

# B-Safe Testing and Validation v. 0.0.6 for B-Safe v. 0.1

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2024-08-17

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# 1 Background

The B-Safe r-shiny application is an interactive statistical software used to analyse several safety endpoints using the Bayesian (robust) Meta-Analytic Predictive (MAP) method. This approach was based on the works of [1].

## 1.1 Requirement Specification

The application will present its results via graphs, tables and figures. The application will calculate the meta-analytic predictive (MAP) prior and the robust MAP priors, assesses prior data conflict and reports the effective sample size / effective number of events of the historical data.

The user will then be able to download output data / simulated results in a tabular form.

An error message is expected when the input table does not contain the required columns and when the input parameters does not match the intended analysis.

## 1.2 Purpose and Scope

The aim of this testing and validation plan is to test whether the application is working as specified and that all described functionality are working as intended.

Test cases will cover common use cases of the application with the aim of ensuring that calculations done by the application are implemented properly. If there are any computations that cannot be performed by the application, additional changes or modifications to the application will be done in the future. That is beyond the scope of this document.

# 2 Testing and Requirement Strategy

Software and packages used by the application to perform the validation includes:

Table 1: Softwares and Packages

Program	Version
R	
RStudio	
shiny	1.7.5.1
RBesT	1.7.2
Rmarkdown	2.25
R2jags	0.7-1
rstantools	2.1.1
bayesplot	1.8.1
checkmate	2.3.1
testthat	3.2.1

The testing strategy is based on Input Testing and Structural Testing. Input Testing is performed to investigate whether erroneous input by the user is handled as intended by the application. Structural Testing deals with the confirmation of the accuracy of the calculations done by the application. Different scenarios to cater for common cases will be simulated for the structural testing to be performed.

# 3 Input Testing

This section describes the verification procedure of the functionality of the B-Safe application.

First, testing requirements and strategies are outlined. Then the handling of the testing failures and the processes for performing the testing are characterized.

The table below gives a brief overview about the parameters/variables the user is able to set as used within the document.

Table 2: Definitions of Variable

Variable	Description
STUDYID	Study number or name
HIST	0 for current trial and 1 for historical trial
ARM	Defines the treatment arm of the analysis
SAF_TOPIC	Safety topics of interest
N	Total number of patients in the respective study
N_WITH_AE	Total number of patients for the respective safety topic in that study who experienced at least one adverse event
TOT_EXP	Total exposure time for the respective safety topic in that study: sum of patients treatment exposure period until occurrence of first event. If no event occurs, use complete observation time
Dose	Amount/weight of the drug the patient took
Freq	Number of times the medicine/drug was taken by the patient
Length	Time the patient was on the treatment
Treat	The specific treatment the patient was on
MAP Prior	Meta-Analytic Predictive Prior
CrI	Credible Interval
CrILB	Credible Interval Lower Boundary
CrIUB	Credible Interval Upper Boundary
ESS	Expected Sample Size
ENE	Expected Number of Events

In case the expected specifications are not met, the test is failed.

The conditions above are all implementations that needs to be tested before the actual testing of the full functionality of the B-Safe application can be executed. Various test cases are grouped together and performed in a single action. For example, all test cases that contain checking the applications handling of input values/characters.

All those requirements are testest via the *checkmate* R package, which allows for both warnings as well as errors to guide the user along the error and help fixing the problem. In addition the required variables are within the same approach not only tested for specific required typing, but also the *checkmate* R package allows to test certain boundaries of those variables as well as restricting inputs to certain formats, e.g., csv.

### 3.1 Binary Endpoint

1. Setup a .csv file

Assumptions of the variables:

Table 3: Input

Input	Specification
File type	.csv file
STUDYID	character or numeric variable
HIST	boolean character variable

ARM	character variable
N	integer/numeric variable greater than zero
SAF_TOPIC	character variable with less than 30 characters
N_WITH_AE	integer variable greater than zero but less or equal to N
TOT_EXP	numeric variable greater than zero
Dose	numeric variable that can be treated as a factor. It is an additional variable
Freq(Frequency)	integer variable that can be treated as a factor. It is an additional variable
Length	a numeric variable that is an additional factor

Robust MAP Prior:

2. Weakly-informative Prior weight is numeric between 0.01 and 0.99

New Trial Analysis:

3. Number of Patients in selected ARM is an integer  $> 0$  but  $\leq 200$
4. Number of Patients with with AE is an integer  $\geq 0$  but  $\leq$  number of patients in selected ARM

Decision Making:

5. Likelihood: Percentage of Patients with AE two integers specifying lower bound and upper bound from 0 to 100.
6. MAP Prior: Percentage of Patients with AE two integers specifying lower bound and upper bound from 0 to 100.
7. Robust MAP Prior: Percentage of Patients with AE two integers specifying lower bound and upper bound from 0 to 100.
8. Posterior: Percentage of Patients with AE two integers specifying lower bound and upper bound from 0 to 100.

Download Results:

9. Number of comparisons: integer from 1 to 5

Test cases were performed as shown in the the table below. Different formats of the various input are violated in different test cases. For any false input, the user shall be informed about the error and the error will be displayed. The test is passed if no error message is displayed.

Test Case	Description of violation	Expected Response	Observed Response
1	An xlsx file uploaded	Error	Error
2	A file without the StudyID coulum uploaded	Error	Error
3	A file without the Hist coulum uploaded	Error	Error
4	A file without the ARM column uploaded	Error	Error
5	A file without N column uploaded	Error	Error
6	A file without N_WITH_AE uploaded	Error	Error
7	A file without SAF_Topic uploaded	Error	Error
8	A file without Dose column uploaded	No Error	No Error
9	A file without FREQ column uploaded	No Error	No Error
10	A file without Length coumn uploaded	No Error	No Error
11	A file with number of Patients less than zero	Error	Error
12	A file with more events patients	Error	Error

Some inputs including weakly-informative prior weight for the calculation of Robust MAP Prior, number of patients in selected arm and number of patients with AE in the new trial analysis, percentages for making statistical inferences about MAP Prior, Robust MAP Prior, Likelihood and Posterior are all imputed with a slider. Different values along the range on the sliders will be tested in the various scenarios.

### 3.2 Time To Event Endpoint

1. Setup a .csv file

Assumptions of the variables:

Table 4: Input

Input	Specification
File type	.csv file
STUDYID	character or numeric variable
HIST	boolean character variable
ARM	character variable
N	integer/numeric variable greater than zero
SAF_TOPIC	character variable with less than 30 characters
N_WITH_AE	integer variable greater than zero but less or equal to N
TOT_EXP	numeric variable greater than zero
Dose	numeric variable that can be treated as a factor. It is an additional variable
Freq(Frequency)	integer variable that can be treated as a factor. It is an additional variable
Length	a numeric variable that is an additional factor

Robust MAP Prior:

2. Weakly-informative Prior weight is numeric between 0.01 and 0.99
3. Weakly-informative Prior mean on the exp scale is numeric between 0.01 and 3

New Trial Analysis:

4. Number of first occurrence of the event is numeric between 1 and 200
5. Cumulative time to occurrence of the first events is numeric between 1 and 1000

Decision Making:

6. Likelihood: area of log(hazard) for patients with AE is numeric within a 99.8% (0.01% to 99.9%) quantile.
7. MAP Prior: area of log(hazard) for patients with AE is numeric within a 99.8% (0.01% to 99.9%) quantile.
8. Robust MAP Prior: area of log(hazard) for patients with AE is within a 99.8% (0.01% to 99.9%) quantile.
9. Posterior: area of log(hazard) for patients with AE is numeric within a 99.8% (0.01% to 99.9%) quantile.

Download Results:

10. Number of comparisons: integer from 1 to 5

Test Case	Description of violation	Expected Response	Observed Response
1	An xlsx file uploaded	Error	Error
2	A file without the StudyID column uploaded	Error	Error
3	A file without the Hist column uploaded	Error	Error
4	A file without the ARM column uploaded	Error	Error
5	A file without N column uploaded	Error	Error
6	A file without N_WITH_AE uploaded	Error	Error
7	A file without TOT_Exp uploaded	Error	Error
8	A file without SAF_Topic uploaded	Error	Error
9	A file without Dose column uploaded	No Error	No Error

10	A file without <code>FREQ</code> column uploaded	No Error	No Error
11	A file without <code>Length</code> column uploaded	No Error	No Error
12	A file with number of patients less than zero	Error	Error
13	A file with more events than patients	Error	Error
14	A file with a negative <code>TOT_Exp</code> uploaded	Error	Error

---

Some inputs including weakly-informative prior weight for the calculation of Robust MAP Prior, number of patients in selected arm and number of patients with AE in the new trial analysis, percentages for making statistical inferences about MAP Prior, Robust MAP Prior, Likelihood and Posterior are all imputed with a slider. Different values along the range on the sliders will be tested in the various scenarios.

## 4 Testing Framework in `testthat`

For testing purpose with `testthat`, the values for the defined scenarios, were created beforehand and saved as a separate file. As well were reference images for scenario 03 created and saved for comparison. Moreover, due to the use of Stan, also for image comparison the `RBest gMAP` element was saved. Moreover, the parameter, used in testing, were also defined upfront and are saved in the same file `tests/testthat/thresholds`.

Therefore the `testthat` R package is being used to ensure a framework, that is commonly used and stable.

Hereby, the testing setup replicates partially the workflow of the application with loading the respective data, parameters as well as thresholds. Then all functions that B-SAFE is running are run in the needed order to ensure the same workflow. Afterwards the outputs of the different plots as well as tables that are being displayed within the application are compared against the reference images, where the binaries of the images are compared and expected to be equal. Regarding the tables, the thresholds, both for the lower as well as the upper limits are being used to create threshold tables which then the corresponding tables / values of the replicated application workflow are compared against. The framework then either passes the comparison as the values are within a certain tolerance, or the framework will throw an error when the values are not within the threshold respective their tolerance.

In the setup file (`tests/testthat/setup.R`), all plots will be created and saved in (`tests/testthat/test_img`). This will be executed, prior to the pixel wise comparison. Here all plots will be created. Then in (`tests/testthat/tests-plots.R`) all the different created plot images will be binary tested against the reference images (`tests/testthat/img`) to ensure reproducibility.

ESS and summary statistics are tested independently from each other, for reason see section 5.1.

Moreover the displayed tables are checked, that the values and NA's are at their correct position. If a row (e.g. MAP prior summary statistics) appears in two different displayed tables, we check that they are identical.

Further unit tests have been created to ensure the correct functionality for the helper functions. The overall test coverage is greater than 80%.

## 5 Scenario Testing

Scenario testing was used to verify the computations the B-Safe Shiny application performs.

For this purpose, various conditions were set to capture a wide array of possibilities to set different parameter values. Each simulated scenario is a representation of a probable occurrence in a clinical trial. There are scenarios to cover heterogeneous and homogeneous data, very large to small borrowing of historical information, high and low robustification of the MAP prior. These scenarios are tested for both the Adverse Event Incidence Proportion and the Exposure-Adjusted Adverse Event Rate.

Following each scenario is briefly described. The simulated data sets are displayed in section 5.1. For further information (e.g. the level of heterogeneity) please refer to the statistical analysis plan of B-Safe.

All scenarios, except the worst scenarios (2, 4 and 12) pass without any failures. For Scenario 2, 4 and 12 the issues stem from problems with the integration within **RBest**. The developers of **RBest** are informed and will fix this in an upcoming version.

## 5.1 Simulation and Testing of Scenarios

In this chapter, the scenarios that are described in section 6 for incidence proportions and in section 7 for exposure adjusted incidence rates respectively, will be simulated and run through the B-SAFE app with the results being cross-checked for errors.

The testing procedure is as follows. The fixed historical data for each scenario as shown in their respective sections above, were run through **RBest** 1000 times to generate a set of 1000 different MAP / robust MAP priors. From this set of MAP / robust MAP priors, upper and lower thresholds for the following summary statistics were calculated by taking the 1% and 99% quantile of the summary statistics that were observed over the 1000 simulation replicates. Summary statistics for the MAP / robust MAP priors were: mean, SD, median, 95% Credible Intervals, ESS.

Each of the 1000 MAP / robust MAP priors for each scenario was subsequently updated with the corresponding (fixed) new trial data for that scenario, where the new data is as shown in the tables. Summary statistics for the likelihoods and the posterior distributions were again calculated, and upper and lower thresholds determined as above. The code can be found under `tests/teststrat/ScriptThresholds.R`.

Tests are then run using `testthat`. A test will pass if the summary statistics (for the MAP prior, robust MAP prior, likelihood, and posterior) lie within the upper and lower thresholds with a respective tolerance, and fail otherwise. The tolerances were included to adjust for the variability in results. Due to the use of **stan** within **RBest** on each machine a different MCMC is the result of the function calls. For good scenarios (e.g. 1,3) this threshold could be very small (e.g.  $1 \cdot 10^{-4}$ ). For worse scenarios (e.g. 4,5), the variability is higher. We decided to use one tolerance for the binary (e.g.  $3 \cdot 10^{-2}$ ) and another for the time to event endpoint (e.g.  $8 \cdot 10^{-2}$ ). We used the highest rounded difference we encountered during a couple of test runs.

For the ESS/ENE we decided for a 10% tolerance. However, as seen by the observed minimum and maximum values of the 1000 runs, in some cases a absurdly high ESS/ENE is reported. This is a known **RBest** issue, and we have contacted the authors. For certain mixture components with especially low weights, the integration function malfunctions. Therefore, if the ESS/ENE exceeds the number of patients/events, the MCMC sample will be drawn again, up to three times. After a third attempt the test will fail.

Moreover, for certain scenarios (2, 4, 12), this issue leads to the general exclusion to test these scenarios. In general those are scenarios in which borrowing historical information is strongly discouraged to perform.

Some values are not displayed, neither in the exploratory nor the reporting feature of B-SAFE. Nevertheless, for coding reasons, they are still part of the array structure and will be mentioned here as not available (NA).

## 5.2 Code der Daten Simulation

The scripts generates synthetic data that mimics real-world studies. The code can also be found under `tests/teststrat/SimStudy.R`

```
# Function to simulate 1 study
# nPat = Number of patients in each group
# g1 = group 1 (treatment); g2 = group 2 (control)
# dropout = 0_05: 5% dropout after time units of measure
# accr = accrual time, is to be in regards to the hazard
# NObsEvt = type 2 censoring, censor after NObsEvt number of events, probability of observing the event
# accr_timepoint should include 0 and total accrual time_
# Pre-specify the censor type ahead of time

#' Simulate a study
```



```

#'
#' @param nPat
#' @param hz
#' @param dropout
#' @param accr
#' @param NObsEvt
#' @param accr_method
#' @param surv_method
#' @param intensity
#' @param accr_timepoint
#' @param censor_type
#' @param time_cutoff
#'
#' @return
#' @export
#'
#' @examples
SimStudy <- function(nPat = c(g1 = 100, g2 = 100),
                     hz = c(g1 = 0.1, g2 = 0.2),
                     dropout = c(rate = 0.05, time = 12),
                     accr = 6,
                     NObsEvt = 0.5,
                     accr_method = "Uniform",
                     surv_method = "Exponential",
                     intensity = c(2, 6, 10),
                     accr_timepoint = c(0, 2, 4, 6),
                     censor_type = 1,
                     time_cutoff = 18) {
  N <- sum(nPat)
  # Observed events either proportional ( < 100) or as absolute numbers
  if (NObsEvt < 1) {
    NObsEvt <- sum(nPat) * NObsEvt
  }

  # res: variable which stores the result output
  # gID: 1 treatment 2 control
  # ID: Subject
  # Entry: Entry time according to accrual
  # EventTime: Simulated Eventtime + Entry time
  # ObsTime: Time observed (min(EventTime, CensorTime)-Entry)
  # StudyTime: Timepoint in Study
  # Eventindicator: 1 event observed, 0 censored
  res <- matrix(
    data = NA, nrow = N, ncol = 8,
    dimnames = list(
      ID = 1:N,
      c(
        "gID", "ID", "Entry", "EventTime",
        "ObsTime", "CensorTime",
        "StudyTime", "EventIndicator"
      )
    )
  )
}

```

```

# ID and gID just from 1 to number of patients in each group
res[, "ID"] <- 1:N
res[, "gID"] <- c(rep(1, nPat["g1"]), rep(2, nPat["g2"]))

# Different methods for generating Enrollment Time
if (accr_method == "Uniform") {
  res[, "Entry"] <- runif(N, 0, accr)
}

# Poisson accrual times
if (accr_method == "Poisson") {
  rtlist <- lapply(intensity, function(x) rexp(N, x))
  recruit_time <- c()
  for (i in 1:length(intensity)) {
    recruit_time_new <- c(accr_timepoint[i] + cumsum(rtlist[[i]][(accr_timepoint[i] + cumsum(rtlist[[i]]
    recruit_time <- c(recruit_time, recruit_time_new)
  }
  if (length(recruit_time) < N) {
    enrollment <- c(recruit_time, runif((N - length(recruit_time)), min(accr_timepoint), max(accr_timepoint)))
  } else {
    enrollment <- recruit_time[1:N]
  }
  res[, "Entry"] <- enrollment
}

# Piecewise Uniform accrual times
if (accr_method == "Piecewise Uniform") {
  recruit_time <- c()
  for (i in 1:length(intensity)) {
    n_part <- intensity[i] * diff(accr_timepoint)[i]
    recruit_time_new <- runif(n_part, accr_timepoint[i], accr_timepoint[i + 1])
    recruit_time <- c(recruit_time, recruit_time_new)
  }
  if (length(recruit_time) < N) {
    enrollment <- c(recruit_time, runif((N - length(recruit_time)), min(accr_timepoint), max(accr_timepoint)))
  } else {
    enrollment <- recruit_time[1:N]
  }
  res[, "Entry"] <- enrollment
}

# Method for generating Survival Time
if (surv_method == "Exponential") {
  for (i in 1:length(nPat)) {
    SurvTimesG <- rexp(nPat[i], hz[i])
    if (i == 1) {
      SurvTimes <- SurvTimesG
    } else {
      SurvTimes <- c(SurvTimes, SurvTimesG)
    }
  }
}

```

```

# Event Times
res[, "EventTime"] <- res[, "Entry"] + SurvTimes

# Get rate parameter for exponential distributed censoring times
CensorRate <- if (dropout["rate"] > 0) {
  -log(1 - dropout["rate"]) / dropout["time"]
} else {
  0
}

# Censoring times for all individuals, infinity if no censoring is applied
CensorTime <- if (dropout["rate"] > 0) {
  rexp(N, CensorRate)
} else {
  rep(Inf, N)
}

res[, "CensorTime"] <- CensorTime + res[, "Entry"]

# Censor type 1, administrative censoring after cutoff time
if (censor_type == 1) {
  evt_ind <- which(res[, "EventTime"] < res[, "CensorTime"] & res[, "EventTime"] < time_cutoff)
  non_evt_ind <- which(!(res[, "EventTime"] < res[, "CensorTime"] & res[, "EventTime"] < time_cutoff))
  res[evt_ind, "EventIndicator"] <- 1
  res[non_evt_ind, "EventIndicator"] <- 0
  res[evt_ind, "ObsTime"] <- res[evt_ind, "EventTime"] - res[evt_ind, "Entry"]
  res[non_evt_ind, "ObsTime"] <- ifelse(res[non_evt_ind, "CensorTime"] < time_cutoff,
    res[non_evt_ind, "CensorTime"] - res[non_evt_ind, "Entry"],
    time_cutoff - res[non_evt_ind, "Entry"])
  res[, "StudyTime"] <- res[, "ObsTime"] + res[, "Entry"]
}

# Type 2 censoring, censoring after number of observed events
if (censor_type == 2) {
  # Introduce censoring indices
  evt_ind <- which(res[, "EventTime"] < res[, "CensorTime"])
  non_evt_ind <- which(res[, "EventTime"] >= res[, "CensorTime"])
  res[evt_ind, "EventIndicator"] <- 1
  res[non_evt_ind, "EventIndicator"] <- 0
  res[evt_ind, "ObsTime"] <- res[evt_ind, "EventTime"] - res[evt_ind, "Entry"]
  res[non_evt_ind, "ObsTime"] <- res[non_evt_ind, "CensorTime"] - res[non_evt_ind, "Entry"]
  res[, "StudyTime"] <- res[, "ObsTime"] + res[, "Entry"]

  type2_censortime <- sort(res[, "StudyTime"], decreasing = FALSE)[NobsEvt]
  type2_censorind <- which(res[, "StudyTime"] > type2_censortime)
  res[type2_censorind, "StudyTime"] <- type2_censortime
  res[type2_censorind, "EventIndicator"] <- 0

  new_censored_row_idx <- which(res[, "StudyTime"] == type2_censortime)

  res[new_censored_row_idx, "ObsTime"] <- type2_censortime - res[new_censored_row_idx, "Entry"]

```

```

}

res <- as.data.frame(res)
return(res)
}

```

The data set that will be used for testing the various scenarios is then simulate using scenario specific variables. The code can also be found under `tests/teststrat/SimTestData.R`

```

#' Simulate Test Data Set
#'
#' @param SimStudy_nPat
#' @param SimStudy_hz
#' @param SimStudy_dropout
#' @param SimStudy_accr
#' @param SimStudy_accr_method
#' @param SimStudy_surv_method
#' @param SimStudy_intensity
#' @param SimStudy_accr_timepoint
#' @param SimStudy_time_cutoff
#' @param SimStudy_NObsEvt
#' @param SimStudy_censor_type
#' @param nStudy Number
#' @param tau
#' @param prior_data_conflict
#' @param SAF_TOPIC Selected safety topic to analyze/the adverse event of interest
#' @param pdc_hz
#' @param diff_trt_length
#' @param seed
#'
#' @return
#' @export
#'
#' @examples
SimTestData <- function(
  SimStudy_nPat = c(g1 = 50, g2 = 100),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 18),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = c(2, 4, 6),
  SimStudy_accr_timepoint = c(0, 2, 4, 6),
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 100,
  SimStudy_censor_type = 1,
  nStudy = 5,
  tau = 0,
  prior_data_conflict = FALSE,
  diff_trt_length = FALSE,
  pdc_hz = c(g1 = 0.05, g2 = 0.5),
  SAF_TOPIC = "Example",
  seed = 123) {
  res <- array(

```

```

data = NA, dim = c(nStudy, 5, 2),
dimnames = list(
  STUDYID = c(1:nStudy),
  c("HIST", "ARM", "N", "N_WITH_AE", "TOT_EXP"),
  c("g1", "g2")
)
)

res[1:(nStudy - 1), "HIST", ] <- 1
res[nStudy, "HIST", ] <- 0

res[, "ARM", "g1"] <- 1
res[, "ARM", "g2"] <- 2

res[, "N", "g1"] <- SimStudy_nPat["g1"]
res[, "N", "g2"] <- SimStudy_nPat["g2"]

# initialize the list to save the data
res_SimStudy <- list()

#
if (!is.na(seed)) {
  set.seed(seed)
}

# For prior Data conflict, simulate n-1 similar and 1 different trial
if (prior_data_conflict == TRUE) {
  nStudy <- nStudy - 1
}

# Simulate sutdies
SimStudy_time_cutoff_set <- (c(0.5, 0.5, 1, 1, 1.5, 1.5) + 1) * 12
for (i in 1:nStudy) {
  if (tau > 0) {
    SimStudy_hz <- exp(log(SimStudy_hz) + rnorm(2, mean = 0, sd = tau))
  }
  if (diff_trt_length == FALSE) {
    res_SimStudy[[i]] <- SimStudy(
      nPat = SimStudy_nPat,
      hz = SimStudy_hz,
      dropout = SimStudy_dropout,
      accr = SimStudy_accr,
      accr_method = SimStudy_accr_method,
      surv_method = SimStudy_surv_method,
      intensity = SimStudy_intensity,
      accr_timepoint = SimStudy_accr_timepoint,
      time_cutoff = SimStudy_time_cutoff_set,
      NObsEvt = SimStudy_NObsEvt,
      censor_type = SimStudy_censor_type
    )
  } else {
    # treatment_length = runif(1, 0.5, 1.5)
    # SimStudy_time_cutoff = (treatment_length + 1) * 12

```

```

# SimStudy_time_cutoff_set = c(SimStudy_time_cutoff_set, treatment_length)
res_SimStudy[[i]] <- SimStudy(
  nPat = SimStudy_nPat,
  hz = SimStudy_hz,
  dropout = SimStudy_dropout,
  accr = SimStudy_accr,
  accr_method = SimStudy_accr_method,
  surv_method = SimStudy_surv_method,
  intensity = SimStudy_intensity,
  accr_timepoint = SimStudy_accr_timepoint,
  time_cutoff = SimStudy_time_cutoff_set[i],
  NObsEvt = SimStudy_NObsEvt,
  censor_type = SimStudy_censor_type
)
}
}

# Simulate the different trial
if (prior_data_conflict == TRUE) {
  nStudy <- nStudy + 1

  res_SimStudy[[nStudy]] <- SimStudy(
    nPat = SimStudy_nPat,
    hz = pdc_hz,
    dropout = SimStudy_dropout,
    accr = SimStudy_accr,
    accr_method = SimStudy_accr_method,
    surv_method = SimStudy_surv_method,
    intensity = SimStudy_intensity,
    accr_timepoint = SimStudy_accr_timepoint,
    time_cutoff = SimStudy_time_cutoff,
    NObsEvt = SimStudy_NObsEvt,
    censor_type = SimStudy_censor_type
  )
}

for (s in 1:nStudy) {
  for (g in 1:2) {
    res[s, "TOT_EXP", g] <-
      sum(res_SimStudy[[s]][res_SimStudy[[s]]$gID == g, ]$ObsTime)

    res[s, "N_WITH_AE", g] <-
      sum(res_SimStudy[[s]][res_SimStudy[[s]]$gID == g, ]$EventIndicator)
  }
}

res_df <- as.data.frame(rbind(res[, , 1], res[, , 2]))
row.names(res_df) <- c(paste0(c(1:nStudy), "_g1"), paste0(c(1:nStudy), "_g2"))
res_df$STUDYID <- c(paste0("Study#", 1:nStudy), paste0("Study#", 1:nStudy))
res_df[res_df$ARM == 1, "ARM"] <- "g1"
res_df[res_df$ARM == 2, "ARM"] <- "g2"
res_df$SAF_TOPIC <- SAF_TOPIC
res_df <- res_df[, c(

```

```

    "STUDYID", "HIST", "ARM", "N",
    "SAF_TOPIC", "N_WITH_AE", "TOT_EXP"
  )]

  if (diff_trt_length == TRUE) {
    res_df$LENGTH <- NA
    for (i in 1:nStudy) {
      res_df[res_df$STUDYID == paste0("Study#", i), ]$LENGTH <- round(SimStudy_time_cutoff_set[i] / 12)
    }
  }

  res_df$TREAT <- SAF_TOPIC

  return(res_df)
}

```

## 6 Binary Endpoint results

### 6.1 Scenario 1 - Best Case Scenario

In the best case scenario, almost all events are observed, a long follow up time and a large number of historical trials available.

```

# Scen1
SimTestData(
  SimStudy_nPat = c(g1 = 300, g2 = 300),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0, time = 12),
  SimStudy_accr = 1,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 0.999,
  SimStudy_censor_type = 2,
  nStudy = 10,
  tau = 0,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen1",
  seed = 1699874539
)

```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
## 1_g1	Study#1	1	g1	300	Scen1	299	2828.715	Scen1
## 2_g1	Study#2	1	g1	300	Scen1	299	2882.367	Scen1
## 3_g1	Study#3	1	g1	300	Scen1	299	3236.408	Scen1
## 4_g1	Study#4	1	g1	300	Scen1	299	3085.252	Scen1
## 5_g1	Study#5	1	g1	300	Scen1	299	2984.353	Scen1
## 6_g1	Study#6	1	g1	300	Scen1	299	3305.953	Scen1
## 7_g1	Study#7	1	g1	300	Scen1	299	2975.530	Scen1
## 8_g1	Study#8	1	g1	300	Scen1	299	3103.969	Scen1

```
## 9_g1 Study#9 1 g1 300 Scen1 299 2763.876 Scen1
## 10_g1 Study#10 0 g1 300 Scen1 299 3044.691 Scen1
## 1_g2 Study#1 1 g2 300 Scen1 300 1466.836 Scen1
## 2_g2 Study#2 1 g2 300 Scen1 300 1604.556 Scen1
## 3_g2 Study#3 1 g2 300 Scen1 300 1428.295 Scen1
## 4_g2 Study#4 1 g2 300 Scen1 300 1472.222 Scen1
## 5_g2 Study#5 1 g2 300 Scen1 300 1678.517 Scen1
## 6_g2 Study#6 1 g2 300 Scen1 300 1504.812 Scen1
## 7_g2 Study#7 1 g2 300 Scen1 300 1626.479 Scen1
## 8_g2 Study#8 1 g2 300 Scen1 300 1480.283 Scen1
## 9_g2 Study#9 1 g2 300 Scen1 300 1644.251 Scen1
## 10_g2 Study#10 0 g2 300 Scen1 300 1519.465 Scen1
```

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
```

```
##          csv group          analysis saf_topic      seed
## Best case scenario Scen01.csv g1 Incidence proportion Scen01 1699874539
##          pool          tau heterog ESS rob_weight nta_event nta_npat
## Best case scenario TRUE HalfNormal Small elir      0.05      194      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.9795	0.9795	0.9797	0.9798
Expected MAP Prior: SD	0.0029	0.0029	0.0031	0.0035
Expected MAP Prior: median	0.9796	0.9796	0.9799	0.98
95% CrILB	0.9717	0.973	0.9737	0.9738
95% CrIUB	0.9847	0.9848	0.9853	0.9857
ESS MAP Prior	1793.8827	2191.68	2460.5191	2552.3257
Expected robustified MAP Prior: mean	0.9555	0.9555	0.9557	0.9558
Expected robustified MAP Prior: SD	0.1229	0.1229	0.1229	0.1229
Expected robustified MAP Prior: median	0.9794	0.9794	0.9797	0.9798
95% CrILB	0.5	0.5	0.5	0.5
95% CrIUB	0.9847	0.9848	0.9852	0.9856
ESS robustified MAP	1695.3091	2067.2245	2321.3406	2410.0451
Expected results for Likelihood: mean	0.97	0.97	0.97	0.97
Expected results for Likelihood: SD	0.012	0.012	0.012	0.012
Expected results for Likelihood: median	0.9716	0.9716	0.9716	0.9716
95% CrILB	0.9423	0.9423	0.9423	0.9423
95% CrIUB	0.9889	0.9889	0.9889	0.9889
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.9785	0.9787	0.9789	0.979
Expected results for Posterior: SD	0.003	0.003	0.0032	0.0036
Expected results for Posterior: median	0.9788	0.9789	0.9791	0.9792
95% CrILB	0.9703	0.972	0.9728	0.9729
95% CrIUB	0.9839	0.984	0.9843	0.9844
ESS Posterior	NA	NA	NA	NA

## 6.2 Scenario 2 - Strong Prior Data Conflict

Scenario 2 describes a test case scenario for a binary endpoint with a strong prior data conflict between the historical and current trials. The characteristics of this scenario includes no censoring in the current trial, no noise, all events being observed, homogeneous historical data and heavy prior data conflict.



```
# Scen2
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.3),
  SimStudy_dropout = c(rate = 0, time = 12),
  SimStudy_accr = 1,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 0.9,
  SimStudy_censor_type = 2,
  nStudy = 10,
  tau = 0.01,
  prior_data_conflict = TRUE,
  pdc_hz = c(g1 = 0.4, g2 = 0.05),
  SAF_TOPIC = "Scen2",
  seed = 1701611344
)
```

##		STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1	g1	200	Scen2	161	1530.2128	Scen2
##	2_g1	Study#2	1	g1	200	Scen2	162	1528.7454	Scen2
##	3_g1	Study#3	1	g1	200	Scen2	160	1660.3443	Scen2
##	4_g1	Study#4	1	g1	200	Scen2	161	1840.7538	Scen2
##	5_g1	Study#5	1	g1	200	Scen2	162	1605.1504	Scen2
##	6_g1	Study#6	1	g1	200	Scen2	164	1496.5477	Scen2
##	7_g1	Study#7	1	g1	200	Scen2	161	1622.6838	Scen2
##	8_g1	Study#8	1	g1	200	Scen2	162	1575.8092	Scen2
##	9_g1	Study#9	1	g1	200	Scen2	161	1638.6499	Scen2
##	10_g1	Study#10	0	g1	200	Scen2	200	439.5240	Scen2
##	1_g2	Study#1	1	g2	200	Scen2	199	723.4652	Scen2
##	2_g2	Study#2	1	g2	200	Scen2	198	725.3088	Scen2
##	3_g2	Study#3	1	g2	200	Scen2	200	633.6027	Scen2
##	4_g2	Study#4	1	g2	200	Scen2	199	631.2705	Scen2
##	5_g2	Study#5	1	g2	200	Scen2	198	701.9784	Scen2
##	6_g2	Study#6	1	g2	200	Scen2	196	705.4184	Scen2
##	7_g2	Study#7	1	g2	200	Scen2	199	680.0606	Scen2
##	8_g2	Study#8	1	g2	200	Scen2	198	704.2055	Scen2
##	9_g2	Study#9	1	g2	200	Scen2	199	727.2699	Scen2
##	10_g2	Study#10	0	g2	200	Scen2	160	3910.1011	Scen2

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##               csv group          analysis saf_topic
## Strong Prior Data Conflict Scen02.csv    g1 Incidence proportion    Scen02
##               seed pool              tau heterog ESS rob_weight
## Strong Prior Data Conflict 1701611344 TRUE HalfNormal Moderate elir      0.8
##               nta_event nta_npat
## Strong Prior Data Conflict      199      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.807	0.8071	0.808	0.8082
Expected MAP Prior: SD	0.0116	0.0117	0.0124	0.0157
Expected MAP Prior: median	0.807	0.8072	0.8083	0.8085
95% CrILB	0.7731	0.7814	0.7845	0.7848
95% CrIUB	0.8284	0.8292	0.8321	0.8363
ESS MAP Prior	809.8125	1071.8074	1219.9763	1246.6077
Expected robustified MAP Prior: mean	0.5614	0.5614	0.5616	0.5616
Expected robustified MAP Prior: SD	0.286	0.286	0.2861	0.2862
Expected robustified MAP Prior: median	0.625	0.625	0.625	0.625
95% CrILB	0.0312	0.0312	0.0312	0.0312
95% CrIUB	0.9688	0.9688	0.9688	0.9688
ESS robustified MAP	111.1373	144.9961	169.0632	174.0196
Expected results for Likelihood: mean	0.995	0.995	0.995	0.995
Expected results for Likelihood: SD	0.005	0.005	0.005	0.005
Expected results for Likelihood: median	0.9965	0.9965	0.9965	0.9965
95% CrILB	0.9816	0.9816	0.9816	0.9816
95% CrIUB	0.9999	0.9999	0.9999	0.9999
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.9901	0.9901	0.9901	0.9901
Expected results for Posterior: SD	0.0069	0.0069	0.0069	0.0069
Expected results for Posterior: median	0.9916	0.9916	0.9917	0.9917
95% CrILB	0.9726	0.9726	0.9726	0.9726
95% CrIUB	0.9988	0.9988	0.9988	0.9988
ESS Posterior	NA	NA	NA	NA

### 6.3 Scenario 3 - Realistic Scenario

Scenario 3 describes a binary endpoint for a realistic situation with a dropout rate of 5%, some with a 2% tau, events observed at a 90% power, homogeneous historical data and with no planned prior data conflict.

```

SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen3",
  seed = 1701621384
)

```

```

##      STUDYID HIST ARM   N SAF_TOPIC N_WITH_AE  TOT_EXP TREAT
## 1_g1 Study#1    1  g1 200      Scen3         30 282.8273 Scen3

```

```
## 2_g1 Study#2      1  g1 200      Scen3      35 345.5776 Scen3
## 3_g1 Study#3      1  g1 200      Scen3      32 355.6786 Scen3
## 4_g1 Study#4      1  g1 200      Scen3      35 409.5392 Scen3
## 5_g1 Study#5      1  g1 200      Scen3      36 207.1725 Scen3
## 6_g1 Study#6      0  g1 200      Scen3      40 291.3027 Scen3
## 1_g2 Study#1      1  g2 200      Scen3      60 259.6821 Scen3
## 2_g2 Study#2      1  g2 200      Scen3      52 268.0612 Scen3
## 3_g2 Study#3      1  g2 200      Scen3      57 237.5458 Scen3
## 4_g2 Study#4      1  g2 200      Scen3      54 359.4474 Scen3
## 5_g2 Study#5      1  g2 200      Scen3      52 170.1687 Scen3
## 6_g2 Study#6      0  g2 200      Scen3      50 266.0703 Scen3
```

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
```

```
##              csv group          analysis saf_topic      seed
## Realisitic Scenarios Scen03.csv    g1 Incidence proportion    Scen03 1701621384
##              pool      tau      heterog ESS rob_weight nta_event
## Realisitic Scenarios TRUE HalfNormal Substantial elir      0.25      31
##              nta_npat
## Realisitic Scenarios      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.1713	0.1718	0.1741	0.1749
Expected MAP Prior: SD	0.0313	0.0319	0.0358	0.0456
Expected MAP Prior: median	0.1691	0.1697	0.1718	0.1721
95% CrILB	0.0962	0.1078	0.1153	0.1171
95% CrIUB	0.2415	0.2439	0.2592	0.2883
ESS MAP Prior	143.6512	181.6262	220.2055	229.6131
Expected robustified MAP Prior: mean	0.2535	0.2539	0.2556	0.2562
Expected robustified MAP Prior: SD	0.2038	0.2039	0.2046	0.2057
Expected robustified MAP Prior: median	0.176	0.1765	0.1785	0.1788
95% CrILB	0.0747	0.0822	0.0883	0.0891
95% CrIUB	0.9	0.9	0.9	0.9
ESS robustified MAP	98.7803	124.2616	152.5439	159.551
Expected results for Likelihood: mean	0.155	0.155	0.155	0.155
Expected results for Likelihood: SD	0.0255	0.0255	0.0255	0.0255
Expected results for Likelihood: median	0.1538	0.1538	0.1538	0.1538
95% CrILB	0.1084	0.1084	0.1084	0.1084
95% CrIUB	0.2082	0.2082	0.2082	0.2082
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.1627	0.1633	0.1644	0.1646
Expected results for Posterior: SD	0.0176	0.0177	0.0185	0.0191
Expected results for Posterior: median	0.1628	0.1633	0.1647	0.165
95% CrILB	0.1243	0.1262	0.1287	0.1296
95% CrIUB	0.1979	0.1982	0.2001	0.2004
ESS Posterior	NA	NA	NA	NA

## 6.4 Scenario 4 - Worst Case Scenario

Scenario 4 describes a binary endpoint for a worst case scenario with huge censoring during the trial, huge noise in the data, low number of events observed at 90% power, heterogeneous historical data and huge data conflict.

```

SimTestData(
  SimStudy_nPat = c(g1 = 50, g2 = 100),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.2, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 112,
  SimStudy_censor_type = 2,
  nStudy = 3,
  tau = 0.15,
  prior_data_conflict = TRUE,
  pdc_hz = c(g1 = 0.05, g2 = 0.1),
  SAF_TOPIC = "Scen4",
  seed = 1701626683
)

```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1 g1	50	Scen4	28	197.5691	Scen4
##	2_g1	Study#2	1 g1	50	Scen4	27	237.3923	Scen4
##	3_g1	Study#3	0 g1	50	Scen4	23	425.0280	Scen4
##	1_g2	Study#1	1 g2	100	Scen4	73	283.1671	Scen4
##	2_g2	Study#2	1 g2	100	Scen4	73	334.8827	Scen4
##	3_g2	Study#3	0 g2	100	Scen4	70	750.5857	Scen4

The characteristics and thresholds for the simulation is as in the table below:

```

## [1] "With those values our newly created MAP Prior has been updated:"

##               csv group          analysis saf_topic      seed
## Worst Case Scenario Scen04.csv    g1 Incidence proportion  Scen04 1701626683
##               pool      tau      heterog ESS rob_weight nta_event
## Worst Case Scenario TRUE HalfNormal Very Large elir      0.99      27
##               nta_npat
## Worst Case Scenario      50

```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.5347	0.5378	0.5494	0.5552
Expected MAP Prior: SD	0.1427	0.1474	0.1595	0.1958
Expected MAP Prior: median	0.5428	0.5445	0.5537	0.5556
95% CrILB	0.0692	0.1472	0.2031	0.2153
95% CrIUB	0.8382	0.8486	0.8911	0.9436
ESS MAP Prior	12.9106	15.6987	19.7761	21.1598
Expected robustified MAP Prior: mean	0.5003	0.5004	0.5005	0.5005
Expected robustified MAP Prior: SD	0.2876	0.2876	0.2877	0.2879
Expected robustified MAP Prior: median	0.5014	0.5015	0.5018	0.5019
95% CrILB	0.0252	0.0252	0.0252	0.0252
95% CrIUB	0.9748	0.9748	0.9748	0.9749
ESS robustified MAP	0.017	0.0223	0.0233	0.0236
Expected results for Likelihood: mean	0.54	0.54	0.54	0.54
Expected results for Likelihood: SD	0.0698	0.0698	0.0698	0.0698
Expected results for Likelihood: median	0.5405	0.5405	0.5405	0.5405
95% CrILB	0.4023	0.4023	0.4023	0.4023
95% CrIUB	0.6747	0.6747	0.6747	0.6747
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.5385	0.5386	0.5387	0.5387
Expected results for Posterior: SD	0.0681	0.0681	0.0682	0.0682
Expected results for Posterior: median	0.539	0.5391	0.5392	0.5392
95% CrILB	0.4039	0.404	0.4041	0.4041
95% CrIUB	0.6701	0.6702	0.6703	0.6703
ESS Posterior	NA	NA	NA	NA

## 6.5 Scenario 5 - Heterogeneous Data (Medium)

Scenario 5 describes a binary endpoint for a medium heterogeneous scenario between the historical data, moderate noise at a 5% tau, moderate censoring at 5%, all events observed at a 90% power and no planned prior data conflict.

```

SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 1,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.05,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen5",
  seed = 1701628373
)

```

```
##      STUDYID HIST ARM    N SAF_TOPIC N_WITH_AE  TOT_EXP TREAT
## 1_g1 Study#1    1  g1 200     Scen5         24 336.2761 Scen5
## 2_g1 Study#2    1  g1 200     Scen5         35 328.5856 Scen5
## 3_g1 Study#3    1  g1 200     Scen5         26 319.0432 Scen5
## 4_g1 Study#4    1  g1 200     Scen5         36 319.4839 Scen5
## 5_g1 Study#5    1  g1 200     Scen5         39 282.5063 Scen5
## 6_g1 Study#6    0  g1 200     Scen5         25 289.3660 Scen5
## 1_g2 Study#1    1  g2 200     Scen5         68 295.3881 Scen5
## 2_g2 Study#2    1  g2 200     Scen5         55 310.0651 Scen5
## 3_g2 Study#3    1  g2 200     Scen5         63 290.2667 Scen5
## 4_g2 Study#4    1  g2 200     Scen5         54 288.7203 Scen5
## 5_g2 Study#5    1  g2 200     Scen5         52 283.8704 Scen5
## 6_g2 Study#6    0  g2 200     Scen5         66 263.6880 Scen5
```

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
```

```
##                  csv group          analysis saf_topic      seed
## Worst Case Scenario Scen04.csv    g1 Incidence proportion  Scen04 1701626683
##                  pool      tau      heterog  ESS rob_weight nta_event
## Worst Case Scenario TRUE HalfNormal Very Large elir      0.99      27
##                  nta_npat
## Worst Case Scenario      50
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.5347	0.5378	0.5494	0.5552
Expected MAP Prior: SD	0.1427	0.1474	0.1595	0.1958
Expected MAP Prior: median	0.5428	0.5445	0.5537	0.5556
95% CrILB	0.0692	0.1472	0.2031	0.2153
95% CrIUB	0.8382	0.8486	0.8911	0.9436
ESS MAP Prior	12.9106	15.6987	19.7761	21.1598
Expected robustified MAP Prior: mean	0.5003	0.5004	0.5005	0.5005
Expected robustified MAP Prior: SD	0.2876	0.2876	0.2877	0.2879
Expected robustified MAP Prior: median	0.5014	0.5015	0.5018	0.5019
95% CrILB	0.0252	0.0252	0.0252	0.0252
95% CrIUB	0.9748	0.9748	0.9748	0.9749
ESS robustified MAP	0.017	0.0223	0.0233	0.0236
Expected results for Likelihood: mean	0.54	0.54	0.54	0.54
Expected results for Likelihood: SD	0.0698	0.0698	0.0698	0.0698
Expected results for Likelihood: median	0.5405	0.5405	0.5405	0.5405
95% CrILB	0.4023	0.4023	0.4023	0.4023
95% CrIUB	0.6747	0.6747	0.6747	0.6747
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.5385	0.5386	0.5387	0.5387
Expected results for Posterior: SD	0.0681	0.0681	0.0682	0.0682
Expected results for Posterior: median	0.539	0.5391	0.5392	0.5392
95% CrILB	0.4039	0.404	0.4041	0.4041
95% CrIUB	0.6701	0.6702	0.6703	0.6703
ESS Posterior	NA	NA	NA	NA

## 6.6 Scenario 6 - High Dropout

Scenario 6 describes a binary endpoint scenario with huge dropout within the current trial, some noise at a 2% tau, some event being observed at a 90% power, homogeneous data and no planned prior data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.3, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 95,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen6",
  seed = 1701628373
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT	
##	1_g1	Study#1	1	g1	200	Scen6	26	291.6589	Scen6
##	2_g1	Study#2	1	g1	200	Scen6	27	225.3005	Scen6
##	3_g1	Study#3	1	g1	200	Scen6	28	292.3146	Scen6
##	4_g1	Study#4	1	g1	200	Scen6	28	268.4692	Scen6
##	5_g1	Study#5	1	g1	200	Scen6	40	212.6690	Scen6
##	6_g1	Study#6	0	g1	200	Scen6	24	198.0645	Scen6
##	1_g2	Study#1	1	g2	200	Scen6	56	226.4060	Scen6
##	2_g2	Study#2	1	g2	200	Scen6	52	203.6631	Scen6
##	3_g2	Study#3	1	g2	200	Scen6	55	255.6490	Scen6
##	4_g2	Study#4	1	g2	200	Scen6	47	221.9167	Scen6
##	5_g2	Study#5	1	g2	200	Scen6	45	238.6339	Scen6
##	6_g2	Study#6	0	g2	200	Scen6	54	219.5831	Scen6

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##          csv group          analysis saf_topic      seed pool
## High Dropout Scen06.csv    g1 Incidence proportion    Scen06 1701628373 TRUE
##          tau heterog  ESS rob_weight nta_event nta_npat
## High Dropout HalfNormal Moderate elir      0.14      31      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.1487	0.1491	0.1506	0.1509
Expected MAP Prior: SD	0.0187	0.019	0.0207	0.0271
Expected MAP Prior: median	0.1479	0.1482	0.1497	0.15
95% CrILB	0.1008	0.1103	0.1152	0.1158
95% CrIUB	0.1874	0.1892	0.1968	0.2114
ESS MAP Prior	250.0113	376.8769	437.179	448.0136
Expected robustified MAP Prior: mean	0.1979	0.1982	0.1995	0.1997
Expected robustified MAP Prior: SD	0.1633	0.1634	0.1638	0.1644
Expected robustified MAP Prior: median	0.1505	0.1507	0.1521	0.1523
95% CrILB	0.0916	0.1019	0.1076	0.1088
95% CrIUB	0.8214	0.8214	0.8214	0.8214
ESS robustified MAP	205.8849	310.4363	361.9021	370.8301
Expected results for Likelihood: mean	0.155	0.155	0.155	0.155
Expected results for Likelihood: SD	0.0255	0.0255	0.0255	0.0255
Expected results for Likelihood: median	0.1538	0.1538	0.1538	0.1538
95% CrILB	0.1084	0.1084	0.1084	0.1084
95% CrIUB	0.2082	0.2082	0.2082	0.2082
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.1506	0.1508	0.1517	0.1519
Expected results for Posterior: SD	0.0141	0.0141	0.0148	0.0162
Expected results for Posterior: median	0.1501	0.1503	0.1514	0.1515
95% CrILB	0.1211	0.1236	0.1252	0.1256
95% CrIUB	0.1798	0.1803	0.1826	0.1852
ESS Posterior	NA	NA	NA	NA

## 6.7 Scenario 7 - High Heterogeneity

Scenario 7 describes a binary endpoint scenario with high heterogeneity between historical data, moderate censoring in current trial, moderate noise at a 2% tau, all events observed at a 90% power, with no planned prior data conflict.

```

SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.15,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen7",
  seed = 1701416989
)

```

```
##          STUDYID HIST ARM    N SAF_TOPIC N_WITH_AE  TOT_EXP TREAT
```



```
## 1_g1 Study#1      1  g1 200      Scen7      32 222.47360 Scen7
## 2_g1 Study#2      1  g1 200      Scen7      27 270.34094 Scen7
## 3_g1 Study#3      1  g1 200      Scen7      32 271.08747 Scen7
## 4_g1 Study#4      1  g1 200      Scen7      36 116.93497 Scen7
## 5_g1 Study#5      1  g1 200      Scen7      29 111.37228 Scen7
## 6_g1 Study#6      0  g1 200      Scen7      23 163.68689 Scen7
## 1_g2 Study#1      1  g2 200      Scen7      59 189.49417 Scen7
## 2_g2 Study#2      1  g2 200      Scen7      62 284.62991 Scen7
## 3_g2 Study#3      1  g2 200      Scen7      58 210.80011 Scen7
## 4_g2 Study#4      1  g2 200      Scen7      56  77.53109 Scen7
## 5_g2 Study#5      1  g2 200      Scen7      62 118.22857 Scen7
## 6_g2 Study#6      0  g2 200      Scen7      68  97.68813 Scen7
```

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
```

```
##              csv group          analysis saf_topic      seed
## High Heterogeneity Scen07.csv    g1 Incidence proportion  Scen07 1701416989
##              pool      tau      heterog ESS rob_weight nta_event
## High Heterogeneity TRUE HalfNormal Very Large elir      0.2      35
##              nta_npat
## High Heterogeneity      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.1564	0.1572	0.1598	0.1606
Expected MAP Prior: SD	0.0281	0.0296	0.0387	0.0512
Expected MAP Prior: median	0.155	0.1552	0.1569	0.1572
95% CrILB	0.0961	0.0982	0.1076	0.109
95% CrIUB	0.2186	0.2208	0.2401	0.2439
ESS MAP Prior	243.2871	253.8611	309.9919	322.6752
Expected robustified MAP Prior: mean	0.2252	0.2258	0.2279	0.2285
Expected robustified MAP Prior: SD	0.1897	0.1898	0.1909	0.1925
Expected robustified MAP Prior: median	0.1592	0.1596	0.1614	0.1616
95% CrILB	0.0739	0.0769	0.0883	0.0902
95% CrIUB	0.875	0.875	0.8751	0.8764
ESS robustified MAP	183.1333	191.5037	235.5025	245.8014
Expected results for Likelihood: mean	0.175	0.175	0.175	0.175
Expected results for Likelihood: SD	0.0268	0.0268	0.0268	0.0268
Expected results for Likelihood: median	0.1739	0.1739	0.1739	0.1739
95% CrILB	0.1257	0.1257	0.1257	0.1257
95% CrIUB	0.2305	0.2305	0.2305	0.2305
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.1632	0.1633	0.1645	0.1649
Expected results for Posterior: SD	0.0163	0.0164	0.0176	0.0178
Expected results for Posterior: median	0.1617	0.1621	0.1637	0.1639
95% CrILB	0.1326	0.1329	0.1346	0.1348
95% CrIUB	0.1982	0.199	0.2047	0.2053
ESS Posterior	NA	NA	NA	NA

## 6.8 Scenario 8 - Bad Scenario

Scenario 8 describes a binary endpoint for a bad scenario with huge censoring in the current trial, huge noise, little events observed in the current trial, heterogeneous historical data and no planned prior data conflict.

```

SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.3, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.15,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen8",
  seed = 1701652217
)

```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT	
##	1_g1	Study#1	1	g1	200	Scen8	22	297.7669	Scen8
##	2_g1	Study#2	1	g1	200	Scen8	31	298.1832	Scen8
##	3_g1	Study#3	1	g1	200	Scen8	21	307.9312	Scen8
##	4_g1	Study#4	1	g1	200	Scen8	21	379.2739	Scen8
##	5_g1	Study#5	1	g1	200	Scen8	28	405.2051	Scen8
##	6_g1	Study#6	0	g1	200	Scen8	30	368.8481	Scen8
##	1_g2	Study#1	1	g2	200	Scen8	53	234.0924	Scen8
##	2_g2	Study#2	1	g2	200	Scen8	45	226.9392	Scen8
##	3_g2	Study#3	1	g2	200	Scen8	55	211.8717	Scen8
##	4_g2	Study#4	1	g2	200	Scen8	56	348.7668	Scen8
##	5_g2	Study#5	1	g2	200	Scen8	46	375.9676	Scen8
##	6_g2	Study#6	0	g2	200	Scen8	45	284.3348	Scen8

The characteristics and thresholds for the simulation is as in the table below:

```

## [1] "With those values our newly created MAP Prior has been updated:"

##           csv group           analysis saf_topic      seed pool
## Bad Scenario Scen08.csv      g1 Incidence proportion  Scen08 1701652217 TRUE
##           tau heterog ESS rob_weight nta_event nta_npat
## Bad Scenario HalfNormal Large elir      0.2      25      200

```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.1243	0.1247	0.127	0.1274
Expected MAP Prior: SD	0.0276	0.0285	0.035	0.0408
Expected MAP Prior: median	0.1216	0.1221	0.1238	0.1243
95% CrILB	0.0669	0.0706	0.0777	0.0786
95% CrIUB	0.1859	0.1895	0.2062	0.2127
ESS MAP Prior	205.3855	208.5494	256.1965	265.0909
Expected robustified MAP Prior: mean	0.1995	0.1998	0.2017	0.202
Expected robustified MAP Prior: SD	0.1991	0.1992	0.2	0.2007
Expected robustified MAP Prior: median	0.1267	0.127	0.1288	0.1291
95% CrILB	0.0587	0.061	0.0683	0.0702
95% CrIUB	0.875	0.875	0.875	0.8755
ESS robustified MAP	154.7852	157.714	195.0413	201.8845
Expected results for Likelihood: mean	0.125	0.125	0.125	0.125
Expected results for Likelihood: SD	0.0233	0.0233	0.0233	0.0233
Expected results for Likelihood: median	0.1237	0.1237	0.1237	0.1237
95% CrILB	0.083	0.083	0.083	0.083
95% CrIUB	0.1741	0.1741	0.1741	0.1741
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.1236	0.1238	0.1248	0.125
Expected results for Posterior: SD	0.0146	0.0147	0.0156	0.0158
Expected results for Posterior: median	0.1228	0.1232	0.1244	0.1247
95% CrILB	0.0947	0.095	0.0968	0.0972
95% CrIUB	0.1539	0.1543	0.1572	0.1577
ESS Posterior	NA	NA	NA	NA

## 6.9 Scenario 9 - Good Scenario

Scenario 9 describes a binary endpoint for a good scenario with low censoring in the current trial, small noise, majority of the events being observed and homogeneous historical data.

```
SimTestData(
  SimStudy_nPat = c(g1 = 300, g2 = 300),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 24,
  SimStudy_NObsEvt = 0.999,
  SimStudy_censor_type = 1,
  nStudy = 8,
  tau = 0.01,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen9",
  seed = 1701655293
)
```

```
## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length
## is not a multiple of shorter object length
```

```

## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not
## a multiple of shorter object length

## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length
## is not a multiple of shorter object length

## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not
## a multiple of shorter object length

## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length
## is not a multiple of shorter object length

## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not
## a multiple of shorter object length

## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length
## is not a multiple of shorter object length

## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not
## a multiple of shorter object length

## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length
## is not a multiple of shorter object length

## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not
## a multiple of shorter object length

##      STUDYID HIST ARM   N SAF_TOPIC N_WITH_AE  TOT_EXP TREAT
## 1_g1 Study#1    1  g1 300      Scen9      252 2871.475 Scen9
## 2_g1 Study#2    1  g1 300      Scen9      258 2659.380 Scen9
## 3_g1 Study#3    1  g1 300      Scen9      246 2997.827 Scen9
## 4_g1 Study#4    1  g1 300      Scen9      242 3019.844 Scen9
## 5_g1 Study#5    1  g1 300      Scen9      251 2704.768 Scen9
## 6_g1 Study#6    1  g1 300      Scen9      261 2808.790 Scen9
## 7_g1 Study#7    1  g1 300      Scen9      253 2697.728 Scen9
## 8_g1 Study#8    0  g1 300      Scen9      257 2735.211 Scen9
## 1_g2 Study#1    1  g2 300      Scen9      292 1552.231 Scen9
## 2_g2 Study#2    1  g2 300      Scen9      283 1684.490 Scen9
## 3_g2 Study#3    1  g2 300      Scen9      293 1375.547 Scen9
## 4_g2 Study#4    1  g2 300      Scen9      287 1703.108 Scen9
## 5_g2 Study#5    1  g2 300      Scen9      295 1689.214 Scen9
## 6_g2 Study#6    1  g2 300      Scen9      292 1664.492 Scen9
## 7_g2 Study#7    1  g2 300      Scen9      295 1631.283 Scen9
## 8_g2 Study#8    0  g2 300      Scen9      295 1506.824 Scen9

```

The characteristics and thresholds for the simulation is as in the table below:

```

## [1] "With those values our newly created MAP Prior has been updated:"

##      csv group      analysis saf_topic      seed pool
## Good Scenario Scen09.csv    g1 Incidence proportion    Scen09 1701655293 TRUE
##      tau heterog  ESS rob_weight nta_event nta_npat
## Good Scenario HalfNormal  Small elir      0.05      175      200

```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.8563	0.8565	0.8572	0.8575
Expected MAP Prior: SD	0.01	0.0102	0.0109	0.0139
Expected MAP Prior: median	0.8566	0.8567	0.8575	0.8576
95% CrILB	0.8274	0.8336	0.8366	0.8373
95% CrIUB	0.8753	0.8757	0.8782	0.8841
ESS MAP Prior	823.8082	1138.2494	1296.4729	1325.0507
Expected robustified MAP Prior: mean	0.8385	0.8387	0.8393	0.8396
Expected robustified MAP Prior: SD	0.1015	0.1015	0.1017	0.1019
Expected robustified MAP Prior: median	0.8561	0.8563	0.857	0.8571
95% CrILB	0.5	0.5	0.5	0.5
95% CrIUB	0.8768	0.8769	0.8796	0.8865
ESS robustified MAP	774.0716	1068.3639	1216.9515	1244.3148
Expected results for Likelihood: mean	0.875	0.875	0.875	0.875
Expected results for Likelihood: SD	0.0233	0.0233	0.0233	0.0233
Expected results for Likelihood: median	0.8763	0.8763	0.8763	0.8763
95% CrILB	0.8259	0.8259	0.8259	0.8259
95% CrIUB	0.917	0.917	0.917	0.917
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.8591	0.8593	0.8599	0.8604
Expected results for Posterior: SD	0.0092	0.0092	0.0097	0.0113
Expected results for Posterior: median	0.859	0.8591	0.8599	0.8602
95% CrILB	0.8389	0.8405	0.8416	0.8418
95% CrIUB	0.8771	0.8773	0.8799	0.8845
ESS Posterior	NA	NA	NA	NA

## 6.10 Scenario 10 - Favoured Control

Scenario 10 describes a binary endpoint for a favored control scenario with no censoring in the current trial, no noise, all events being observed, homogeneous historical data, heavy prior data conflict and the hazard ratio in favor of the control group.

```

SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.2, g2 = 0.1),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = TRUE,
  pdc_hz = 1.2,
  SAF_TOPIC = "Scen10",
  seed = 1701673095
)

```

```
## Warning in rexp(nPat[i], hz[i]): NAs produced
```

```
##      STUDYID HIST ARM   N SAF_TOPIC N_WITH_AE   TOT_EXP   TREAT
## 1_g1 Study#1    1  g1 200   Scen10      54 234.482445 Scen10
## 2_g1 Study#2    1  g1 200   Scen10      42 200.954605 Scen10
## 3_g1 Study#3    1  g1 200   Scen10      59 233.239862 Scen10
## 4_g1 Study#4    1  g1 200   Scen10      51 204.363002 Scen10
## 5_g1 Study#5    1  g1 200   Scen10      52 170.728016 Scen10
## 6_g1 Study#6    0  g1 200   Scen10      93 -6.482995 Scen10
## 1_g2 Study#1    1  g2 200   Scen10      36 282.421760 Scen10
## 2_g2 Study#2    1  g2 200   Scen10      46 214.300246 Scen10
## 3_g2 Study#3    1  g2 200   Scen10      32 318.335395 Scen10
## 4_g2 Study#4    1  g2 200   Scen10      37 243.939964 Scen10
## 5_g2 Study#5    1  g2 200   Scen10      39 244.166712 Scen10
## 6_g2 Study#6    0  g2 200   Scen10      NA      NA Scen10
```

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
```

```
##      csv group      analysis saf_topic      seed pool
## Favored Control Scen10.csv   g1 Incidence proportion   Scen10 1701673095 TRUE
##      tau heterog  ESS rob_weight nta_event nta_npat
## Favored Control HalfNormal   Small elir      0.6      175      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.2575	0.2577	0.2591	0.2594
Expected MAP Prior: SD	0.0178	0.018	0.0192	0.025
Expected MAP Prior: median	0.257	0.2573	0.2588	0.2591
95% CrILB	0.2094	0.2203	0.2245	0.2252
95% CrIUB	0.2933	0.294	0.299	0.3103
ESS MAP Prior	375.0382	558.9076	628.9878	643.3917
Expected robustified MAP Prior: mean	0.403	0.4031	0.4036	0.4038
Expected robustified MAP Prior: SD	0.253	0.2531	0.2534	0.2535
Expected robustified MAP Prior: median	0.2742	0.2744	0.2763	0.2794
95% CrILB	0.0417	0.0417	0.0417	0.0417
95% CrIUB	0.9583	0.9583	0.9583	0.9583
ESS robustified MAP	115.1126	171.2627	197.8828	201.7215
Expected results for Likelihood: mean	0.875	0.875	0.875	0.875
Expected results for Likelihood: SD	0.0233	0.0233	0.0233	0.0233
Expected results for Likelihood: median	0.8763	0.8763	0.8763	0.8763
95% CrILB	0.8259	0.8259	0.8259	0.8259
95% CrIUB	0.917	0.917	0.917	0.917
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.8713	0.8713	0.8713	0.8713
Expected results for Posterior: SD	0.0235	0.0235	0.0235	0.0235
Expected results for Posterior: median	0.8725	0.8725	0.8725	0.8725
95% CrILB	0.8219	0.8219	0.8219	0.8219
95% CrIUB	0.9137	0.9137	0.9137	0.9137
ESS Posterior	NA	NA	NA	NA

## 6.11 Scenario 11 - Continued study duration with Realistic Setting

Scenario 11 describes a binary endpoint for a realistic situation where the study continued regardless of when the proposed number of events has been observed. Characteristics of this scenario includes a drop out rate of 5%, noise at a 5% tau, homogeneous historical data and no planned prior data conflict planned.

```

SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 24,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 1,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen11",
  seed = 1701876972
)

```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1	g1	200	Scen11	167	1883.7131
##	2_g1	Study#2	1	g1	200	Scen11	167	1664.7275
##	3_g1	Study#3	1	g1	200	Scen11	169	1764.2083
##	4_g1	Study#4	1	g1	200	Scen11	161	1934.3152
##	5_g1	Study#5	1	g1	200	Scen11	162	1749.0500
##	6_g1	Study#6	0	g1	200	Scen11	163	1896.7833
##	1_g2	Study#1	1	g2	200	Scen11	190	922.3104
##	2_g2	Study#2	1	g2	200	Scen11	189	973.0542
##	3_g2	Study#3	1	g2	200	Scen11	194	925.5636
##	4_g2	Study#4	1	g2	200	Scen11	197	934.8412
##	5_g2	Study#5	1	g2	200	Scen11	193	1025.8741
##	6_g2	Study#6	0	g2	200	Scen11	193	1077.5747

The characteristics and thresholds for the simulation is as in the table below:

```

## [1] "With those values our newly created MAP Prior has been updated:"

##                                     csv group
## Continued Study Duration with Realistic Setting Scen11.csv      g1
##                                     analysis saf_topic
## Continued Study Duration with Realistic Setting Incidence proportion Scen11
##                                     seed pool      tau
## Continued Study Duration with Realistic Setting 1701876972 TRUE HalfNormal
##                                     heterog ESS rob_weight
## Continued Study Duration with Realistic Setting Small elir      0.05
##                                     nta_event nta_npat
## Continued Study Duration with Realistic Setting      170      200

```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.8458	0.846	0.8469	0.8472
Expected MAP Prior: SD	0.0133	0.0135	0.0143	0.0173
Expected MAP Prior: median	0.8461	0.8463	0.8475	0.8476
95% CrILB	0.8077	0.8163	0.8196	0.8201
95% CrIUB	0.8707	0.8713	0.8741	0.8801
ESS MAP Prior	503.3322	662.3413	740.7616	761.5512
Expected robustified MAP Prior: mean	0.8285	0.8287	0.8296	0.8298
Expected robustified MAP Prior: SD	0.1001	0.1002	0.1004	0.1007
Expected robustified MAP Prior: median	0.8454	0.8457	0.8468	0.847
95% CrILB	0.5	0.5	0.5	0.5
95% CrIUB	0.8725	0.8727	0.8757	0.8813
ESS robustified MAP	470.4463	617.2974	691.4401	708.0809
Expected results for Likelihood: mean	0.85	0.85	0.85	0.85
Expected results for Likelihood: SD	0.0252	0.0252	0.0252	0.0252
Expected results for Likelihood: median	0.8512	0.8512	0.8512	0.8512
95% CrILB	0.7975	0.7975	0.7975	0.7975
95% CrIUB	0.8959	0.8959	0.8959	0.8959
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.8468	0.8469	0.8477	0.8478
Expected results for Posterior: SD	0.0117	0.0118	0.0122	0.0134
Expected results for Posterior: median	0.8468	0.8469	0.848	0.8481
95% CrILB	0.8202	0.8221	0.8237	0.824
95% CrIUB	0.869	0.8693	0.8712	0.8731
ESS Posterior	NA	NA	NA	NA

## 6.12 Scenario 12 - Continued study duration with Worst Setting

Scenario 12 describes a binary endpoint for a scenario with a worst case scenario (scenario 4) that continued till the end of the proposed study duration. The scenario characteristics includes huge censoring, huge noise, little events observed, heterogeneous historical and huge prior data conflict.

```

SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = NA,
  SimStudy_NObsEvt = 400,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.15,
  prior_data_conflict = TRUE,
  pdc_hz = c(g1 = 0.05, g2 = 0.1),
  SAF_TOPIC = "Scen12",
  seed = 1701878308
)

```

```
##          STUDYID HIST ARM    N SAF_TOPIC N_WITH_AE  TOT_EXP  TREAT
```



```
## 1_g1 Study#1      1  g1 200      Scen12      193 2145.2002 Scen12
## 2_g1 Study#2      1  g1 200      Scen12      189 2026.7007 Scen12
## 3_g1 Study#3      1  g1 200      Scen12      192 2099.1503 Scen12
## 4_g1 Study#4      1  g1 200      Scen12      193 2200.2265 Scen12
## 5_g1 Study#5      1  g1 200      Scen12      189 2060.4879 Scen12
## 6_g1 Study#6      0  g1 200      Scen12      193 3214.6233 Scen12
## 1_g2 Study#1      1  g2 200      Scen12      196  927.0819 Scen12
## 2_g2 Study#2      1  g2 200      Scen12      193 1097.0120 Scen12
## 3_g2 Study#3      1  g2 200      Scen12      196 1112.5535 Scen12
## 4_g2 Study#4      1  g2 200      Scen12      195 1489.9002 Scen12
## 5_g2 Study#5      1  g2 200      Scen12      198 1575.7302 Scen12
## 6_g2 Study#6      0  g2 200      Scen12      191 1811.5262 Scen12
```

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
##
##                                     csv group
## Continued Study Duration with Worst Setting Scen12.csv      g1
##                                     analysis saf_topic
## Continued Study Duration with Worst Setting Incidence proportion Scen12
##                                     seed pool      tau heterog
## Continued Study Duration with Worst Setting 1701878308 TRUE HalfNormal Large
##                                     ESS rob_weight nta_event nta_npat
## Continued Study Duration with Worst Setting elir           0.5      30      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.9524	0.953	0.9542	0.9544
Expected MAP Prior: SD	0.0143	0.0148	0.0204	0.0237
Expected MAP Prior: median	0.9551	0.9553	0.9562	0.9563
95% CrILB	0.9034	0.912	0.9214	0.9224
95% CrIUB	0.975	0.9756	0.9782	0.98
ESS MAP Prior	259.1619	277.2156	362.0679	373.7183
Expected robustified MAP Prior: mean	0.7262	0.7264	0.7271	0.7272
Expected robustified MAP Prior: SD	0.305	0.3051	0.3055	0.3056
Expected robustified MAP Prior: median	0.93	0.9323	0.9349	0.9351
95% CrILB	0.05	0.05	0.05	0.05
95% CrIUB	0.9748	0.975	0.9774	0.9786
ESS robustified MAP	111.3519	121.4599	163.1765	169.3251
Expected results for Likelihood: mean	0.15	0.15	0.15	0.15
Expected results for Likelihood: SD	0.0252	0.0252	0.0252	0.0252
Expected results for Likelihood: median	0.1488	0.1488	0.1488	0.1488
95% CrILB	0.1041	0.1041	0.1041	0.1041
95% CrIUB	0.2025	0.2025	0.2025	0.2025
ESS Likelihood	NA	NA	NA	NA
Expected results for Posterior: mean	0.1535	0.1535	0.1535	0.1535
Expected results for Posterior: SD	0.0253	0.0253	0.0253	0.0253
Expected results for Posterior: median	0.1523	0.1523	0.1523	0.1523
95% CrILB	0.1072	0.1073	0.1073	0.1073
95% CrIUB	0.2061	0.2061	0.2062	0.2062
ESS Posterior	NA	NA	NA	NA

## 6.13 Scenario 13 - Different treatment length

Scenario 13 describes a good scenario with different treatment length.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 1,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  diff_trt_length = TRUE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen13",
  seed = 1718356066
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	LENGTH	TREAT
##	1_g1	Study#1	1	g1	200	Scen13	151	1566.6752	548 Scen13
##	2_g1	Study#2	1	g1	200	Scen13	150	1494.2869	548 Scen13
##	3_g1	Study#3	1	g1	200	Scen13	174	1599.3219	730 Scen13
##	4_g1	Study#4	1	g1	200	Scen13	173	1799.5756	730 Scen13
##	5_g1	Study#5	1	g1	200	Scen13	185	1708.9438	912 Scen13
##	6_g1	Study#6	0	g1	200	Scen13	186	1681.4362	912 Scen13
##	1_g2	Study#1	1	g2	200	Scen13	185	897.0528	548 Scen13
##	2_g2	Study#2	1	g2	200	Scen13	185	872.8150	548 Scen13
##	3_g2	Study#3	1	g2	200	Scen13	191	943.3266	730 Scen13
##	4_g2	Study#4	1	g2	200	Scen13	194	872.9301	730 Scen13
##	5_g2	Study#5	1	g2	200	Scen13	192	1047.1975	912 Scen13
##	6_g2	Study#6	0	g2	200	Scen13	198	861.1155	912 Scen13

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##                                csv group          analysis saf_topic
## Different treatment length Scen13.csv    g1 Incidence proportion    Scen13
##                                seed pool          tau heterog    ESS rob_weight
## Different treatment length 1718356066 TRUE HalfNormal    Large elir          0.1
##                                nta_event nta_npat
## Different treatment length          186          200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
Expected MAP Prior: mean	0.8107	0.8174	0.8247	0.8259
Expected MAP Prior: SD	0.09	0.0924	0.1013	0.1251
Expected MAP Prior: median	0.8339	0.8358	0.8433	0.8448
95% CrILB	0.4636	0.5513	0.5973	0.6031
95% CrIUB	0.9469	0.9485	0.9564	0.9632
ESS	16.3107	18.8341	21.8854	22.7865
Expected robustified MAP Prior: mean	0.7793	0.7855	0.792	0.7931
Expected robustified MAP Prior: SD	0.1587	0.1593	0.1636	0.1765
Expected robustified MAP Prior: median	0.8267	0.8283	0.8353	0.8369
95% CrILB	0.2166	0.2427	0.2491	0.2496
95% CrIUB	0.9484	0.9494	0.9557	0.9627
ESS	12.8102	15.5257	18.1352	18.9596
Expected results for Likelihood: mean	0.93	0.93	0.93	0.93
Expected results for Likelihood: SD	0.018	0.018	0.018	0.018
Expected results for Likelihood: median	0.9314	0.9314	0.9314	0.9314
95% CrILB	0.8909	0.8909	0.8909	0.8909
95% CrIUB	0.961	0.961	0.961	0.961
ESS	NA	NA	NA	NA
Expected results for Posterior: mean	0.9179	0.9184	0.9203	0.9213
Expected results for Posterior: SD	0.0178	0.0179	0.0183	0.0184
Expected results for Posterior: median	0.9189	0.9195	0.9215	0.9225
95% CrILB	0.8793	0.8797	0.8815	0.8826
95% CrIUB	0.9502	0.9505	0.9523	0.953
ESS	NA	NA	NA	NA

## 7 Time To Event Endpoint results

### 7.1 Scenario 1 - Best Case Scenario

```
# Scen1
SimTestData(
  SimStudy_nPat = c(g1 = 300, g2 = 300),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0, time = 12),
  SimStudy_accr = 1,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 0.999,
  SimStudy_censor_type = 2,
  nStudy = 10,
  tau = 0,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen1",
  seed = 1699874539
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
## 1_g1	Study#1	1	g1	300	Scen1	299	2828.715	Scen1
## 2_g1	Study#2	1	g1	300	Scen1	299	2882.367	Scen1
## 3_g1	Study#3	1	g1	300	Scen1	299	3236.408	Scen1
## 4_g1	Study#4	1	g1	300	Scen1	299	3085.252	Scen1
## 5_g1	Study#5	1	g1	300	Scen1	299	2984.353	Scen1
## 6_g1	Study#6	1	g1	300	Scen1	299	3305.953	Scen1
## 7_g1	Study#7	1	g1	300	Scen1	299	2975.530	Scen1
## 8_g1	Study#8	1	g1	300	Scen1	299	3103.969	Scen1
## 9_g1	Study#9	1	g1	300	Scen1	299	2763.876	Scen1
## 10_g1	Study#10	0	g1	300	Scen1	299	3044.691	Scen1
## 1_g2	Study#1	1	g2	300	Scen1	300	1466.836	Scen1
## 2_g2	Study#2	1	g2	300	Scen1	300	1604.556	Scen1
## 3_g2	Study#3	1	g2	300	Scen1	300	1428.295	Scen1
## 4_g2	Study#4	1	g2	300	Scen1	300	1472.222	Scen1
## 5_g2	Study#5	1	g2	300	Scen1	300	1678.517	Scen1
## 6_g2	Study#6	1	g2	300	Scen1	300	1504.812	Scen1
## 7_g2	Study#7	1	g2	300	Scen1	300	1626.479	Scen1
## 8_g2	Study#8	1	g2	300	Scen1	300	1480.283	Scen1
## 9_g2	Study#9	1	g2	300	Scen1	300	1644.251	Scen1
## 10_g2	Study#10	0	g2	300	Scen1	300	1519.465	Scen1

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##          csv group          analysis saf_topic
## Best Case Scenario Scen01.csv   g1 Exposure-adjusted AE rate   Scen01
##          seed pool          tau heterog   ESS rob_weight rob_mean
## Best Case Scenario 1699874539 TRUE HalfNormal   Small elir      0.05      0.1
##          nta_event nta_time
## Best Case Scenario      100      1000
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.3129	-2.3123	-2.3093	-2.3088
log Expected MAP Prior: SD	0.0394	0.0399	0.0436	0.0445
log Expected MAP Prior: median	-2.3134	-2.3125	-2.3095	-2.3091
log 95% CrILB	-2.4062	-2.4039	-2.3897	-2.3877
log 95% CrIUB	-2.233	-2.2306	-2.2167	-2.2146
log ENE	736.2409	763.0512	886.8576	3395463.4564
log Expected robustified MAP Prior: mean	-2.3124	-2.3118	-2.3089	-2.3085
log Expected robustified MAP Prior: SD	0.2269	0.227	0.2276	0.2278
log Expected robustified MAP Prior: median	-2.313	-2.3123	-2.3095	-2.3092
log 95% CrILB	-2.4887	-2.4778	-2.445	-2.4413
log 95% CrIUB	-2.1743	-2.1713	-2.1405	-2.1325
log ENE	690.6398	715.8271	833.4278	3161488.7143
log Expected results for Likelihood: mean	-2.3026	-2.3026	-2.3026	-2.3026
log Expected results for Likelihood: SD	0.1	0.1	0.1	0.1
log Expected results for Likelihood: median	-2.3026	-2.3026	-2.3026	-2.3026
log 95% CrILB	-2.4986	-2.4986	-2.4986	-2.4986
log 95% CrIUB	-2.1066	-2.1066	-2.1066	-2.1066
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.3113	-2.3111	-2.3087	-2.3083
log Expected results for Posterior: SD	0.0348	0.0352	0.0372	0.0376
log Expected results for Posterior: median	-2.3121	-2.3114	-2.3089	-2.3085
log 95% CrILB	-2.3885	-2.387	-2.3784	-2.3773
log 95% CrIUB	-2.2396	-2.2388	-2.2292	-2.2276
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.0991	0.0991	0.0994	0.0995
exp Expected MAP Prior: SD	0.0039	0.004	0.0044	0.0045
exp Expected MAP Prior: median	0.0989	0.099	0.0993	0.0994
exp 95% CrILB	0.0902	0.0904	0.0917	0.0918
exp 95% CrIUB	0.1072	0.1075	0.109	0.1092
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.102	0.1022	0.103	0.1031
exp Expected robustified MAP Prior: SD	0.0409	0.0448	0.0595	0.1086
exp Expected robustified MAP Prior: median	0.099	0.099	0.0993	0.0993
exp 95% CrILB	0.083	0.0838	0.0867	0.0874
exp 95% CrIUB	0.1132	0.1136	0.118	0.119
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.0992	0.0992	0.0995	0.0995
exp Expected results for Posterior: SD	0.0035	0.0035	0.0037	0.0038
exp Expected results for Posterior: median	0.0991	0.0991	0.0994	0.0994
exp 95% CrILB	0.0918	0.0919	0.0927	0.0929
exp 95% CrIUB	0.1064	0.1066	0.1076	0.1077
exp ENE	NA	NA	NA	NA

## 7.2 Scenario 2 - Strong Prior Data Conflict

Scenario 2 describes a test case scenario for a binary endpoint with a strong prior data conflict between the historical and current trials. The characteristics of this scenario includes no censoring in the current trial, no noise, all events being observed, homogeneous historical data and heavy prior data conflict.

```
# Scen2
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.3),
  SimStudy_dropout = c(rate = 0, time = 12),
  SimStudy_accr = 1,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 0.9,
  SimStudy_censor_type = 2,
  nStudy = 10,
  tau = 0.01,
  prior_data_conflict = TRUE,
  pdc_hz = c(g1 = 0.4, g2 = 0.05),
  SAF_TOPIC = "Scen2",
  seed = 1701611344
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
## 1_g1	Study#1	1	g1	200	Scen2	161	1530.2128	Scen2
## 2_g1	Study#2	1	g1	200	Scen2	162	1528.7454	Scen2
## 3_g1	Study#3	1	g1	200	Scen2	160	1660.3443	Scen2
## 4_g1	Study#4	1	g1	200	Scen2	161	1840.7538	Scen2
## 5_g1	Study#5	1	g1	200	Scen2	162	1605.1504	Scen2
## 6_g1	Study#6	1	g1	200	Scen2	164	1496.5477	Scen2
## 7_g1	Study#7	1	g1	200	Scen2	161	1622.6838	Scen2
## 8_g1	Study#8	1	g1	200	Scen2	162	1575.8092	Scen2
## 9_g1	Study#9	1	g1	200	Scen2	161	1638.6499	Scen2
## 10_g1	Study#10	0	g1	200	Scen2	200	439.5240	Scen2
## 1_g2	Study#1	1	g2	200	Scen2	199	723.4652	Scen2
## 2_g2	Study#2	1	g2	200	Scen2	198	725.3088	Scen2
## 3_g2	Study#3	1	g2	200	Scen2	200	633.6027	Scen2
## 4_g2	Study#4	1	g2	200	Scen2	199	631.2705	Scen2
## 5_g2	Study#5	1	g2	200	Scen2	198	701.9784	Scen2
## 6_g2	Study#6	1	g2	200	Scen2	196	705.4184	Scen2
## 7_g2	Study#7	1	g2	200	Scen2	199	680.0606	Scen2
## 8_g2	Study#8	1	g2	200	Scen2	198	704.2055	Scen2
## 9_g2	Study#9	1	g2	200	Scen2	199	727.2699	Scen2
## 10_g2	Study#10	0	g2	200	Scen2	160	3910.1011	Scen2

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##          csv group          analysis saf_topic
## Strong Prior Data Conflict Scen02.csv    g2 Exposure-adjusted AE rate    Scen02
##          seed pool          tau heterog ESS rob_weight
## Strong Prior Data Conflict 1701611344 TRUE HalfNormal    Small elir          0.8
```

##		rob_mean	nta_event	nta_time
##	Strong Prior Data Conflict	0.3854	200	518

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.3005	-2.2999	-2.2963	-2.2957
log Expected MAP Prior: SD	0.0456	0.0466	0.0505	0.0522
log Expected MAP Prior: median	-2.3005	-2.3	-2.2964	-2.2958
log 95% CrILB	-2.4081	-2.4046	-2.3892	-2.3879
log 95% CrIUB	-2.209	-2.2062	-2.1903	-2.1867
log ENE	501.6945	515.8801	602.4201	2621456.6029
log Expected robustified MAP Prior: mean	-1.2229	-1.2227	-1.222	-1.2219
log Expected robustified MAP Prior: SD	1.0434	1.0435	1.0443	1.0444
log Expected robustified MAP Prior: median	-1.2721	-1.2721	-1.2721	-1.2721
log 95% CrILB	-2.8166	-2.8162	-2.8162	-2.8162
log 95% CrIUB	0.9093	0.9093	0.9093	0.9093
log ENE	78.9374	82.4984	98.2023	438521.5568
log Expected results for Likelihood: mean	-0.9517	-0.9517	-0.9517	-0.9517
log Expected results for Likelihood: SD	0.0707	0.0707	0.0707	0.0707
log Expected results for Likelihood: median	-0.9517	-0.9517	-0.9517	-0.9517
log 95% CrILB	-1.0902	-1.0902	-1.0902	-1.0902
log 95% CrIUB	-0.8131	-0.8131	-0.8131	-0.8131
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-0.9517	-0.9517	-0.9517	-0.9517
log Expected results for Posterior: SD	0.0705	0.0705	0.0705	0.0705
log Expected results for Posterior: median	-0.9517	-0.9517	-0.9517	-0.9516
log 95% CrILB	-1.0899	-1.0899	-1.0899	-1.0899
log 95% CrIUB	-0.8135	-0.8135	-0.8134	-0.8134
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.1003	0.1004	0.1008	0.1008
exp Expected MAP Prior: SD	0.0046	0.0047	0.0051	0.0053
exp Expected MAP Prior: median	0.1002	0.1003	0.1006	0.1007
exp 95% CrILB	0.09	0.0903	0.0917	0.0918
exp 95% CrIUB	0.1098	0.1101	0.1119	0.1123
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.5209	0.5226	0.5346	0.5366
exp Expected robustified MAP Prior: SD	0.7416	0.7493	0.8173	0.874
exp Expected robustified MAP Prior: median	0.2757	0.277	0.2837	0.2851
exp 95% CrILB	0.0581	0.0586	0.0612	0.0616
exp 95% CrIUB	2.4133	2.4318	2.5368	2.5511
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.3868	0.3869	0.3872	0.3873
exp Expected results for Posterior: SD	0.0271	0.0272	0.0275	0.0275
exp Expected results for Posterior: median	0.3857	0.3858	0.3863	0.3864
exp 95% CrILB	0.3356	0.3358	0.3367	0.3369
exp 95% CrIUB	0.4426	0.4427	0.444	0.4444
exp ENE	NA	NA	NA	NA



### 7.3 Scenario 3 - Realistic Scenario

Scenario 3 describes a binary endpoint for a realistic situation with a dropout rate of 5%, some with a 2% tau, events observed at a 90% power, homogeneous historical data and with no planned prior data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen3",
  seed = 1701621384
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT	
##	1_g1	Study#1	1	g1	200	Scen3	30	282.8273	Scen3
##	2_g1	Study#2	1	g1	200	Scen3	35	345.5776	Scen3
##	3_g1	Study#3	1	g1	200	Scen3	32	355.6786	Scen3
##	4_g1	Study#4	1	g1	200	Scen3	35	409.5392	Scen3
##	5_g1	Study#5	1	g1	200	Scen3	36	207.1725	Scen3
##	6_g1	Study#6	0	g1	200	Scen3	40	291.3027	Scen3
##	1_g2	Study#1	1	g2	200	Scen3	60	259.6821	Scen3
##	2_g2	Study#2	1	g2	200	Scen3	52	268.0612	Scen3
##	3_g2	Study#3	1	g2	200	Scen3	57	237.5458	Scen3
##	4_g2	Study#4	1	g2	200	Scen3	54	359.4474	Scen3
##	5_g2	Study#5	1	g2	200	Scen3	52	170.1687	Scen3
##	6_g2	Study#6	0	g2	200	Scen3	50	266.0703	Scen3

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##               csv group               analysis saf_topic
## Realistic scenario Scen03.csv   g1 Exposure-adjusted AE rate   Scen03
##               seed pool               tau      heterog ESS rob_weight
## Realistic scenario 1701621384 TRUE HalfNormal Substantial elir      0.25
##               rob_mean nta_event nta_time
## Realistic scenario   0.0944      31   328.47
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.3025	-2.2986	-2.2771	-2.2722
log Expected MAP Prior: SD	0.2536	0.2586	0.2831	0.2894
log Expected MAP Prior: median	-2.3132	-2.3047	-2.2865	-2.2821
log 95% CrILB	-2.8865	-2.8733	-2.7934	-2.7846
log 95% CrIUB	-1.7698	-1.7477	-1.6492	-1.6336
log ENE	17.4891	18.2772	22.374	23.0881
log Expected robustified MAP Prior: mean	-2.317	-2.314	-2.2979	-2.2942
log Expected robustified MAP Prior: SD	0.5469	0.5487	0.5579	0.5602
log Expected robustified MAP Prior: median	-2.3116	-2.3066	-2.2903	-2.2865
log 95% CrILB	-3.6569	-3.655	-3.6419	-3.6418
log 95% CrIUB	-1.0777	-1.0771	-1.0481	-1.0433
log ENE	11.1563	11.65	14.5225	14.9138
log Expected results for Likelihood: mean	-2.3605	-2.3605	-2.3605	-2.3605
log Expected results for Likelihood: SD	0.1796	0.1796	0.1796	0.1796
log Expected results for Likelihood: median	-2.3605	-2.3605	-2.3605	-2.3605
log 95% CrILB	-2.7125	-2.7125	-2.7125	-2.7125
log 95% CrIUB	-2.0084	-2.0084	-2.0084	-2.0084
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.3399	-2.3376	-2.3291	-2.328
log Expected results for Posterior: SD	0.1315	0.1326	0.1387	0.1397
log Expected results for Posterior: median	-2.3391	-2.3362	-2.3262	-2.3248
log 95% CrILB	-2.6198	-2.6173	-2.6029	-2.5955
log 95% CrIUB	-2.0785	-2.0764	-2.0649	-2.0617
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.1036	0.1042	0.1068	0.1073
exp Expected MAP Prior: SD	0.0284	0.0292	0.0396	0.0504
exp Expected MAP Prior: median	0.0989	0.0998	0.1016	0.1021
exp 95% CrILB	0.0558	0.0565	0.0612	0.0618
exp 95% CrIUB	0.1704	0.1742	0.1922	0.1952
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.1164	0.1167	0.1192	0.1197
exp Expected robustified MAP Prior: SD	0.0999	0.1014	0.1175	0.1636
exp Expected robustified MAP Prior: median	0.099	0.0995	0.1013	0.1017
exp 95% CrILB	0.0252	0.0254	0.0268	0.0271
exp 95% CrIUB	0.3307	0.3343	0.3536	0.3608
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.0972	0.0974	0.0983	0.0985
exp Expected results for Posterior: SD	0.0128	0.013	0.0136	0.0137
exp Expected results for Posterior: median	0.0964	0.0967	0.0977	0.0978
exp 95% CrILB	0.0725	0.073	0.0741	0.0746
exp 95% CrIUB	0.1249	0.1253	0.1269	0.1273
exp ENE	NA	NA	NA	NA

## 7.4 Scenario 4 - Worst Case Scenario

Scenario 4 describes a binary endpoint for a worst case scenario with huge censoring during the trial, huge noise in the data, low number of events observed at 90% power, heterogeneous historical data and huge data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 50, g2 = 100),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.2, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 112,
  SimStudy_censor_type = 2,
  nStudy = 3,
  tau = 0.15,
  prior_data_conflict = TRUE,
  pdc_hz = c(g1 = 0.05, g2 = 0.1),
  SAF_TOPIC = "Scen4",
  seed = 1701626683
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1 g1	50	Scen4	28	197.5691	Scen4
##	2_g1	Study#2	1 g1	50	Scen4	27	237.3923	Scen4
##	3_g1	Study#3	0 g1	50	Scen4	23	425.0280	Scen4
##	1_g2	Study#1	1 g2	100	Scen4	73	283.1671	Scen4
##	2_g2	Study#2	1 g2	100	Scen4	73	334.8827	Scen4
##	3_g2	Study#3	0 g2	100	Scen4	70	750.5857	Scen4

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##               csv group               analysis saf_topic
## worst Case Scenario Scen04.csv      g1 Exposure-adjusted AE rate   Scen04
##               seed pool               tau   heterog ESS rob_weight
## worst Case Scenario 1701626683 TRUE HalfNormal Very Large elir      0.25
##               rob_mean nta_event nta_time
## worst Case Scenario  0.0539      31   328.47
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-1.7523	-1.7358	-1.6477	-1.5713
log Expected MAP Prior: SD	0.9037	0.9294	1.0706	1.2833
log Expected MAP Prior: median	-1.942	-1.9336	-1.8875	-1.8721
log 95% CrILB	-3.5157	-3.4159	-3.1215	-3.084
log 95% CrIUB	0.5523	0.6537	1.2223	2.0621
log ENE	2.6458	3.4408	5.2377	5.5649
log Expected robustified MAP Prior: mean	-2.0444	-2.032	-1.9659	-1.9086
log Expected robustified MAP Prior: SD	1.062	1.0792	1.1857	1.351
log Expected robustified MAP Prior: median	-2.0488	-2.0336	-1.9981	-1.9841
log 95% CrILB	-4.4101	-4.3535	-4.2863	-4.2809
log 95% CrIUB	0.3744	0.4744	0.9332	1.6365
log ENE	1.7239	2.2197	3.392	3.5796
log Expected results for Likelihood: mean	-2.3605	-2.3605	-2.3605	-2.3605
log Expected results for Likelihood: SD	0.1796	0.1796	0.1796	0.1796
log Expected results for Likelihood: median	-2.3605	-2.3605	-2.3605	-2.3605
log 95% CrILB	-2.7125	-2.7125	-2.7125	-2.7125
log 95% CrIUB	-2.0084	-2.0084	-2.0084	-2.0084
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.3231	-2.3096	-2.2889	-2.2869
log Expected results for Posterior: SD	0.1677	0.1685	0.1716	0.1727
log Expected results for Posterior: median	-2.3222	-2.3077	-2.2836	-2.2811
log 95% CrILB	-2.6642	-2.6509	-2.6369	-2.6352
log 95% CrIUB	-1.9873	-1.9803	-1.9688	-1.9664
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.368	0.4056	4.4864	17.0341
exp Expected MAP Prior: SD	1.4497	1.7607	216.052	1042.1225
exp Expected MAP Prior: median	0.1434	0.1446	0.1514	0.1538
exp 95% CrILB	0.0297	0.0328	0.0441	0.0458
exp 95% CrIUB	1.7372	1.9226	3.3952	7.8628
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.2586	0.2736	0.3859	0.7443
exp Expected robustified MAP Prior: SD	0.6003	0.7204	1.9481	6.1261
exp Expected robustified MAP Prior: median	0.1288	0.1307	0.1357	0.1372
exp 95% CrILB	0.0123	0.0128	0.0139	0.014
exp 95% CrIUB	1.4651	1.6043	2.5705	5.1572
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.0994	0.1008	0.1028	0.103
exp Expected results for Posterior: SD	0.017	0.0171	0.0174	0.0175
exp Expected results for Posterior: median	0.098	0.0995	0.1019	0.1022
exp 95% CrILB	0.0695	0.0706	0.0717	0.0719
exp 95% CrIUB	0.1369	0.138	0.1397	0.1399
exp ENE	NA	NA	NA	NA

## 7.5 Scenario 5 - Heterogeneous Data (Medium)

Scenario 5 describes a binary endpoint for a medium heterogeneous scenario between the historical data, moderate noise at a 5% tau, moderate censoring at 5%, all events observed at a 90% power and no planned prior data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 1,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.05,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen5",
  seed = 1701628373
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1	g1	200	Scen5	24	336.2761
##	2_g1	Study#2	1	g1	200	Scen5	35	328.5856
##	3_g1	Study#3	1	g1	200	Scen5	26	319.0432
##	4_g1	Study#4	1	g1	200	Scen5	36	319.4839
##	5_g1	Study#5	1	g1	200	Scen5	39	282.5063
##	6_g1	Study#6	0	g1	200	Scen5	25	289.3660
##	1_g2	Study#1	1	g2	200	Scen5	68	295.3881
##	2_g2	Study#2	1	g2	200	Scen5	55	310.0651
##	3_g2	Study#3	1	g2	200	Scen5	63	290.2667
##	4_g2	Study#4	1	g2	200	Scen5	54	288.7203
##	5_g2	Study#5	1	g2	200	Scen5	52	283.8704
##	6_g2	Study#6	0	g2	200	Scen5	66	263.6880

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##                                csv group                                analysis
## Heterogeneity Data (Medium) Scen05.csv      g1 Exposure-adjusted AE rate
##                                saf_topic      seed pool                    tau heterog ESS
## Heterogeneity Data (Medium)      Scen05 1701628373 TRUE HalfNormal    Large elir
##                                rob_weight rob_mean nta_event nta_time
## Heterogeneity Data (Medium)      0.2    0.0865          25          289
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.2707	-2.268	-2.2415	-2.207
log Expected MAP Prior: SD	0.3111	0.3182	0.3572	0.4687
log Expected MAP Prior: median	-2.2833	-2.2788	-2.2595	-2.2539
log 95% CrILB	-2.98	-2.9658	-2.8585	-2.8466
log 95% CrIUB	-1.606	-1.5813	-1.4337	-0.9871
log ENE	13.6623	14.9005	19.2428	20.0071
log Expected robustified MAP Prior: mean	-2.306	-2.3039	-2.2827	-2.2552
log Expected robustified MAP Prior: SD	0.5315	0.5351	0.5551	0.6205
log Expected robustified MAP Prior: median	-2.2887	-2.2867	-2.2689	-2.2656
log 95% CrILB	-3.6636	-3.6553	-3.608	-3.6001
log 95% CrIUB	-1.2033	-1.1885	-1.0758	-0.7472
log ENE	9.6863	10.5677	13.8846	14.4188
log Expected results for Likelihood: mean	-2.4476	-2.4476	-2.4476	-2.4476
log Expected results for Likelihood: SD	0.2	0.2	0.2	0.2
log Expected results for Likelihood: median	-2.4476	-2.4476	-2.4476	-2.4476
log 95% CrILB	-2.8395	-2.8395	-2.8395	-2.8395
log 95% CrIUB	-2.0556	-2.0556	-2.0556	-2.0556
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.3794	-2.3773	-2.3665	-2.3651
log Expected results for Posterior: SD	0.1505	0.1516	0.1588	0.1598
log Expected results for Posterior: median	-2.3741	-2.371	-2.3553	-2.3548
log 95% CrILB	-2.7184	-2.7147	-2.6946	-2.6883
log 95% CrIUB	-2.0944	-2.0928	-2.0782	-2.0769
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.1088	0.1097	0.1146	0.1396
exp Expected MAP Prior: SD	0.0386	0.0421	0.1495	0.3556
exp Expected MAP Prior: median	0.1019	0.1024	0.1044	0.105
exp 95% CrILB	0.0508	0.0515	0.0574	0.058
exp 95% CrIUB	0.2007	0.2057	0.2384	0.3726
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.1157	0.116	0.1201	0.1378
exp Expected robustified MAP Prior: SD	0.0878	0.0889	0.1098	0.2624
exp Expected robustified MAP Prior: median	0.1013	0.1016	0.1035	0.1038
exp 95% CrILB	0.0252	0.0257	0.0274	0.0277
exp 95% CrIUB	0.2984	0.3039	0.3425	0.4759
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.0937	0.0939	0.0949	0.095
exp Expected results for Posterior: SD	0.014	0.0141	0.0148	0.0149
exp Expected results for Posterior: median	0.093	0.0934	0.0949	0.095
exp 95% CrILB	0.0659	0.0662	0.0676	0.0679
exp 95% CrIUB	0.123	0.1233	0.1252	0.1255
exp ENE	NA	NA	NA	NA

## 7.6 Scenario 6 - High Dropout

Scenario 6 describes a binary endpoint scenario with huge dropout within the current trial, some noise at a 2% tau, some event being observed at a 90% power, homogeneous data and no planned prior data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.3, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 95,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen6",
  seed = 1701628373
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT	
##	1_g1	Study#1	1	g1	200	Scen6	26	291.6589	Scen6
##	2_g1	Study#2	1	g1	200	Scen6	27	225.3005	Scen6
##	3_g1	Study#3	1	g1	200	Scen6	28	292.3146	Scen6
##	4_g1	Study#4	1	g1	200	Scen6	28	268.4692	Scen6
##	5_g1	Study#5	1	g1	200	Scen6	40	212.6690	Scen6
##	6_g1	Study#6	0	g1	200	Scen6	24	198.0645	Scen6
##	1_g2	Study#1	1	g2	200	Scen6	56	226.4060	Scen6
##	2_g2	Study#2	1	g2	200	Scen6	52	203.6631	Scen6
##	3_g2	Study#3	1	g2	200	Scen6	55	255.6490	Scen6
##	4_g2	Study#4	1	g2	200	Scen6	47	221.9167	Scen6
##	5_g2	Study#5	1	g2	200	Scen6	45	238.6339	Scen6
##	6_g2	Study#6	0	g2	200	Scen6	54	219.5831	Scen6

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##          csv group          analysis saf_topic      seed
## High Dropout Scen06.csv    g1 Exposure-adjusted AE rate    Scen06 1701628373
##          pool          tau heterog ESS rob_weight rob_mean nta_event
## High Dropout TRUE HalfNormal Moderate elir          0.14  0.1204          31
##          nta_time
## High Dropout          257
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.1461	-2.144	-2.1296	-2.1263
log Expected MAP Prior: SD	0.1854	0.1896	0.2043	0.2071
log Expected MAP Prior: median	-2.1492	-2.146	-2.1321	-2.13
log 95% CrILB	-2.5773	-2.5648	-2.5086	-2.5023
log 95% CrIUB	-1.7599	-1.75	-1.6922	-1.6713
log ENE	29.2203	30.1353	35.755	37.0992
log Expected robustified MAP Prior: mean	-2.142	-2.1402	-2.1279	-2.125
log Expected robustified MAP Prior: SD	0.4118	0.4135	0.4194	0.4206
log Expected robustified MAP Prior: median	-2.147	-2.1452	-2.1321	-2.13
log 95% CrILB	-3.0557	-3.0527	-3.0382	-3.038
log 95% CrIUB	-1.196	-1.1959	-1.184	-1.1631
log ENE	22.7554	23.4656	27.9901	29.0979
log Expected results for Likelihood: mean	-2.1151	-2.1151	-2.1151	-2.1151
log Expected results for Likelihood: SD	0.1796	0.1796	0.1796	0.1796
log Expected results for Likelihood: median	-2.1151	-2.1151	-2.1151	-2.1151
log 95% CrILB	-2.4671	-2.4671	-2.4671	-2.4671
log 95% CrIUB	-1.7631	-1.7631	-1.7631	-1.7631
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.134	-2.1324	-2.1249	-2.1241
log Expected results for Posterior: SD	0.1184	0.1195	0.1244	0.1252
log Expected results for Posterior: median	-2.1366	-2.1343	-2.1254	-2.1231
log 95% CrILB	-2.3769	-2.3743	-2.3614	-2.3602
log 95% CrIUB	-1.8912	-1.889	-1.8737	-1.8709
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.1192	0.1195	0.1213	0.1217
exp Expected MAP Prior: SD	0.0227	0.0235	0.0263	0.0276
exp Expected MAP Prior: median	0.1166	0.1169	0.1186	0.1188
exp 95% CrILB	0.076	0.0769	0.0814	0.0819
exp 95% CrIUB	0.1721	0.1738	0.1841	0.188
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.13	0.1303	0.1324	0.1328
exp Expected robustified MAP Prior: SD	0.092	0.0965	0.116	0.1259
exp Expected robustified MAP Prior: median	0.1168	0.117	0.1186	0.1189
exp 95% CrILB	0.0458	0.0463	0.0493	0.0497
exp 95% CrIUB	0.2901	0.2938	0.3129	0.3163
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.1192	0.1194	0.1204	0.1205
exp Expected results for Posterior: SD	0.0143	0.0144	0.0151	0.0152
exp Expected results for Posterior: median	0.1181	0.1183	0.1194	0.1197
exp 95% CrILB	0.0928	0.0931	0.0943	0.0946
exp 95% CrIUB	0.1507	0.1511	0.1536	0.1542
exp ENE	NA	NA	NA	NA



## 7.7 Scenario 7 - High Heterogeneity

Scenario 7 describes a binary endpoint scenario with high heterogeneity between historical data, moderate censoring in current trial, moderate noise at a 2% tau, all events observed at a 90% power, with no planned prior data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.15,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen7",
  seed = 1701416989
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1	g1	200	Scen7	32	222.47360
##	2_g1	Study#2	1	g1	200	Scen7	27	270.34094
##	3_g1	Study#3	1	g1	200	Scen7	32	271.08747
##	4_g1	Study#4	1	g1	200	Scen7	36	116.93497
##	5_g1	Study#5	1	g1	200	Scen7	29	111.37228
##	6_g1	Study#6	0	g1	200	Scen7	23	163.68689
##	1_g2	Study#1	1	g2	200	Scen7	59	189.49417
##	2_g2	Study#2	1	g2	200	Scen7	62	284.62991
##	3_g2	Study#3	1	g2	200	Scen7	58	210.80011
##	4_g2	Study#4	1	g2	200	Scen7	56	77.53109
##	5_g2	Study#5	1	g2	200	Scen7	62	118.22857
##	6_g2	Study#6	0	g2	200	Scen7	68	97.68813

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##               csv group               analysis saf_topic
## High Heterogeneity Scen07.csv    g1 Exposure-adjusted AE rate    Scen07
##               seed pool               tau    heterog    ESS rob_weight
## High Heterogeneity 1701416989 TRUE HalfNormal Very Large elir        0.2
##               rob_mean nta_event nta_time
## High Heterogeneity    0.19        35      200
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-1.6779	-1.6708	-1.614	-1.6052
log Expected MAP Prior: SD	0.7138	0.7264	0.7997	0.808
log Expected MAP Prior: median	-1.7163	-1.7099	-1.6537	-1.6422
log 95% CrILB	-3.2246	-3.1904	-2.976	-2.9361
log 95% CrIUB	-0.1432	-0.1124	0.1745	0.216
log ENE	2.0397	2.1646	2.5676	584.7937
log Expected robustified MAP Prior: mean	-1.6744	-1.6688	-1.6233	-1.6163
log Expected robustified MAP Prior: SD	0.7795	0.7887	0.8436	0.85
log Expected robustified MAP Prior: median	-1.7097	-1.6983	-1.6533	-1.6456
log 95% CrILB	-3.3582	-3.333	-3.1921	-3.1756
log 95% CrIUB	0.0167	0.0461	0.2778	0.3313
log ENE	1.7138	1.7954	2.0715	467.8661
log Expected results for Likelihood: mean	-1.743	-1.743	-1.743	-1.743
log Expected results for Likelihood: SD	0.169	0.169	0.169	0.169
log Expected results for Likelihood: median	-1.743	-1.743	-1.743	-1.743
log 95% CrILB	-2.0743	-2.0743	-2.0743	-2.0743
log 95% CrIUB	-1.4117	-1.4117	-1.4117	-1.4117
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-1.7455	-1.7446	-1.7359	-1.7352
log Expected results for Posterior: SD	0.1588	0.1597	0.163	0.1633
log Expected results for Posterior: median	-1.746	-1.7451	-1.7357	-1.7349
log 95% CrILB	-2.0619	-2.0605	-2.0526	-2.0507
log 95% CrIUB	-1.4306	-1.4292	-1.4188	-1.4179
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.253	0.2624	0.621	5.7172
exp Expected MAP Prior: SD	0.3265	0.3684	19.763	344.1807
exp Expected MAP Prior: median	0.1797	0.1809	0.1913	0.1936
exp 95% CrILB	0.0398	0.0412	0.051	0.0531
exp 95% CrIUB	0.8666	0.8937	1.1906	1.2411
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.2651	0.2702	0.354	5.071
exp Expected robustified MAP Prior: SD	0.3223	0.3478	5.9	322.8276
exp Expected robustified MAP Prior: median	0.1808	0.1829	0.1918	0.1934
exp 95% CrILB	0.0345	0.0357	0.0412	0.042
exp 95% CrIUB	1.009	1.0454	1.3185	1.378
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.1767	0.177	0.1786	0.1788
exp Expected results for Posterior: SD	0.0283	0.0285	0.0293	0.0294
exp Expected results for Posterior: median	0.1744	0.1747	0.1763	0.1766
exp 95% CrILB	0.127	0.1272	0.1286	0.1288
exp 95% CrIUB	0.239	0.2393	0.2423	0.2429
exp ENE	NA	NA	NA	NA

## 7.8 Scenario 8 - Bad Scenario

Scenario 8 describes a binary endpoint for a bad scenario with huge censoring in the current trial, huge noise, little events observed in the current trial, heterogeneous historical data and no planned prior data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.3, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.15,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen8",
  seed = 1701652217
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT	
##	1_g1	Study#1	1	g1	200	Scen8	22	297.7669	Scen8
##	2_g1	Study#2	1	g1	200	Scen8	31	298.1832	Scen8
##	3_g1	Study#3	1	g1	200	Scen8	21	307.9312	Scen8
##	4_g1	Study#4	1	g1	200	Scen8	21	379.2739	Scen8
##	5_g1	Study#5	1	g1	200	Scen8	28	405.2051	Scen8
##	6_g1	Study#6	0	g1	200	Scen8	30	368.8481	Scen8
##	1_g2	Study#1	1	g2	200	Scen8	53	234.0924	Scen8
##	2_g2	Study#2	1	g2	200	Scen8	45	226.9392	Scen8
##	3_g2	Study#3	1	g2	200	Scen8	55	211.8717	Scen8
##	4_g2	Study#4	1	g2	200	Scen8	56	348.7668	Scen8
##	5_g2	Study#5	1	g2	200	Scen8	46	375.9676	Scen8
##	6_g2	Study#6	0	g2	200	Scen8	45	284.3348	Scen8

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##          csv group          analysis saf_topic      seed
## Bad Scenario Scen08.csv    g1 Exposure-adjusted AE rate    Scen08 1701652217
##          pool          tau heterog  ESS rob_weight rob_mean nta_event
## Bad Scenario TRUE HalfNormal  Large elir          0.2  0.0741          35
##          nta_time
## Bad Scenario          338
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.5882	-2.5848	-2.5618	-2.5474
log Expected MAP Prior: SD	0.2782	0.2853	0.3269	0.3627
log Expected MAP Prior: median	-2.5986	-2.5965	-2.5805	-2.5768
log 95% CrILB	-3.225	-3.2126	-3.107	-3.0898
log 95% CrIUB	-1.9973	-1.9608	-1.8093	-1.7091
log ENE	19.158	20.1334	24.9054	25.7294
log Expected robustified MAP Prior: mean	-2.591	-2.5883	-2.5699	-2.5584
log Expected robustified MAP Prior: SD	0.5118	0.515	0.5345	0.5529
log Expected robustified MAP Prior: median	-2.5978	-2.5961	-2.5811	-2.5772
log 95% CrILB	-3.8309	-3.8149	-3.7668	-3.7633
log 95% CrIUB	-1.4247	-1.4094	-1.2994	-1.1812
log ENE	13.6029	14.3634	17.9266	18.5528
log Expected results for Likelihood: mean	-2.2677	-2.2677	-2.2677	-2.2677
log Expected results for Likelihood: SD	0.169	0.169	0.169	0.169
log Expected results for Likelihood: median	-2.2677	-2.2677	-2.2677	-2.2677
log 95% CrILB	-2.599	-2.599	-2.599	-2.599
log 95% CrIUB	-1.9364	-1.9364	-1.9364	-1.9364
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.3916	-2.3881	-2.3725	-2.3697
log Expected results for Posterior: SD	0.1496	0.1519	0.1619	0.1627
log Expected results for Posterior: median	-2.4064	-2.4024	-2.3846	-2.3821
log 95% CrILB	-2.6586	-2.6579	-2.6503	-2.649
log 95% CrIUB	-2.0551	-2.049	-2.034	-2.0304
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.0785	0.0789	0.0831	0.0915
exp Expected MAP Prior: SD	0.0258	0.0273	0.1137	0.3621
exp Expected MAP Prior: median	0.0744	0.0745	0.0757	0.076
exp 95% CrILB	0.0398	0.0403	0.0447	0.0455
exp 95% CrIUB	0.1357	0.1407	0.1638	0.181
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.0869	0.0874	0.0904	0.0972
exp Expected robustified MAP Prior: SD	0.0727	0.0742	0.0931	0.3388
exp Expected robustified MAP Prior: median	0.0744	0.0745	0.0757	0.0761
exp 95% CrILB	0.0216	0.0218	0.0234	0.0237
exp 95% CrIUB	0.2373	0.2428	0.2759	0.306
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.0925	0.0929	0.0945	0.0947
exp Expected results for Posterior: SD	0.0145	0.0148	0.0158	0.0159
exp Expected results for Posterior: median	0.0901	0.0905	0.0921	0.0924
exp 95% CrILB	0.0699	0.0701	0.0707	0.0708
exp 95% CrIUB	0.128	0.1287	0.1309	0.1315
exp ENE	NA	NA	NA	NA

## 7.9 Scenario 9 - Good Scenario

Scenario 9 describes a binary endpoint for a good scenario with low censoring in the current trial, small noise, majority of the events being observed and homogeneous historical data.

```
SimTestData(  
  SimStudy_nPat = c(g1 = 300, g2 = 300),  
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),  
  SimStudy_dropout = c(rate = 0, time = 12),  
  SimStudy_accr = 6,  
  SimStudy_accr_method = "Uniform",  
  SimStudy_surv_method = "Exponential",  
  SimStudy_intensity = NA,  
  SimStudy_accr_timepoint = NA,  
  SimStudy_time_cutoff = 24,  
  SimStudy_NObsEvt = 0.999,  
  SimStudy_censor_type = 1,  
  nStudy = 8,  
  tau = 0.01,  
  prior_data_conflict = FALSE,  
  pdc_hz = NA,  
  SAF_TOPIC = "Scen9",  
  seed = 1701655293  
)  
  
## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length  
## is not a multiple of shorter object length  
  
## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not  
## a multiple of shorter object length  
  
## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length  
## is not a multiple of shorter object length  
  
## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not  
## a multiple of shorter object length  
  
## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length  
## is not a multiple of shorter object length  
  
## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not  
## a multiple of shorter object length  
  
## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length  
## is not a multiple of shorter object length  
  
## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not  
## a multiple of shorter object length  
  
## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length  
## is not a multiple of shorter object length  
  
## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not  
## a multiple of shorter object length  
  
## Warning in res[non_evt_ind, "CensorTime"] < time_cutoff: longer object length  
## is not a multiple of shorter object length  
  
## Warning in time_cutoff - res[non_evt_ind, "Entry"]: longer object length is not  
## a multiple of shorter object length
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1	g1	300	Scen9	252	2871.475
##	2_g1	Study#2	1	g1	300	Scen9	258	2659.380
##	3_g1	Study#3	1	g1	300	Scen9	246	2997.827
##	4_g1	Study#4	1	g1	300	Scen9	242	3019.844
##	5_g1	Study#5	1	g1	300	Scen9	251	2704.768
##	6_g1	Study#6	1	g1	300	Scen9	261	2808.790
##	7_g1	Study#7	1	g1	300	Scen9	253	2697.728
##	8_g1	Study#8	0	g1	300	Scen9	257	2735.211
##	1_g2	Study#1	1	g2	300	Scen9	292	1552.231
##	2_g2	Study#2	1	g2	300	Scen9	283	1684.490
##	3_g2	Study#3	1	g2	300	Scen9	293	1375.547
##	4_g2	Study#4	1	g2	300	Scen9	287	1703.108
##	5_g2	Study#5	1	g2	300	Scen9	295	1689.214
##	6_g2	Study#6	1	g2	300	Scen9	292	1664.492
##	7_g2	Study#7	1	g2	300	Scen9	295	1631.283
##	8_g2	Study#8	0	g2	300	Scen9	295	1506.824

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
```

##		csv	group	analysis	saf_topic	seed
##	Good Scenario	Scen09.csv	g1	Exposure-adjusted AE rate	Scen09	1701655293
##		pool	tau	heterog	ESS	rob_weight
##	Good Scenario	TRUE	HalfNormal	Small	elir	0.05
##		nta_time				0.0926
##	Good Scenario	1000				92

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.3832	-2.3824	-2.3785	-2.3778
log Expected MAP Prior: SD	0.0472	0.0483	0.0532	0.0539
log Expected MAP Prior: median	-2.3835	-2.3823	-2.3789	-2.3781
log 95% CrILB	-2.4957	-2.4926	-2.4758	-2.4715
log 95% CrIUB	-2.2862	-2.2824	-2.2658	-2.2626
log ENE	501.9947	513.4791	607.3843	628.4373
log Expected robustified MAP Prior: mean	-2.383	-2.3822	-2.3785	-2.3779
log Expected robustified MAP Prior: SD	0.2283	0.2285	0.2295	0.2297
log Expected robustified MAP Prior: median	-2.383	-2.3822	-2.379	-2.3784
log 95% CrILB	-2.5845	-2.576	-2.54	-2.533
log 95% CrIUB	-2.2249	-2.2171	-2.1824	-2.1742
log ENE	469.9987	480.6944	569.6637	589.5599
log Expected results for Likelihood: mean	-2.386	-2.386	-2.386	-2.386
log Expected results for Likelihood: SD	0.1043	0.1043	0.1043	0.1043
log Expected results for Likelihood: median	-2.386	-2.386	-2.386	-2.386
log 95% CrILB	-2.5903	-2.5903	-2.5903	-2.5903
log 95% CrIUB	-2.1816	-2.1816	-2.1816	-2.1816
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.3833	-2.3829	-2.38	-2.3795
log Expected results for Posterior: SD	0.0402	0.0408	0.0431	0.0435
log Expected results for Posterior: median	-2.3836	-2.3827	-2.3799	-2.3794
log 95% CrILB	-2.4736	-2.4723	-2.463	-2.4606
log 95% CrIUB	-2.3024	-2.3006	-2.2909	-2.2891
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.0924	0.0925	0.0928	0.0929
exp Expected MAP Prior: SD	0.0044	0.0045	0.005	0.005
exp Expected MAP Prior: median	0.0922	0.0923	0.0927	0.0927
exp 95% CrILB	0.0824	0.0827	0.0841	0.0845
exp 95% CrIUB	0.1016	0.102	0.1038	0.1041
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.0952	0.0953	0.096	0.0963
exp Expected robustified MAP Prior: SD	0.0403	0.0415	0.0571	0.0852
exp Expected robustified MAP Prior: median	0.0923	0.0923	0.0927	0.0927
exp 95% CrILB	0.0751	0.0758	0.0791	0.0794
exp 95% CrIUB	0.108	0.1086	0.1131	0.1141
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.0923	0.0924	0.0926	0.0927
exp Expected results for Posterior: SD	0.0037	0.0038	0.004	0.004
exp Expected results for Posterior: median	0.0922	0.0923	0.0926	0.0926
exp 95% CrILB	0.0842	0.0844	0.0852	0.0854
exp 95% CrIUB	0.1	0.1002	0.1012	0.1013
exp ENE	NA	NA	NA	NA

## 7.10 Scenario 10 - Favoured Control

Scenario 10 describes a binary endpoint for a favored control scenario with no censoring in the current trial, no noise, all events being observed, homogeneous historical data, heavy prior data conflict and the hazard ratio in favor of the control group.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.2, g2 = 0.1),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = TRUE,
  pdc_hz = 1.2,
  SAF_TOPIC = "Scen10",
  seed = 1701673095
)
```

```
## Warning in rexp(nPat[i], hz[i]): NAs produced
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1 g1	200	Scen10	54	234.482445	Scen10
##	2_g1	Study#2	1 g1	200	Scen10	42	200.954605	Scen10
##	3_g1	Study#3	1 g1	200	Scen10	59	233.239862	Scen10
##	4_g1	Study#4	1 g1	200	Scen10	51	204.363002	Scen10
##	5_g1	Study#5	1 g1	200	Scen10	52	170.728016	Scen10
##	6_g1	Study#6	0 g1	200	Scen10	93	-6.482995	Scen10
##	1_g2	Study#1	1 g2	200	Scen10	36	282.421760	Scen10
##	2_g2	Study#2	1 g2	200	Scen10	46	214.300246	Scen10
##	3_g2	Study#3	1 g2	200	Scen10	32	318.335395	Scen10
##	4_g2	Study#4	1 g2	200	Scen10	37	243.939964	Scen10
##	5_g2	Study#5	1 g2	200	Scen10	39	244.166712	Scen10
##	6_g2	Study#6	0 g2	200	Scen10	NA	NA	Scen10

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"
```

##	csv	group	analysis	saf_topic	seed
##	Favored Control	Scen10.csv	g1 Exposure-adjusted AE rate	Scen10	1701673095
##		pool	tau heterog	ESS rob_weight	rob_mean nta_event
##	Favored Control	TRUE HalfNormal	Small elir	0.6	0.2472 150
##		nta_time			
##	Favored Control	200			



Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-1.3978	-1.3967	-1.3902	-1.3891
log Expected MAP Prior: SD	0.0841	0.0851	0.0912	0.0924
log Expected MAP Prior: median	-1.3982	-1.3969	-1.3893	-1.3885
log 95% CrILB	-1.5838	-1.5806	-1.5587	-1.557
log 95% CrIUB	-1.2365	-1.2299	-1.2073	-1.1976
log ENE	128.824	132.8997	151.5567	154.4831
log Expected robustified MAP Prior: mean	-1.3977	-1.3972	-1.3946	-1.3942
log Expected robustified MAP Prior: SD	0.7764	0.7765	0.7767	0.7768
log Expected robustified MAP Prior: median	-1.3977	-1.3967	-1.3908	-1.3895
log 95% CrILB	-3.1292	-3.1292	-3.1292	-3.1292
log 95% CrIUB	0.3341	0.3341	0.3341	0.3341
log ENE	35.6689	37.0334	43.2564	44.097
log Expected results for Likelihood: mean	-0.2877	-0.2877	-0.2877	-0.2877
log Expected results for Likelihood: SD	0.0816	0.0816	0.0816	0.0816
log Expected results for Likelihood: median	-0.2877	-0.2877	-0.2877	-0.2877
log 95% CrILB	-0.4477	-0.4477	-0.4477	-0.4477
log 95% CrIUB	-0.1277	-0.1277	-0.1277	-0.1277
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-0.295	-0.295	-0.295	-0.295
log Expected results for Posterior: SD	0.0814	0.0814	0.0814	0.0814
log Expected results for Posterior: median	-0.2951	-0.2951	-0.295	-0.295
log 95% CrILB	-0.4546	-0.4546	-0.4545	-0.4545
log 95% CrIUB	-0.1356	-0.1355	-0.1355	-0.1355
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.2481	0.2484	0.25	0.2503
exp Expected MAP Prior: SD	0.021	0.0212	0.0229	0.0233
exp Expected MAP Prior: median	0.247	0.2474	0.2492	0.2494
exp 95% CrILB	0.2052	0.2058	0.2104	0.2108
exp 95% CrIUB	0.2904	0.2923	0.299	0.3019
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.3407	0.3414	0.3473	0.3486
exp Expected robustified MAP Prior: SD	0.4002	0.4047	0.4458	0.477
exp Expected robustified MAP Prior: median	0.247	0.2473	0.249	0.2492
exp 95% CrILB	0.0424	0.0428	0.0446	0.0452
exp 95% CrIUB	1.3585	1.3687	1.4258	1.4427
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.7464	0.7466	0.7474	0.7476
exp Expected results for Posterior: SD	0.0604	0.0606	0.0612	0.0614
exp Expected results for Posterior: median	0.7438	0.744	0.7451	0.7452
exp 95% CrILB	0.6334	0.6337	0.6357	0.6362
exp 95% CrIUB	0.8715	0.8719	0.8746	0.875
exp ENE	NA	NA	NA	NA

## 7.11 Scenario 11 - Continued study duration with Realistic Setting

Scenario 11 describes a binary endpoint for a realistic situation where the study continued regardless of when the proposed number of events has been observed. Characteristics of this scenario includes a drop out rate of 5%, noise at a 5% tau, homogeneous historical data and no planned prior data conflict planned.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 24,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 1,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen11",
  seed = 1701876972
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
##	1_g1	Study#1	1	g1	200	Scen11	167 1883.7131	Scen11
##	2_g1	Study#2	1	g1	200	Scen11	167 1664.7275	Scen11
##	3_g1	Study#3	1	g1	200	Scen11	169 1764.2083	Scen11
##	4_g1	Study#4	1	g1	200	Scen11	161 1934.3152	Scen11
##	5_g1	Study#5	1	g1	200	Scen11	162 1749.0500	Scen11
##	6_g1	Study#6	0	g1	200	Scen11	163 1896.7833	Scen11
##	1_g2	Study#1	1	g2	200	Scen11	190 922.3104	Scen11
##	2_g2	Study#2	1	g2	200	Scen11	189 973.0542	Scen11
##	3_g2	Study#3	1	g2	200	Scen11	194 925.5636	Scen11
##	4_g2	Study#4	1	g2	200	Scen11	197 934.8412	Scen11
##	5_g2	Study#5	1	g2	200	Scen11	193 1025.8741	Scen11
##	6_g2	Study#6	0	g2	200	Scen11	193 1077.5747	Scen11

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##                                     csv group
## Continued study duration with Realistic Setting Scen11.csv    g1
##                                     analysis
## Continued study duration with Realistic Setting Exposure-adjusted AE rate
##                                     saf_topic      seed pool
## Continued study duration with Realistic Setting    Scen11 1701876972 TRUE
##                                     tau heterog  ESS
## Continued study duration with Realistic Setting HalfNormal    Small elir
##                                     rob_weight rob_mean nta_event
## Continued study duration with Realistic Setting      0.05    0.0952      95
##                                     nta_time
## Continued study duration with Realistic Setting      1000
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.3521	-2.3513	-2.3463	-2.3453
log Expected MAP Prior: SD	0.0589	0.0597	0.0649	0.0655
log Expected MAP Prior: median	-2.3523	-2.3513	-2.3469	-2.3458
log 95% CrILB	-2.4911	-2.4839	-2.4642	-2.4586
log 95% CrIUB	-2.2348	-2.2301	-2.2103	-2.2039
log ENE	299.5604	311.3627	365.3138	1262606.9623
log Expected robustified MAP Prior: mean	-2.3521	-2.3513	-2.3466	-2.3457
log Expected robustified MAP Prior: SD	0.2309	0.2311	0.2324	0.2325
log Expected robustified MAP Prior: median	-2.3518	-2.3511	-2.3469	-2.3458
log 95% CrILB	-2.5792	-2.5738	-2.5376	-2.5329
log 95% CrIUB	-2.164	-2.1585	-2.1204	-2.1145
log ENE	279.3413	290.0707	341.237	1168901.7112
log Expected results for Likelihood: mean	-2.3539	-2.3539	-2.3539	-2.3539
log Expected results for Likelihood: SD	0.1026	0.1026	0.1026	0.1026
log Expected results for Likelihood: median	-2.3539	-2.3539	-2.3539	-2.3539
log 95% CrILB	-2.555	-2.555	-2.555	-2.555
log 95% CrIUB	-2.1528	-2.1528	-2.1528	-2.1528
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.3523	-2.3518	-2.3486	-2.3477
log Expected results for Posterior: SD	0.0472	0.0475	0.0498	0.0503
log Expected results for Posterior: median	-2.3522	-2.3517	-2.3482	-2.3475
log 95% CrILB	-2.4554	-2.4516	-2.4434	-2.4414
log 95% CrIUB	-2.2594	-2.2571	-2.2494	-2.2474
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.0954	0.0954	0.0959	0.096
exp Expected MAP Prior: SD	0.0056	0.0057	0.0063	0.0064
exp Expected MAP Prior: median	0.0951	0.0952	0.0957	0.0958
exp 95% CrILB	0.0828	0.0834	0.0851	0.0856
exp 95% CrIUB	0.107	0.1075	0.1097	0.1104
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.0983	0.0984	0.0992	0.0993
exp Expected robustified MAP Prior: SD	0.041	0.0424	0.0578	0.0706
exp Expected robustified MAP Prior: median	0.0952	0.0952	0.0957	0.0957
exp 95% CrILB	0.0755	0.076	0.0792	0.0795
exp 95% CrIUB	0.1143	0.1154	0.1202	0.1212
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.0953	0.0953	0.0956	0.0957
exp Expected results for Posterior: SD	0.0045	0.0045	0.0048	0.0048
exp Expected results for Posterior: median	0.0951	0.0952	0.0956	0.0956
exp 95% CrILB	0.0857	0.0861	0.0869	0.087
exp 95% CrIUB	0.1044	0.1046	0.1055	0.1057
exp ENE	NA	NA	NA	NA

## 7.12 Scenario 12 - Continued study duration with Worst Setting

Scenario 12 describes a binary endpoint for a scenario with a worst case scenario (scenario 4) that continued till the end of the proposed study duration. The scenario characteristics includes huge censoring, huge noise, little events observed, heterogeneous historical and huge prior data conflict.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = NA,
  SimStudy_NObsEvt = 400,
  SimStudy_censor_type = 2,
  nStudy = 6,
  tau = 0.15,
  prior_data_conflict = TRUE,
  pdc_hz = c(g1 = 0.05, g2 = 0.1),
  SAF_TOPIC = "Scen12",
  seed = 1701878308
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	TREAT
## 1_g1	Study#1	1	g1	200	Scen12	193	2145.2002	Scen12
## 2_g1	Study#2	1	g1	200	Scen12	189	2026.7007	Scen12
## 3_g1	Study#3	1	g1	200	Scen12	192	2099.1503	Scen12
## 4_g1	Study#4	1	g1	200	Scen12	193	2200.2265	Scen12
## 5_g1	Study#5	1	g1	200	Scen12	189	2060.4879	Scen12
## 6_g1	Study#6	0	g1	200	Scen12	193	3214.6233	Scen12
## 1_g2	Study#1	1	g2	200	Scen12	196	927.0819	Scen12
## 2_g2	Study#2	1	g2	200	Scen12	193	1097.0120	Scen12
## 3_g2	Study#3	1	g2	200	Scen12	196	1112.5535	Scen12
## 4_g2	Study#4	1	g2	200	Scen12	195	1489.9002	Scen12
## 5_g2	Study#5	1	g2	200	Scen12	198	1575.7302	Scen12
## 6_g2	Study#6	0	g2	200	Scen12	191	1811.5262	Scen12

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##                                     csv group
## Continued study duration with Worst Setting Scen12.csv    g1
##                                     analysis saf_topic
## Continued study duration with Worst Setting Exposure-adjusted AE rate    Scen12
##                                     seed pool          tau heterog
## Continued study duration with Worst Setting 1701878308 TRUE HalfNormal    Large
##                                     ESS rob_weight rob_mean nta_event
## Continued study duration with Worst Setting elir          0.5          0.2          200
##                                     nta_time
## Continued study duration with Worst Setting          1000
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.4007	-2.399	-2.3921	-2.3859
log Expected MAP Prior: SD	0.0719	0.0743	0.0966	0.1169
log Expected MAP Prior: median	-2.3997	-2.3989	-2.3946	-2.3934
log 95% CrILB	-2.5746	-2.5692	-2.5346	-2.528
log 95% CrIUB	-2.2592	-2.2532	-2.2114	-2.137
log ENE	215.9405	243.3979	341.7026	361.8332
log Expected robustified MAP Prior: mean	-2.0051	-2.0042	-2.0008	-1.9977
log Expected robustified MAP Prior: SD	0.8101	0.8103	0.812	0.8124
log Expected robustified MAP Prior: median	-2.3596	-2.3586	-2.3498	-2.3461
log 95% CrILB	-3.2554	-3.2546	-3.2543	-3.2543
log 95% CrIUB	0.0354	0.0354	0.0354	0.0354
log ENE	87.8082	102.4652	149.6522	159.3782
log Expected results for Likelihood: mean	-1.6094	-1.6094	-1.6094	-1.6094
log Expected results for Likelihood: SD	0.0707	0.0707	0.0707	0.0707
log Expected results for Likelihood: median	-1.6094	-1.6094	-1.6094	-1.6094
log 95% CrILB	-1.748	-1.748	-1.748	-1.748
log 95% CrIUB	-1.4708	-1.4708	-1.4708	-1.4708
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-1.6105	-1.6098	-1.6094	-1.6094
log Expected results for Posterior: SD	0.0705	0.0705	0.0707	0.0707
log Expected results for Posterior: median	-1.6105	-1.6098	-1.6094	-1.6094
log 95% CrILB	-1.7492	-1.7483	-1.7477	-1.7477
log 95% CrIUB	-1.4719	-1.4714	-1.4712	-1.4712
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.0909	0.0911	0.0919	0.0927
exp Expected MAP Prior: SD	0.0067	0.0069	0.0122	0.0167
exp Expected MAP Prior: median	0.0907	0.0908	0.0912	0.0913
exp 95% CrILB	0.0762	0.0766	0.0793	0.0798
exp 95% CrIUB	0.1044	0.1051	0.1095	0.118
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.2074	0.2081	0.213	0.2138
exp Expected robustified MAP Prior: SD	0.311	0.3147	0.3476	0.3697
exp Expected robustified MAP Prior: median	0.0944	0.0945	0.0954	0.0958
exp 95% CrILB	0.0372	0.0377	0.0395	0.0397
exp 95% CrIUB	1.0015	1.0116	1.0596	1.0625
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.2003	0.2004	0.2006	0.2006
exp Expected results for Posterior: SD	0.0141	0.0141	0.0142	0.0143
exp Expected results for Posterior: median	0.1998	0.1998	0.2001	0.2002
exp 95% CrILB	0.1738	0.1739	0.1744	0.1745
exp 95% CrIUB	0.2293	0.2293	0.23	0.23
exp ENE	NA	NA	NA	NA

### 7.13 Scenario 13 - Different treatment length

Scenario 13 describes a good scenario with different treatment length.

```
SimTestData(
  SimStudy_nPat = c(g1 = 200, g2 = 200),
  SimStudy_hz = c(g1 = 0.1, g2 = 0.2),
  SimStudy_dropout = c(rate = 0.05, time = 12),
  SimStudy_accr = 6,
  SimStudy_accr_method = "Uniform",
  SimStudy_surv_method = "Exponential",
  SimStudy_intensity = NA,
  SimStudy_accr_timepoint = NA,
  SimStudy_time_cutoff = 18,
  SimStudy_NObsEvt = 93,
  SimStudy_censor_type = 1,
  nStudy = 6,
  tau = 0.02,
  prior_data_conflict = FALSE,
  diff_trt_length = TRUE,
  pdc_hz = NA,
  SAF_TOPIC = "Scen13",
  seed = 1718356066
)
```

##	STUDYID	HIST	ARM	N	SAF_TOPIC	N_WITH_AE	TOT_EXP	LENGTH	TREAT
##	1_g1	Study#1	1	g1	200	Scen13	151	1566.6752	548 Scen13
##	2_g1	Study#2	1	g1	200	Scen13	150	1494.2869	548 Scen13
##	3_g1	Study#3	1	g1	200	Scen13	174	1599.3219	730 Scen13
##	4_g1	Study#4	1	g1	200	Scen13	173	1799.5756	730 Scen13
##	5_g1	Study#5	1	g1	200	Scen13	185	1708.9438	912 Scen13
##	6_g1	Study#6	0	g1	200	Scen13	186	1681.4362	912 Scen13
##	1_g2	Study#1	1	g2	200	Scen13	185	897.0528	548 Scen13
##	2_g2	Study#2	1	g2	200	Scen13	185	872.8150	548 Scen13
##	3_g2	Study#3	1	g2	200	Scen13	191	943.3266	730 Scen13
##	4_g2	Study#4	1	g2	200	Scen13	194	872.9301	730 Scen13
##	5_g2	Study#5	1	g2	200	Scen13	192	1047.1975	912 Scen13
##	6_g2	Study#6	0	g2	200	Scen13	198	861.1155	912 Scen13

The characteristics and thresholds for the simulation is as in the table below:

```
## [1] "With those values our newly created MAP Prior has been updated:"

##               csv group               analysis saf_topic
## Different Study length Scen13.csv   g1 Exposure-adjusted AE rate   Scen13
##               seed pool               tau heterog   ESS rob_weight
## Different Study length 1718356066 TRUE HalfNormal   Large elir       0.1
##               rob_mean nta_event nta_time
## Different Study length    0.2      186    1681
```

Characteristic	Observed Min.	Lower Threshold	Upper Threshold	Observed Max.
log Expected MAP Prior: mean	-2.2829	-2.2822	-2.2734	-2.2617
log Expected MAP Prior: SD	0.0946	0.0965	0.1219	0.1767
log Expected MAP Prior: median	-2.2833	-2.2827	-2.2771	-2.2764
log 95% CrILB	-2.5127	-2.5027	-2.4621	-2.4577
log 95% CrIUB	-2.0905	-2.0846	-2.0242	-1.9657
log ENE	167.9332	192.2866	233.9965	240.882
log Expected robustified MAP Prior: mean	-2.2156	-2.2149	-2.207	-2.1965
log Expected robustified MAP Prior: SD	0.3853	0.3857	0.3915	0.4079
log Expected robustified MAP Prior: median	-2.2787	-2.2781	-2.2733	-2.2723
log 95% CrILB	-2.6303	-2.6134	-2.5514	-2.5432
log 95% CrIUB	-0.9349	-0.9349	-0.9262	-0.8651
log ENE	146.3424	168.5202	205.9121	212.005
log Expected results for Likelihood: mean	-2.2014	-2.2014	-2.2014	-2.2014
log Expected results for Likelihood: SD	0.0733	0.0733	0.0733	0.0733
log Expected results for Likelihood: median	-2.2014	-2.2014	-2.2014	-2.2014
log 95% CrILB	-2.3451	-2.3451	-2.3451	-2.3451
log 95% CrIUB	-2.0577	-2.0577	-2.0577	-2.0577
log ENE	NA	NA	NA	NA
log Expected results for Posterior: mean	-2.2481	-2.2474	-2.2436	-2.2406
log Expected results for Posterior: SD	0.0489	0.0501	0.053	0.0537
log Expected results for Posterior: median	-2.252	-2.2517	-2.2469	-2.2415
log 95% CrILB	-2.3411	-2.3397	-2.3358	-2.3351
log 95% CrIUB	-2.1423	-2.1369	-2.1243	-2.1228
log ENE	NA	NA	NA	NA
exp Expected MAP Prior: mean	0.1025	0.1026	0.1038	0.1065
exp Expected MAP Prior: SD	0.01	0.0102	0.019	0.04
exp Expected MAP Prior: median	0.1019	0.102	0.1026	0.1026
exp 95% CrILB	0.0811	0.0819	0.0853	0.0856
exp 95% CrIUB	0.1236	0.1244	0.1321	0.1401
exp ENE	NA	NA	NA	NA
exp Expected robustified MAP Prior: mean	0.1244	0.1246	0.1271	0.1294
exp Expected robustified MAP Prior: SD	0.1379	0.1413	0.1704	0.1962
exp Expected robustified MAP Prior: median	0.1024	0.1025	0.103	0.1031
exp 95% CrILB	0.0722	0.0732	0.0781	0.0788
exp 95% CrIUB	0.3773	0.38	0.4075	0.4275
exp ENE	NA	NA	NA	NA
exp Expected results for Likelihood: mean	NA	NA	NA	NA
exp Expected results for Likelihood: SD	NA	NA	NA	NA
exp Expected results for Likelihood: median	NA	NA	NA	NA
exp 95% CrILB	NA	NA	NA	NA
exp 95% CrIUB	NA	NA	NA	NA
exp ENE	NA	NA	NA	NA
exp Expected results for Posterior: mean	0.1057	0.1058	0.1062	0.1066
exp Expected results for Posterior: SD	0.0052	0.0054	0.0057	0.0058
exp Expected results for Posterior: median	0.1052	0.1052	0.1057	0.1063
exp 95% CrILB	0.0963	0.0964	0.0967	0.0968
exp 95% CrIUB	0.1174	0.118	0.1196	0.1198
exp ENE	NA	NA	NA	NA

## References

- [1] NEUENSCHWANDER, B., CAPKUN-NIGGLI, G., BRANSON, M. and SPIEGELHALTER, D. J. (2010). Summarizing historical information on controls in clinical trials. *Clinical Trials* **7** 5–18.