

# Exploration

*Nick Lauerman*

## Contents

<b>Purpose</b>	<b>1</b>
<b>Libraries used</b>	<b>1</b>
<b>Data</b>	<b>2</b>
Inport the data . . . . .	2
format the data . . . . .	3
factors . . . . .	3
Clean up reason . . . . .	3
Date . . . . .	4
Add new fields . . . . .	4
Month and year . . . . .	4
deliverable UID . . . . .	4
<b>Simple count metrics</b>	<b>4</b>
Projects worked . . . . .	4
Number of reviews . . . . .	4
Number of Documents Reviewed . . . . .	5
Number of Projects Started . . . . .	5
Number of Projects Completed . . . . .	5
Approval rate . . . . .	5
First Pass Acceptance . . . . .	5
Number of deliverables by type . . . . .	6
number od deliverable per application . . . . .	6
distrubation of result of reviews . . . . .	7
2 way table deliverables by application . . . . .	7
Number of Projects Started revisited . . . . .	10
Projects completed round two . . . . .	10
<b>Defects</b>	<b>11</b>
<b>to be transfered</b>	<b>11</b>
defects verse application . . . . .	11
defects verse deliverable . . . . .	12
Rejects by deliverable . . . . .	14

## 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 in a CSV file (saved from an Excel workbook) with the following columns and characteristics

**SQA** SQA/E Preforming the review

**Project ID** Unique ID assigned to the project may come from NPV or ePAS

**Application** Application Name (limited selection)

**Doc Version** Version number of the document, also known as the revision number

**Doc ID, if needed** unique identifier to distinguish between documents for the same deliver type within a project

**Approver or Disapproval?** Approval status from the following list

\* **A** Approved

\* **A-FP** Approved on first 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

## Import the data

The data is read in and variables are assigned more programically 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] "Inaccurate information"
## [3] "Incorrect scope"
## [4] "Insufficient testing"
## [5] "Not compliant with procedure"
## [6] "Not following document version control"
## [7] "Not using template"
## [8] "Other"
## [9] "Requirement deficiency"

```

```

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

```

```

## [1] "Inaccurate information"
## [2] "Incorrect scope"
## [3] "Insufficient testing"
## [4] "Not compliant with procedure"
## [5] "Not following document version control"
## [6] "Not using template"
## [7] "Other"
## [8] "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 across 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
## WVLIMS                           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
## WVLIMS                           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
##	WVLIMS	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
##	WVLIMS	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



##	WVLIMS	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
##	WVLIMS	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	
##	WVLIMS	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
```

## Defects

```
table(FPA$reason)
```

```
##
##           Inaccurate information
##                               29
##           Incorrect scope
##                               1
##           Insufficient testing
##                               6
##           Not compliant with procedure
##                               9
## Not following document version control
##                               3
##           Not using template
##                               1
##                               Other
##                               1
##           Requirement deficiency
##                               1
```

## to be transferred

### defects verse application

```
table(as.character(subset(FPA, subset = (status == "D"))$application),
      subset(FPA, subset = (status == "D"))$reason)
```

```
##
##           Inaccurate information Incorrect scope
## AFMS                               0             0
## Apollo/PHM                         1             0
## Assay File Database                 0             0
## CMSNext                           2             0
## DaVinci                           11             0
## DFCS                              1             0
## DPW                               1             0
## PCN/SCN                           2             1
## Pulse                             0             0
## QIMS                              7             0
## WWLIMS                             4             0
##
##           Insufficient testing Not compliant with procedure
```

```

##      AFMS                                0                                4
##      Apollo/PHM                          0                                0
##      Assay File Database                  0                                1
##      CMSNext                             0                                0
##      DaVinci                             0                                2
##      DFCS                               0                                0
##      DPW                                0                                0
##      PCN/SCN                            0                                0
##      Pulse                              0                                1
##      QIMS                               6                                1
##      WVLIMS                             0                                0
##
##                               Not following document version control
##      AFMS                                0
##      Apollo/PHM                          0
##      Assay File Database                  0
##      CMSNext                             0
##      DaVinci                             1
##      DFCS                               0
##      DPW                                0
##      PCN/SCN                            0
##      Pulse                              0
##      QIMS                               0
##      WVLIMS                             2
##
##                               Not using template Other Requirement deficiency
##      AFMS                                0      0                                0
##      Apollo/PHM                          0      0                                0
##      Assay File Database                  0      1                                0
##      CMSNext                             0      0                                0
##      DaVinci                             0      0                                1
##      DFCS                               1      0                                0
##      DPW                                0      0                                0
##      PCN/SCN                            0      0                                0
##      Pulse                              0      0                                0
##      QIMS                               0      0                                0
##      WVLIMS                             0      0                                0

```

## defects verse deliverable

```

table(as.character(subset(FPA, subset = (status == "D"))$deliverable),
      subset(FPA, subset = (status == "D"))$reason)

```

```

##
##                               Inaccurate information Incorrect scope
##      CII                                4                                0
##      FRS                                0                                0
##      IIVP                               2                                0
##      IIVP results                       1                                0
##      Project Plan                       5                                0
##      Software Change Request            2                                0
##      Software Compliance Assessment      1                                1
##      System Certification Summary        1                                0

```

##	Test Protocol	7	0
##	Test Protocol Results	2	0
##	Traceability	4	0
##	URS	0	0
##	User Acceptance Protocol	0	0
##	Validation Plan	0	0
##			
##		Insufficient testing	
##	CII	0	
##	FRS	0	
##	IIVP	0	
##	IIVP results	0	
##	Project Plan	0	
##	Software Change Request	0	
##	Software Compliance Assessment	0	
##	System Certification Summary	0	
##	Test Protocol	6	
##	Test Protocol Results	0	
##	Traceability	0	
##	URS	0	
##	User Acceptance Protocol	0	
##	Validation Plan	0	
##			
##		Not compliant with procedure	
##	CII	0	
##	FRS	2	
##	IIVP	0	
##	IIVP results	1	
##	Project Plan	0	
##	Software Change Request	1	
##	Software Compliance Assessment	0	
##	System Certification Summary	0	
##	Test Protocol	1	
##	Test Protocol Results	1	
##	Traceability	0	
##	URS	2	
##	User Acceptance Protocol	0	
##	Validation Plan	1	
##			
##		Not following document version control	
##	CII		1
##	FRS		0
##	IIVP		0
##	IIVP results		0
##	Project Plan		0
##	Software Change Request		0
##	Software Compliance Assessment		0
##	System Certification Summary		0
##	Test Protocol		2
##	Test Protocol Results		0
##	Traceability		0
##	URS		0
##	User Acceptance Protocol		0
##	Validation Plan		0

```
##
##
##           Not using template Other
## CII                      0      0
## FRS                      0      0
## IIVP                    0      0
## IIVP results            0      0
## Project Plan            0      1
## Software Change Request 0      0
## Software Compliance Assessment 0      0
## System Certification Summary 0      0
## Test Protocol          0      0
## Test Protocol Results   0      0
## Traceability           0      0
## URS                    0      0
## User Acceptance Protocol 1      0
## Validation Plan        0      0
##
##           Requirement deficiency
## CII                      0
## FRS                      1
## IIVP                    0
## IIVP results            0
## Project Plan            0
## Software Change Request 0
## Software Compliance Assessment 0
## System Certification Summary 0
## Test Protocol          0
## Test Protocol Results   0
## Traceability           0
## URS                    0
## User Acceptance Protocol 0
## Validation Plan        0
```

## Rejects by deliverable

```
table(as.character(subset(FPA, subset = (status == "D"))$deliverable))
```

```
##
##           CII                      FRS
##           5                      3
##           IIVP                    IIVP results
##           2                      2
##           Project Plan            Software Change Request
##           6                      3
## Software Compliance Assessment  System Certification Summary
##           2                      1
##           Test Protocol            Test Protocol Results
##           20                      3
##           Traceability              URS
##           4                      2
##           User Acceptance Protocol  Validation Plan
##           1                      1
```