Exploration

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Contents

Purpose

To explore metrics options based on data collected by Software Quality Assurance in a spreadsheet for document review and approval.

Libraries used

No libriries used yet

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following object is masked from 'package:base':
##
```

```
##     date
```

Data

The data is presented n a CVS file (saved from an Excel workbook) with the following columns and data chartistics

SQA SQAE Preforming the review
Project ID Uniquie ID assigned tot he project may come from NPV or ePAS
Application Application Name (limited selection)
Doc Version Version number of the document, also know as the revision number
Doc ID, if needed unique identifier to distingous between documnets fo the same deliver type within a project
Approver or Disapprov? Approval status from the following list
* **A** Approved
* **A-FP** Approved on fist pass
* **D** Disapproved
Date of Approval or Disapproval Date action was taken

Reason for Disapproval: Selected from the following list

- Inaccurate information
- Incorrect scope
- Insufficient testing
- Insufficient traceability
- N/A
- Not compliant with procedure
- Not following configuration management
- Not following document version control
- Not using template
- Other
- Requirement deficiency

Inport the data

The data is read in and variables are assigned more programicaly useful names.

```
FPA.Raw <- read.csv(file = "./data/First Pass Acceptance.csv",
                    stringsAsFactors = FALSE,
                    col.names = c("sqa",
                                  "project",
                                  "application",
                                  "deliverable",
                                  "version",
                                  "docID",
                                  "status",
                                  "date",
                                  "reason",
```

```
                                    "comments"))
FPA <- FPA.Raw
```

format the data

factors

Set the following data as factors:

*SQA

*Application

*Deliverable

*status

```
FPA$sqa <- as.factor(FPA$sqa)
FPA$application <- as.factor(FPA$application)
FPA$deliverable <- as.factor(FPA$deliverable)
FPA$status <- as.factor(FPA$status)
```

Clean up reason

convert blank fields in status to NA when status is converted to a factor

```
FPA$reason <- as.factor(FPA$reason)
levels(FPA$reason)
```

```
##  [1] ""
##  [2] "ADDULCD771510T"
##  [3] "ADDULCD7727281"
##  [4] "inaccurate information"
##  [5] "Inaccurate information"
##  [6] "Incorrect scope"
##  [7] "Insufficient testing"
##  [8] "N/A"
##  [9] "Not compliant with procedure"
## [10] "Not following document version control"
## [11] "Not using template"
## [12] "Other"
## [13] "Requirement deficiency"
```

```
levels(FPA$reason)[1] <- NA
levels(FPA$reason)
```

```
##  [1] "ADDULCD771510T"
##  [2] "ADDULCD7727281"
##  [3] "inaccurate information"
##  [4] "Inaccurate information"
##  [5] "Incorrect scope"
##  [6] "Insufficient testing"
##  [7] "N/A"
##  [8] "Not compliant with procedure"
##  [9] "Not following document version control"
## [10] "Not using template"
```

```
## [11] "Other"
## [12] "Requirement deficiency"
```

Date

```
FPA$date <- as.Date(FPA$date, format = "%d-%B-%y")
```

Add new fields

Month and year

From date create month and year fields

```
FPA$month <- month(FPA$date, label = TRUE)
FPA$year <- year(FPA$date)
```

deliverable UID

create an unique identification (UID) for each processed item so that each deliverable is uniquely identified accross the entire data set. to do this the UID will consist of the Project, deliverable, docID and version seperated with a dash

```
FPA$UID <- paste(FPA$project,
                 FPA$deliverable,
                 FPA$docID,
                 FPA$version,
                 sep = "-"
                 )
```

Simple count metrics

Projects worked

```
length(unique(FPA$project))
```

```
## [1] 24
```

```
as.character(unique(FPA$application))
```

```
##  [1] "Groninger"                   "Assay File Database"
##  [3] "PCN/SCN"                     "WWLIMS"
##  [5] "Pulse"                       "DFCS"
##  [7] "DPW"                         "QIMS"
##  [9] "Abbott Transfusion Medicine" "Apollo/PHM"
## [11] "AFMS"                        "SAS"
## [13] "Metrics Library"             "DaVinci"
## [15] "CMSNext"                     "GS Reports"
## [17] "IRIS"
```

Number of reviews

```
nrow(FPA)
```

```
## [1] 176
```

Number of Documents Reviewed

```
length(unique(FPA$UID))
```

```
## [1] 121
```

Number of Projects Started

```
length(unique(
     subset(
          subset(FPA,
                 subset = ((status == "A" | status == "A-FP") & version == 1)),
          subset = deliverable == "Software Change Request")$project))
```

```
## [1] 3
```

Number of Projects Completed

```
length(unique(
     subset(
          subset(FPA,
                 subset = ((status == "A" | status == "A-FP"))),
          subset = deliverable == "System Certification Summary")$project))
```

```
## [1] 1
```

Approval rate

probability of a document being approved when reviewed

```
nrow(unique(
     subset(FPA, subset = (status == "A" | status == "A-FP"))
))/nrow(FPA)
```

```
## [1] 0.6761364
```

First Pass Acceptance

probability of a document being approved when reviewed the first time

```
nrow(unique(
     subset(FPA, subset = status == "A-FP")
))/nrow(FPA)
```

```
## [1] 0.375
```

Number of deliverables by type

THe number of each type of deliverable

```
table(FPA[!duplicated(FPA$UID),]$deliverable)
```

```
##
##                              CII            Design Documentation
##                                8                               2
##             Design Verification                             FRS
##                                5                               5
##                             IIVP                     IIVP results
##                                5                               9
##               Move to Production                     Project Plan
##                                1                               6
##          Software Change Request   Software Compliance Assessment
##                                6                               4
##     System Certification Summary                     Test Protocol
##                                2                              37
##            Test Protocol Results                      Traceability
##                               14                               9
##                              URS        User Acceptance Protocol
##                                2                               3
## User Acceptance Protocol results                 Validation Plan
##                                1                               2
```

number od deliverable per application

```
table(FPA[!duplicated(FPA$UID),]$application)
```

```
##
## Abbott Transfusion Medicine                         AFMS
##                           1                            8
##                   Apollo/PHM          Assay File Database
##                           9                            2
##                      CMSNext                      DaVinci
##                           2                           12
##                         DFCS                          DPW
##                           13                           4
##                    Groninger                  GS Reports
##                           1                            3
##                         IRIS              Metrics Library
##                           1                            3
##                      PCN/SCN                        Pulse
##                           6                            8
##                         QIMS                          SAS
##                           12                           3
##                       WWLIMS
##                           33
```

distrubation of result of reviews

```
table(FPA$status)
```

```
##
##    A A-FP    D
##   54   67   55
```

2 way table deliverables by application

```
table(FPA[!duplicated(FPA$UID),]$application,
      FPA[!duplicated(FPA$UID),]$deliverable)
```

```
##
##                               CII Design Documentation Design Verification
##   Abbott Transfusion Medicine   0                    0                    0
##   AFMS                          1                    0                    0
##   Apollo/PHM                    0                    0                    0
##   Assay File Database           0                    0                    0
##   CMSNext                       0                    0                    0
##   DaVinci                       1                    0                    0
##   DFCS                          1                    0                    1
##   DPW                           0                    0                    0
##   Groninger                     0                    0                    0
##   GS Reports                    0                    0                    0
##   IRIS                          0                    0                    0
##   Metrics Library               0                    2                    0
##   PCN/SCN                       0                    0                    1
##   Pulse                         0                    0                    0
##   QIMS                          2                    0                    2
##   SAS                           0                    0                    0
##   WWLIMS                        3                    0                    1
##
##                               FRS IIVP IIVP results Move to Production
##   Abbott Transfusion Medicine   0    0            0                   0
##   AFMS                          2    0            0                   0
##   Apollo/PHM                    0    0            4                   0
##   Assay File Database           0    0            0                   0
##   CMSNext                       0    0            0                   0
##   DaVinci                       1    1            0                   0
##   DFCS                          0    1            0                   0
##   DPW                           0    0            0                   0
##   Groninger                     0    0            0                   0
##   GS Reports                    0    0            0                   1
##   IRIS                          0    0            1                   0
##   Metrics Library               0    0            0                   0
##   PCN/SCN                       1    1            0                   0
##   Pulse                         0    0            1                   0
##   QIMS                          0    1            1                   0
##   SAS                           0    0            0                   0
##   WWLIMS                        1    1            2                   0
##
##                               Project Plan Software Change Request
```

```
##   Abbott Transfusion Medicine            0                     0
##   AFMS                                   0                     1
##   Apollo/PHM                             0                     0
##   Assay File Database                    1                     1
##   CMSNext                                0                     1
##   DaVinci                                1                     1
##   DFCS                                   1                     1
##   DPW                                    0                     0
##   Groninger                              0                     0
##   GS Reports                             2                     0
##   IRIS                                   0                     0
##   Metrics Library                        1                     0
##   PCN/SCN                                0                     1
##   Pulse                                  0                     0
##   QIMS                                   0                     0
##   SAS                                    0                     0
##   WWLIMS                                 0                     0
##
##                              Software Compliance Assessment
##   Abbott Transfusion Medicine                              1
##   AFMS                                                     0
##   Apollo/PHM                                               0
##   Assay File Database                                      0
##   CMSNext                                                  1
##   DaVinci                                                  0
##   DFCS                                                     0
##   DPW                                                      0
##   Groninger                                                0
##   GS Reports                                               0
##   IRIS                                                     0
##   Metrics Library                                          0
##   PCN/SCN                                                  2
##   Pulse                                                    0
##   QIMS                                                     0
##   SAS                                                      0
##   WWLIMS                                                   0
##
##                              System Certification Summary Test Protocol
##   Abbott Transfusion Medicine                            0             0
##   AFMS                                                   0             2
##   Apollo/PHM                                             0             5
##   Assay File Database                                    0             0
##   CMSNext                                                0             0
##   DaVinci                                                0             5
##   DFCS                                                   0             1
##   DPW                                                    1             1
##   Groninger                                              0             0
##   GS Reports                                             0             0
##   IRIS                                                   0             0
##   Metrics Library                                        0             0
##   PCN/SCN                                                0             0
##   Pulse                                                  0             3
##   QIMS                                                   0             4
##   SAS                                                    1             1
```

```
##   WWLIMS                                          0           15
##
##                              Test Protocol Results Traceability URS
##   Abbott Transfusion Medicine                     0            0   0
##   AFMS                                            0            0   1
##   Apollo/PHM                                      0            0   0
##   Assay File Database                             0            0   0
##   CMSNext                                         0            0   0
##   DaVinci                                         0            0   1
##   DFCS                                            2            1   0
##   DPW                                             2            0   0
##   Groninger                                       0            1   0
##   GS Reports                                      0            0   0
##   IRIS                                            0            0   0
##   Metrics Library                                 0            0   0
##   PCN/SCN                                         0            0   0
##   Pulse                                           3            1   0
##   QIMS                                            0            2   0
##   SAS                                             1            0   0
##   WWLIMS                                          6            4   0
##
##                              User Acceptance Protocol
##   Abbott Transfusion Medicine                      0
##   AFMS                                             0
##   Apollo/PHM                                       0
##   Assay File Database                              0
##   CMSNext                                          0
##   DaVinci                                          0
##   DFCS                                             3
##   DPW                                              0
##   Groninger                                        0
##   GS Reports                                       0
##   IRIS                                             0
##   Metrics Library                                  0
##   PCN/SCN                                          0
##   Pulse                                            0
##   QIMS                                             0
##   SAS                                              0
##   WWLIMS                                           0
##
##                              User Acceptance Protocol results
##   Abbott Transfusion Medicine                                0
##   AFMS                                                       0
##   Apollo/PHM                                                 0
##   Assay File Database                                        0
##   CMSNext                                                    0
##   DaVinci                                                    0
##   DFCS                                                       1
##   DPW                                                        0
##   Groninger                                                  0
##   GS Reports                                                 0
##   IRIS                                                       0
##   Metrics Library                                            0
##   PCN/SCN                                                    0
```

```
##   Pulse                                                     0
##   QIMS                                                      0
##   SAS                                                       0
##   WWLIMS                                                    0
##
##                                Validation Plan
##   Abbott Transfusion Medicine               0
##   AFMS                                      1
##   Apollo/PHM                                0
##   Assay File Database                       0
##   CMSNext                                   0
##   DaVinci                                   1
##   DFCS                                      0
##   DPW                                       0
##   Groninger                                 0
##   GS Reports                                0
##   IRIS                                      0
##   Metrics Library                           0
##   PCN/SCN                                   0
##   Pulse                                     0
##   QIMS                                      0
##   SAS                                       0
##   WWLIMS                                    0
```

Number of Projects Started revisited

```
length(unique(subset(FPA, subset = (((status == "A" | status == "A-FP")
                                     & version == 1)
                                    & deliverable == "Software Change Request" ))
              $project)) +
     length(unique(
          subset(FPA,
                 subset = ((((status == "A" | status == "A-FP")
                             & version == 1)
                            & application == "GS Reports")
                           & deliverable == "Project Plan"))
          $project))
```

```
## [1] 5
```

Projects completed round two

```
length(unique(
     subset(
          subset(FPA,
                 subset = (((status == "A" | status == "A-FP")
                            & version == 1))),
          subset = deliverable == "System Certification Summary")$project)) +
     length(unique(
     subset(
          subset(FPA,
```

```
                subset = (((status == "A" | status == "A-FP")
                           & version == 1))),
          subset = deliverable == "Move to Production")$project))
```

```
## [1] 2
```