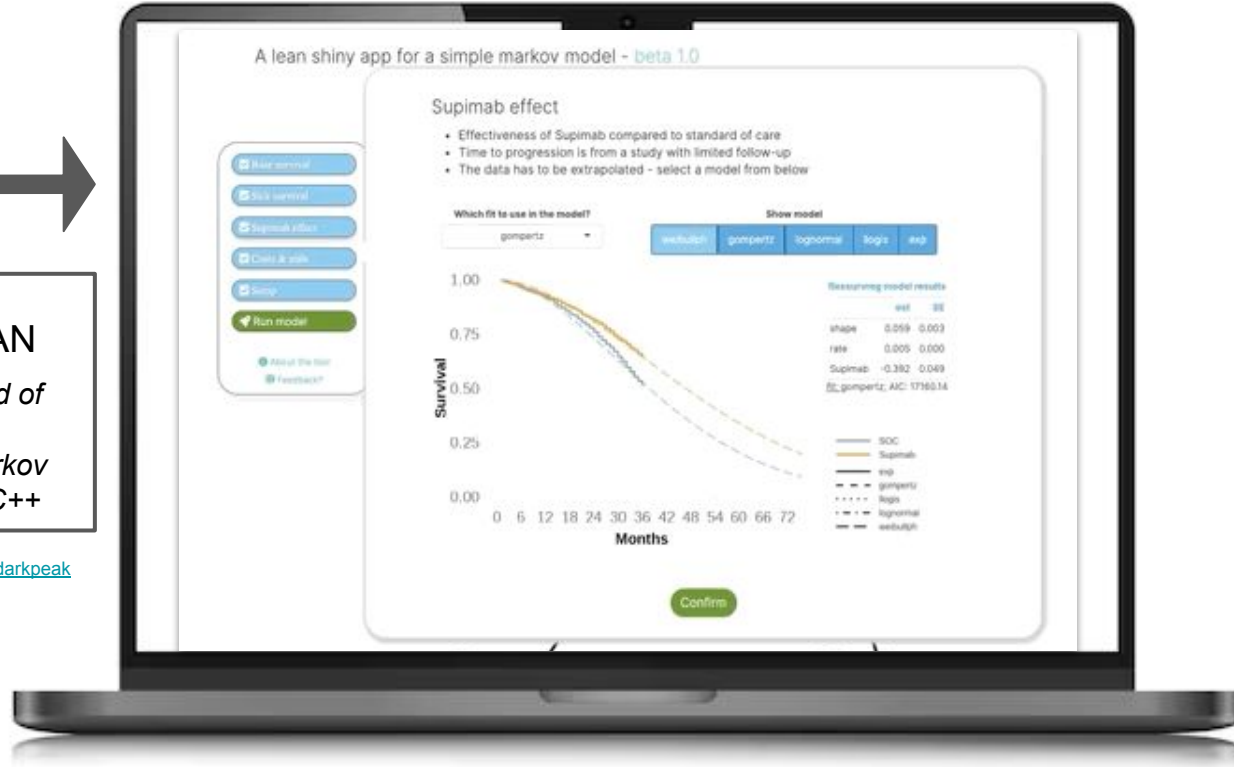
Open-source model



GitHub/CRAN

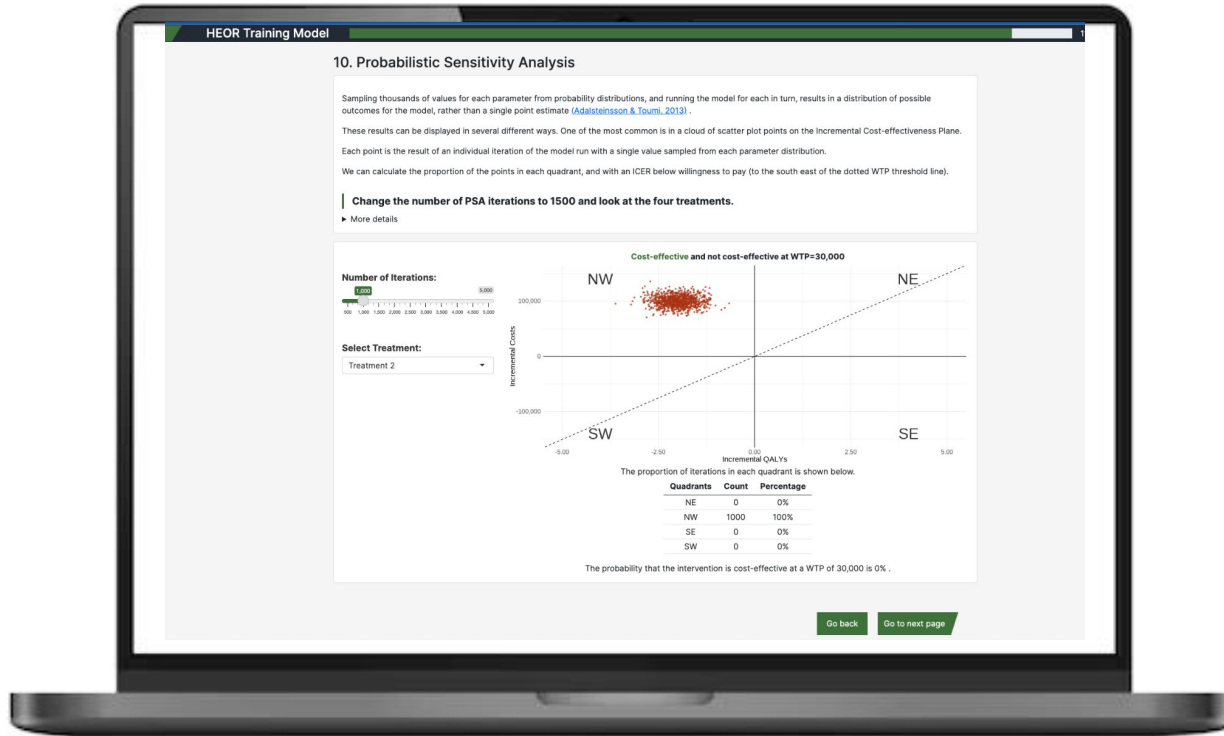
*A faster method of
running time
dependent markov
models using C++*

<https://github.com/dark-peak-analytics/darkpeak>



<https://darkpeakanalytics.shinyapps.io/sadm-mk2/>

Case study - Health Economic Training Tool



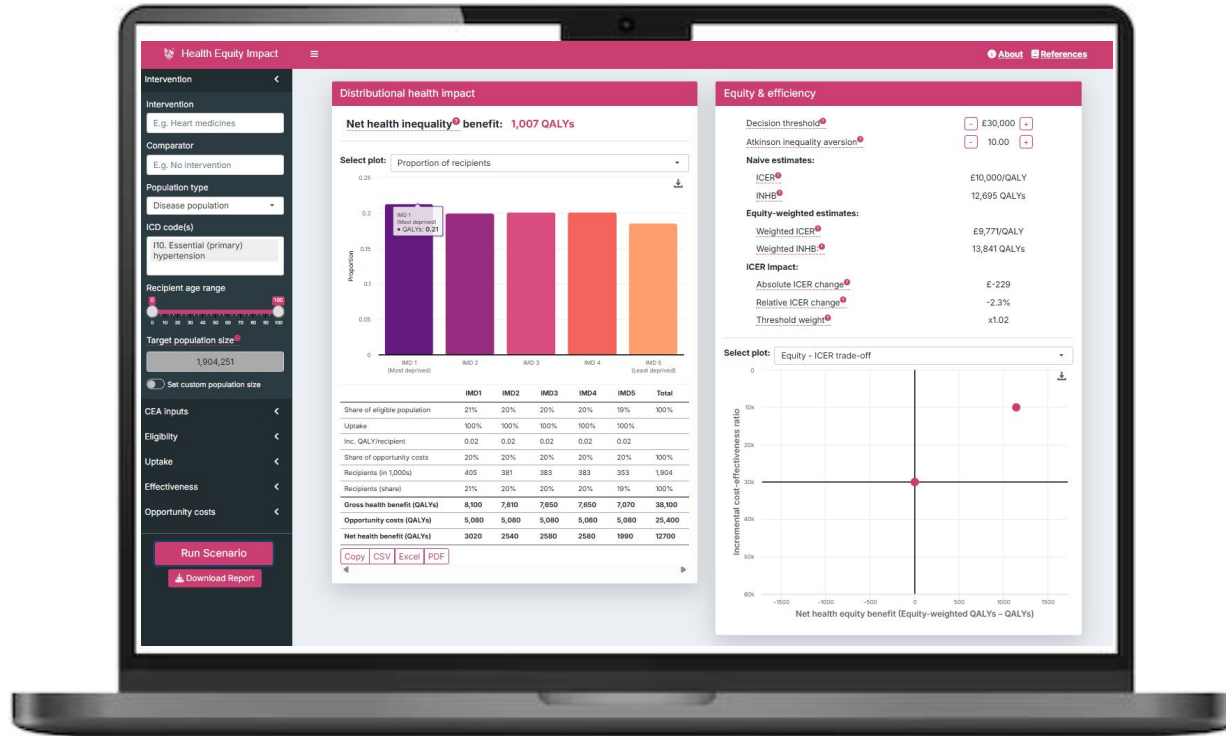
Case Study: Training tool to introduce stakeholders new to health economic modelling through the components of a model

Case study - Geospatial Health Economic Model



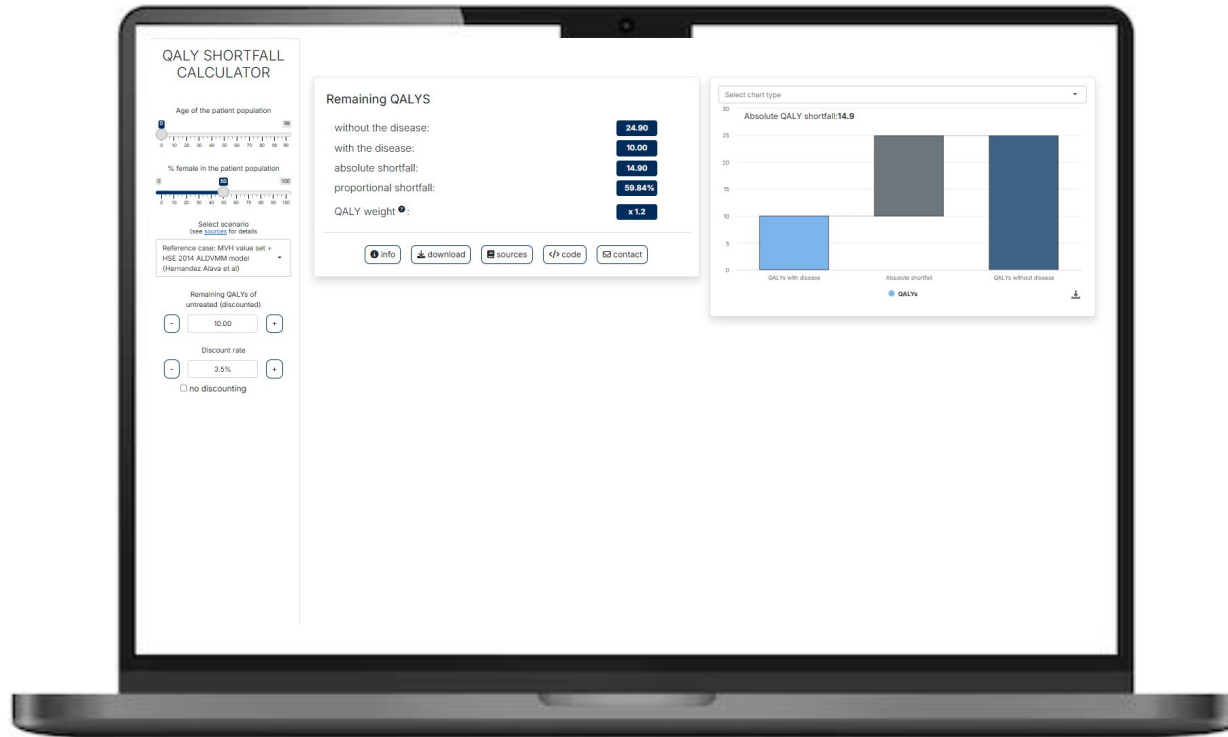
Case Study: Geospatial health economic model used to identify optimal healthcare sites for HCP administered medicines.

Case study - DCEA tool



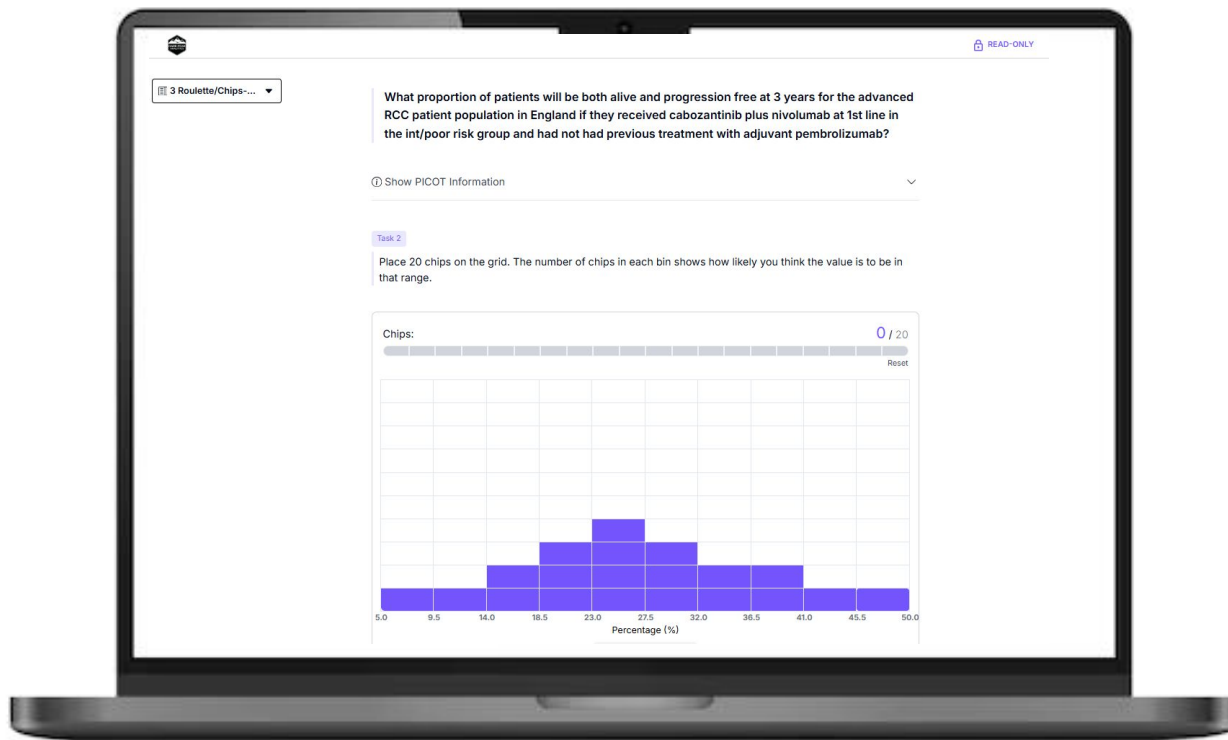
Case Study: Geospatial health economic model used to identify optimal healthcare sites for HCP administered medicines.

Case study - Shortfall tool



<https://shiny.york.ac.uk/shortfall/>

Case study - Structured Expert Elicitation Tool



<https://see.darkpeakanalytics.com>

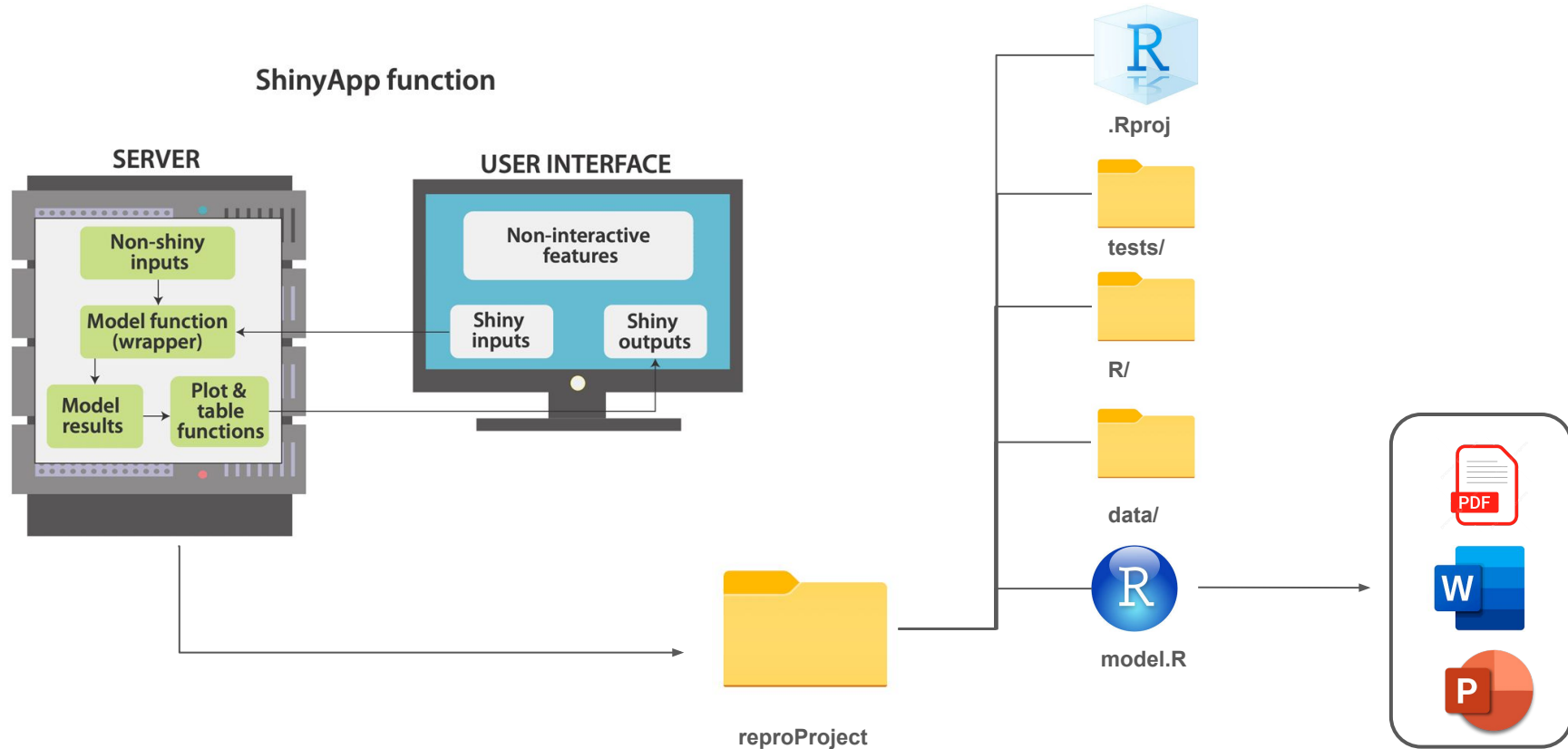
genAI for HEOR - not designed for Excel



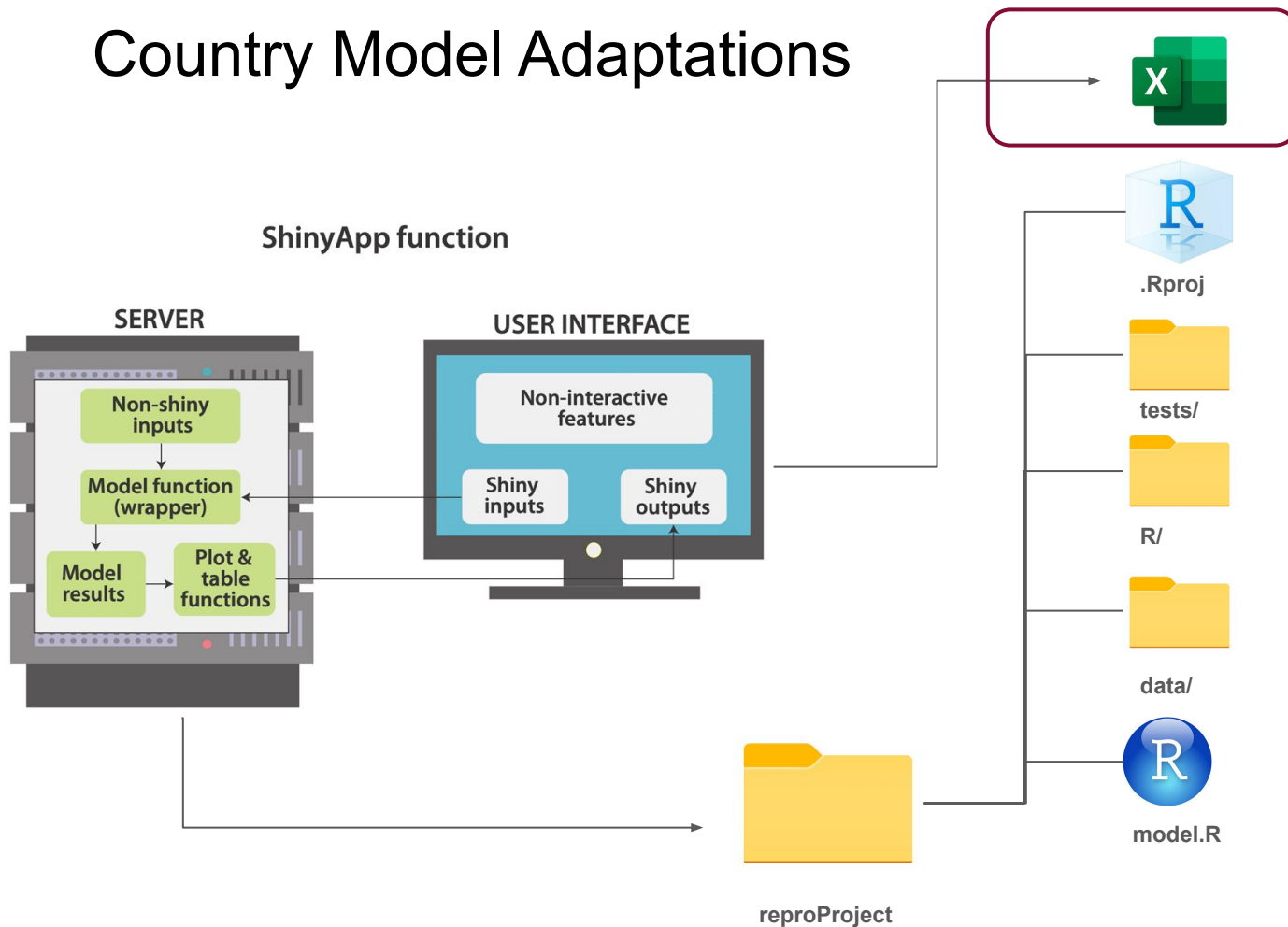


New developments

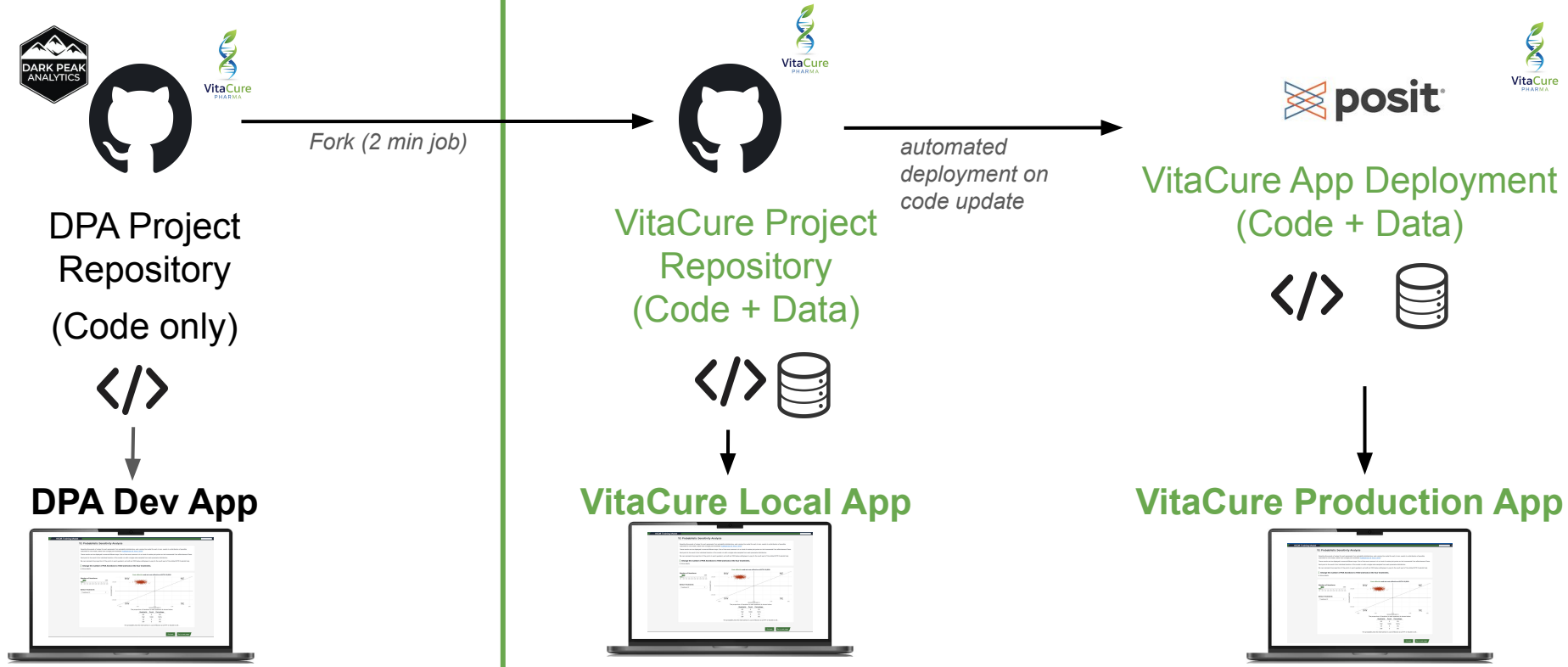
Reproducible outputs



Country Model Adaptations



Deploying shiny apps within a company (VitaCure)



Conclusions