

# Supplier Documentation Data Analysis SJP All Projects

## part one : identifying the duplicates in SAP

In [308...

```
from matplotlib import cm
import matplotlib.pyplot as plt
import pandas as pd
pd.set_option('display.max_columns', 50)
cmap = cm.get_cmap('tab20c')
```

In [215...

```
import warnings

# Ignore all warnings
warnings.filterwarnings("ignore")
```

In [ ]:

Within all portfolios we are actively engaged in managing a substantial volume of 8,046 supplier's documents.

In [216...

```
df = pd.read_csv('Supplier Documents Report all projects.csv', header=0, encoding='latin-1')
df.dropna(inplace=True)
df['Status'] = df['Status'].str.strip()
df
```

Out[216...

	Project	WP	Plant	Document_Responsible	Status	Doc_type	Infotype	Supplier	Purchase Order_Line	Delivery Complete	ACK Date	Materi Delive Da
0	TLA	WP05BR	SJP	Supplier	Overdue	Pos-Manuf.	Manufacturing Record Book (MRB	*Kværner AS	4500940221 (340)	Yes	14/06/2022	9/2/20:
1	TLA	WP05BR	SJP	Supplier	Overdue	Pos-Manuf.	Manufacturing Record Book (MRB	*Kværner AS	4500940221 (350)	Yes	14/06/2022	9/2/20:
2	NCS 2020	WP05BR	SJP	Supplier	Overdue	Pos-Manuf.	Manufacturing Record Book (MRB	*Kværner AS	4500951770 (110)	Yes	21/02/2022	9/2/20:
3	NCS 2020	WP05BR	SJP	Supplier	Overdue	Pos-Manuf.	Manufacturing Record Book (MRB	*Kværner AS	4500951770 (70)	Yes	21/02/2022	9/2/20:
4	NCS 2020	WP05BR	SJP	Supplier	Overdue	Pos-Manuf.	Manufacturing Record Book (MRB	*Kværner AS	4500951770 (90)	Yes	21/02/2022	9/2/20:
...	...	...	...	...	...	...	...	...	...	...	...	...
8540	Moho Infill	WP05BR	SJP	Supplier	Attention	Pre-Manuf.	Welding Procedure Spec. (WPS)	Zamet Industry Spolka Z	4501767381 (20)	No	6/6/2023	6/30/20:
8541	Moho Infill	WP05BR	SJP	Aker Solutions	On Time	Pre-Manuf.	Magnetic Test (MT) Procedure	Zamet Industry Spolka Z	4501746955 (20)	No	13/12/2022	5/17/20:
8542	Moho Infill	WP05BR	SJP	Supplier	Attention	Pre-Manuf.	Manuf. Procedure Spec. (MPS)	Zamet Industry Spolka Z	4501758381 (20)	No	26/06/2023	3/10/20:
8543	Moho Infill	WP05BR	SJP	Supplier	On Time	Pos-Manuf.	Manufacturing Record Book (MRB	Zamet Industry Spolka Z	4501758381 (20)	No	26/06/2023	3/10/20:
8544	Moho Infill	WP05BR	SJP	Supplier	Attention	Pre-Manuf.	Heat Treatment Procedure	Zamet Industry Spolka Z	4501758381 (20)	No	26/06/2023	3/10/20:

8046 rows × 17 columns



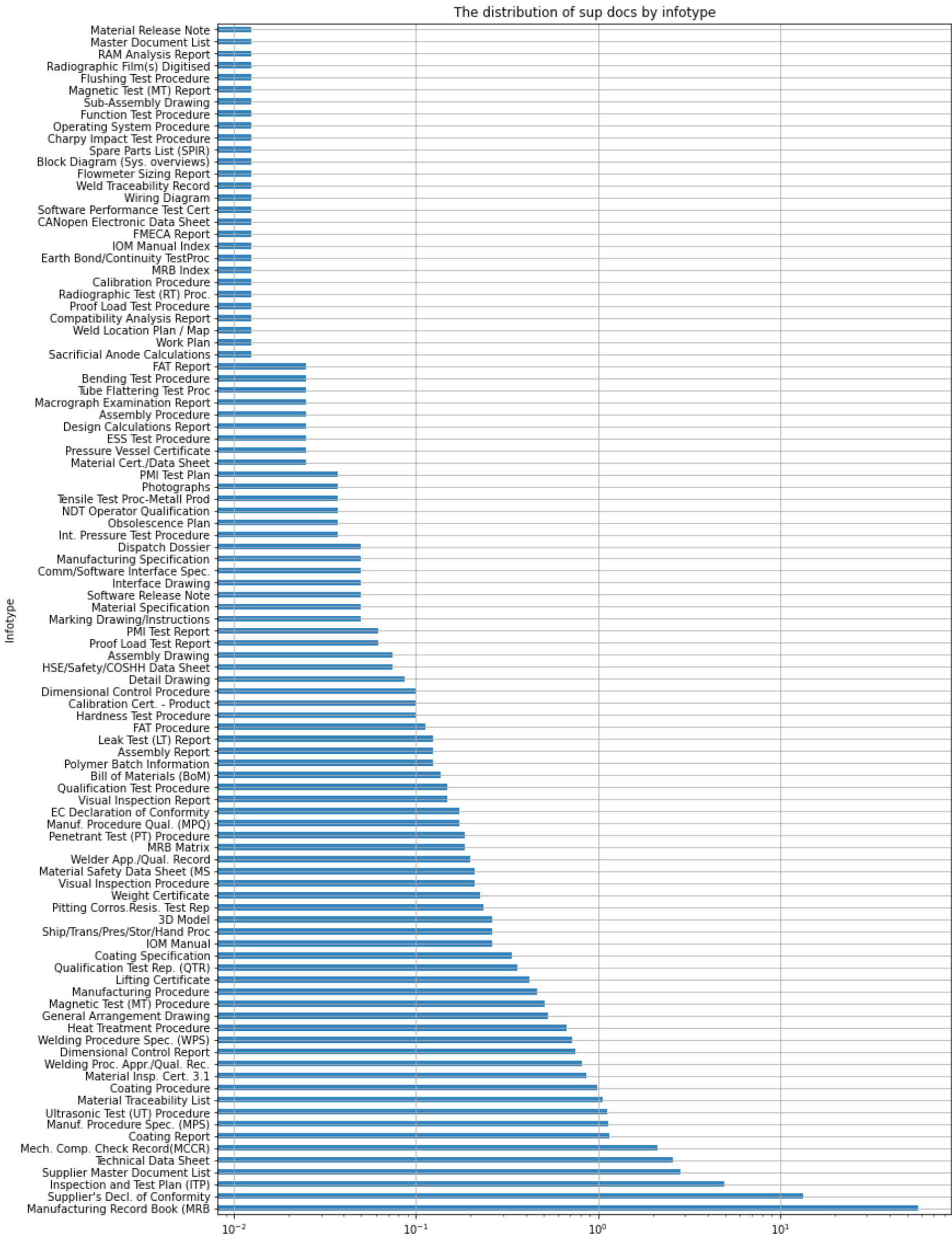
As we explore the distribution of infotypes, we see the following breakdown. The most prevalent infotype is MRB, accounting for approximately 60% of the documents. Additionally, the next two popular infotypes are Suppliers Declaration of Conformity(13%) and ITP (5%), each constituting a significant portion of the remaining documents.

In [217...

```
freq = df['Infotype'].value_counts(normalize=True) * 100
plt.figure(figsize=(12, 20))
freq.plot(kind='barh', cmap=cmap, logx=True, grid=True)
```

```
plt.title('The distribution of sup docs by infotype')
plt.ylabel('Infotype');
```

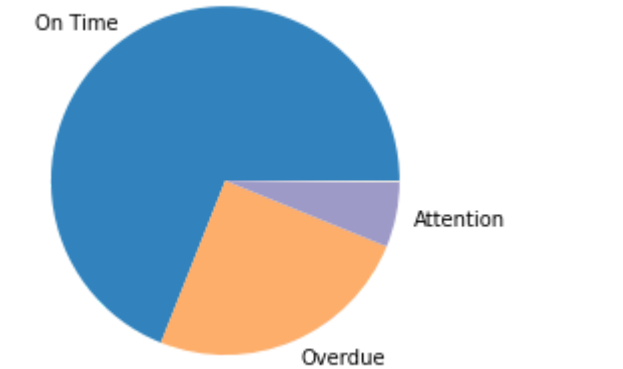
# In the bar chart below I have to use the Logarithmic function to see more clear distribution of 104 infotypes



The distribution of docs by its status depicts the share of overdue docs equal to 25%

In [218...

```
df['Status'].value_counts(normalize=True).plot(kind='pie', cmap=cmap)
plt.ylabel('');
```



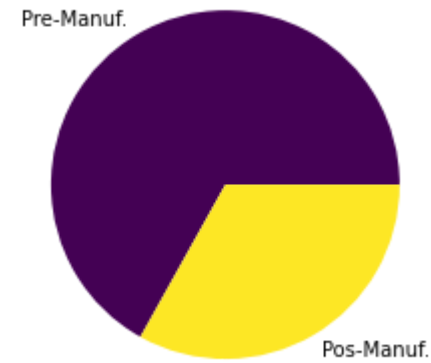
```
In [219... df['Status'].value_counts(normalize=True)
```

Out[219... On Time 0.689784  
Overdue 0.248571  
Attention 0.060154  
0.001491  
Name: Status, dtype: float64

```
In [220... df['Status'] = df['Status'].str.strip()
```

Among all overdue documents the Pre-Manufacturing docs command a slice of 67%

```
In [221... df[df['Status'] == 'Overdue']['Doc_type'].value_counts(normalize=True).plot(kind='pie', cmap='viridis')  
plt.ylabel('');
```

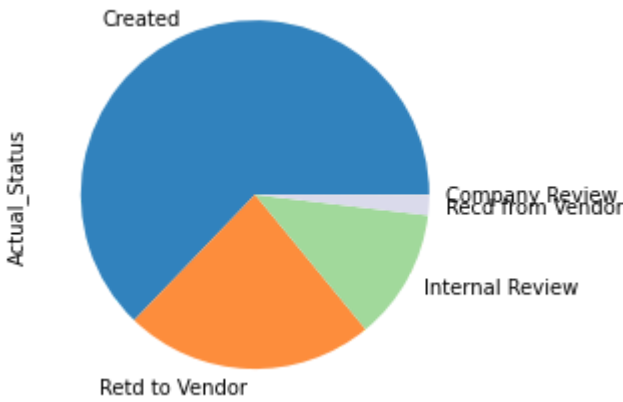


```
In [222... df[df['Status'] == 'Overdue']['Doc_type'].value_counts(normalize=True)
```

Out[222... Pre-Manuf. 0.669  
Pos-Manuf. 0.331  
Name: Doc\_type, dtype: float64

The chart by "actuals status" reflects the where the documentation stands in the approval process:

```
In [223... over = df[df['Status'] == 'Overdue'].copy()  
over['Actual_Status'].value_counts().plot(kind='pie', cmap=cmap);
```



```
In [224... gr = over.groupby(['Document_Responsible', 'Doc_type'])['Project'].count().reset_index()  
gr.set_index('Document_Responsible', inplace=True)  
gr.head(5)
```

Out[224...

	Doc_type	Project
Document_Responsible		
Aker Solutions	Pos-Manuf.	73
Aker Solutions	Pre-Manuf.	207
Check Workflow	Pre-Manuf.	1

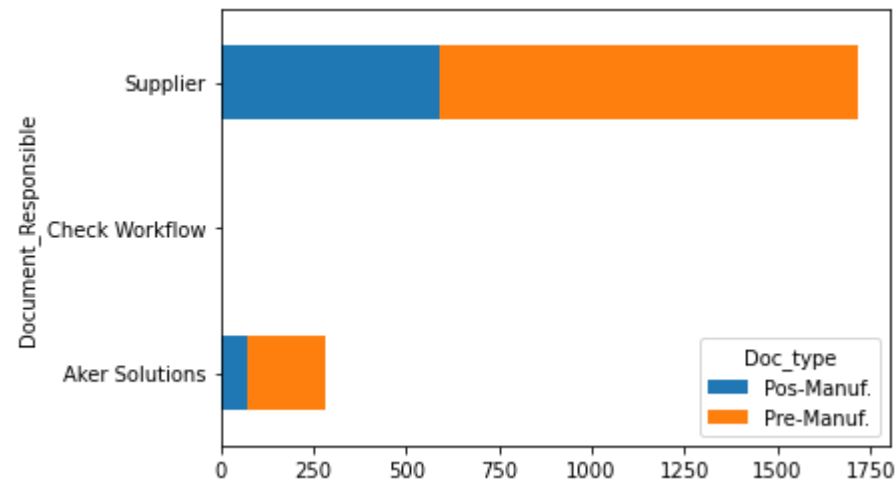
	Doc_type	Project
Document_Responsible		
Supplier	Pos-Manuf.	589
Supplier	Pre-Manuf.	1130

The majority of sup docs remain pending with suppliers, keeping an overwhelming proportion of pre-manufacturing types.

In [225...

```

pivot = pd.pivot_table(over, index=['Document_Responsible'], columns='Doc_type', values='Project', aggfunc='count')
pivot.plot.barh(stacked=True);
```



Now let's see how many suppliers we are dealing with:

In [226...

```

df['Supplier'].nunique()

#amount of suppliers
```

Out[226...

146

Utilizing the unique supplier document number, I reveal documents that have been submitted more than once. These occurrences point to instances where suppliers have provided the same doc content upon our request. But it is registered with varying DIRs entries in our SAP.

In [227...

```

gr = df.groupby('Supplier')['Sup_Doc_Num'].value_counts()
```

In [315...

```

#Documents sent by supplier more than once
gr = gr[gr > 1]
gr_sorted = gr.sort_values(ascending=False)
gr_sorted.head(5)
```

Out[315...

Supplier	Sup_Doc_Num	
Equipsea Equipamentos E Servicos	FE-8.6-04	20
Acos Torres Comercial e	10000316110	13
Equipsea Equipamentos E Servicos	FE-8.6-01	12
A1 Tecnologia e Industria	AKE-2301-999-PRT-0008	10
	AKE-2301-999-PRT-0009	9

Name: Sup\_Doc\_Num, dtype: int64

Run a function, showing which infotypes are represented by duplicates :

In [229...

```

data = {
    'Supplier': [],
    'Docs_num': [],
    'Documents': [],
    'Overdue': []
}

for i in gr.iteritems():
    comp = df[(df.Supplier == i[0][0]) & (df.Sup_Doc_Num == i[0][1])] # .iloc[0]['infotype']
    counter = len(comp)
    over = len(comp[comp['Status'] == 'Overdue'])
    data['Supplier'].append(i[0][0])
    data['Docs_num'].append(counter)
    data['Documents'].append('; \n'.join(comp['Infotype'].unique()))
    data['Overdue'].append(over)
    # print(f''Supplier: {i[0][0]}
    # {counter} times sent
    # Document {doc}
    # Where {over} overdue'')
    # print('\n=====')

result = pd.DataFrame(data)
```

In [316...

```
result.head(5)
```

Out[316...

	Supplier	Docs_num	Documents	Overdue
0	A1 Tecnologia e Industria	10	Welding Proc. Appr./Qual. Rec.; \nCoating Proc...	8
1	A1 Tecnologia e Industria	9	Welding Proc. Appr./Qual. Rec.; \nCoating Proc...	7
2	A1 Tecnologia e Industria	8	Magnetic Test (MT) Procedure	6
3	A1 Tecnologia e Industria	5	Ultrasonic Test (UT) Procedure	4
4	A1 Tecnologia e Industria	5	Welding Proc. Appr./Qual. Rec.; \nWelding Proc...	4

And sort the values of duplicates from max to min.

This way we have the total output of Supplier name, Infotype sent, Num of times sent, Amount of overdues.

In [307...

```
top = result.groupby(['Supplier', 'Documents'])[['Docs_num', 'Overdue']].sum().sort_values('Docs_num', ascending=False)
pd.set_option('display.max_rows', 999)
top
```

Out[307...

	Supplier	Documents	Docs_num	Overdue
	Equipsea Equipamentos E Servicos	Supplier's Decl. of Conformity	20	6
	A1 Tecnologia e Industria	Welding Proc. Appr./Qual. Rec.; \nCoating Procedure; \nWelding Procedure Spec. (WPS)	19	15
		Welding Proc. Appr./Qual. Rec.; \nWelding Procedure Spec. (WPS)	15	12
	Prec Tech Industria E Comercio	Inspection and Test Plan (ITP)	14	12
	Acos Torres Comercial e	Ultrasonic Test (UT) Procedure	13	13
		Heat Treatment Procedure	12	12
	Equipsea Equipamentos E Servicos	Material Traceability List; \nSupplier Master Document List	12	2
	A1 Tecnologia e Industria	Magnetic Test (MT) Procedure	10	8
		Welding Proc. Appr./Qual. Rec.; \nCoating Procedure	10	6
	MarshallXport LLC	Manufacturing Record Book (MRB; \nPitting Corros.Resis. Test Rep	9	2
	Trieng Tecnica Industrial Ltda	Welding Procedure Spec. (WPS); \nWelder App./Qual. Record; \nWelding Proc. Appr./Qual. Rec.	8	8
	FCF - Fabrica Catarinense De	Ship/Trans/Pres/Stor/Hand Proc; \nDimensional Control Procedure	8	8
	HRM Caldeiraria Industrial Eireli	Manufacturing Record Book (MRB	8	0
	IPP Mardale Ltd	Ultrasonic Test (UT) Procedure	8	8
	Salgueiro Industria e Comercio de	Heat Treatment Procedure	8	8
		Ultrasonic Test (UT) Procedure	7	7
	Equipsea Equipamentos E Servicos	Material Safety Data Sheet (MS	7	7
	Trelleborg do Brasil Sol Ved LTDA	Supplier's Decl. of Conformity; \nTechnical Data Sheet; \nManufacturing Record Book (MRB	6	0
	Italbronze Ltda	Manufacturing Record Book (MRB	6	4
	MarshallXport LLC	Manufacturing Record Book (MRB; \nPitting Corros.Resis. Test Rep; \n3D Model	6	1
	Neade Industria e Comercio de	Mech. Comp. Check Record(MCCR); \nMaterial Traceability List; \nCoating Specification; \nSupplier's Decl. of Conformity	6	3
	Qualiferr Qualidade em Ferramentas	Supplier's Decl. of Conformity	6	0
	Usifermag Usinagem	Coating Procedure	5	5
	Italbronze Ltda	Manuf. Procedure Spec. (MPS)	5	5
	Trieng Tecnica Industrial Ltda	Ultrasonic Test (UT) Procedure	5	4
	Siemens Energy Limited	Inspection and Test Plan (ITP)	5	5
	Trieng Tecnica Industrial Ltda	Leak Test (LT) Report	5	0
	A1 Tecnologia e Industria	Ultrasonic Test (UT) Procedure	5	4
	Equipsea Equipamentos E Servicos	Material Insp. Cert. 3.1; \nVisual Inspection Report; \nManufacturing Record Book (MRB	5	0
	MarshallXport LLC	Manufacturing Record Book (MRB; \nPitting Corros.Resis. Test Rep; \nInspection and Test Plan (ITP)	4	3

		Docs_num	Overdue
Supplier	Documents		
Neade Industria e Comercio de	Coating Specification; \nVisual Inspection Report; \nMaterial Insp. Cert. 3.1	4	2
	Material Insp. Cert. 3.1; \nCoating Specification; \nWeight Certificate	4	2
FCF - Fabrica Catarinense De	Inspection and Test Plan (ITP)	4	2
Qualiferr Qualidade em Ferramentas	Coating Procedure	4	3
Nanjing Develop Advanced	Manufacturing Record Book (MRB	4	0
Bubamaster Usinagem de Pecas Ltda	Material Insp. Cert. 3.1	4	0
A1 Tecnologia e Industria	Manufacturing Record Book (MRB	4	0
Trieng Tecnica Industrial Ltda	Welder App./Qual. Record	4	3
Usiesp Usinagens Especiais Ltda -	Manufacturing Record Book (MRB	4	0
ESI Technology Ltd	Material Traceability List	4	0
A1 Tecnologia e Industria	Welding Procedure Spec. (WPS); \nWelding Proc. Appr./Qual. Rec.	4	4
Vama Industrial Ltda	Manufacturing Record Book (MRB	4	0
Neade Industria e Comercio de	Manufacturing Record Book (MRB; \nIOM Manual	3	2
MarshallXport LLC	Pitting Corros.Resis. Test Rep; \nManufacturing Procedure	3	2
NG Metalurgica Ltda	Welding Procedure Spec. (WPS)	3	2
A1 Tecnologia e Industria	Coating Procedure; \nMagnetic Test (MT) Report	3	2
Equipsea Equipamentos E Servicos	Ultrasonic Test (UT) Procedure	3	3
Tecflux Ltda	Pitting Corros.Resis. Test Rep; \nInterface Drawing; \nMech. Comp. Check Record(MCCR)	3	2
Siemens Energy Limited	IOM Manual; \nShip/Trans/Pres/Stor/Hand Proc	3	3
A1 Tecnologia e Industria	Welding Proc. Appr./Qual. Rec.; \nCalibration Procedure	3	1
Prec Tech Industria E Comercio	Tensile Test Proc-Metall Prod	3	0
A1 Tecnologia e Industria	Welding Proc. Appr./Qual. Rec.; \nAssembly Procedure	3	2
Neade Industria e Comercio de	Weight Certificate; \nCoating Specification	3	2
Tecflux Ltda	Manufacturing Record Book (MRB; \nGeneral Arrangement Drawing; \nMech. Comp. Check Record(MCCR)	3	3
Equipsea Equipamentos E Servicos	Weight Certificate	3	0
Trieng Tecnica Industrial Ltda	Visual Inspection Procedure	3	3
ICM - Industria Capixaba De Materia	Manufacturing Record Book (MRB	3	0
Tecflux Ltda	Supplier's Decl. of Conformity; \nManufacturing Record Book (MRB	2	1
Siemens Energy Limited	HSE/Safety/COSHH Data Sheet	2	2
Tequaly Tecnica Industrial Ltda	Material Traceability List; \nManufacturing Procedure	2	1
Siemens Energy Limited	Inspection and Test Plan (ITP); \nFAT Procedure	2	2
Trieng Tecnica Industrial Ltda	Manuf. Procedure Spec. (MPS); \nManufacturing Procedure	2	2
Siemens Energy Limited	IOM Manual; \nWelding Procedure Spec. (WPS)	2	2
Tequaly Tecnica Industrial Ltda	Supplier's Decl. of Conformity	2	0
	Welding Proc. Appr./Qual. Rec.; \nInspection and Test Plan (ITP)	2	2
Transcontrol Com Ind De	Mech. Comp. Check Record(MCCR)	2	1
Tequaly Tecnica Industrial Ltda	Welding Procedure Spec. (WPS); \nManuf. Procedure Spec. (MPS)	2	2
Vama Industrial Ltda	Hardness Test Procedure	2	2
Siemens Energy Limited	General Arrangement Drawing; \nSoftware Release Note	2	1
	General Arrangement Drawing	2	2
Zamet Industry Spolka Z	IOM Manual; \nWeight Certificate	2	0
Siemens Energy Limited	3D Model; \nPenetrant Test (PT) Procedure	2	2
Schlumberger	ESS Test Procedure	2	2
Tequaly Tecnica Industrial Ltda	Manufacturing Record Book (MRB	2	1
Siemens Energy Limited	Inspection and Test Plan (ITP); \nQualification Test Rep. (QTR)	2	1
	Technical Data Sheet; \nCoating Procedure	2	2

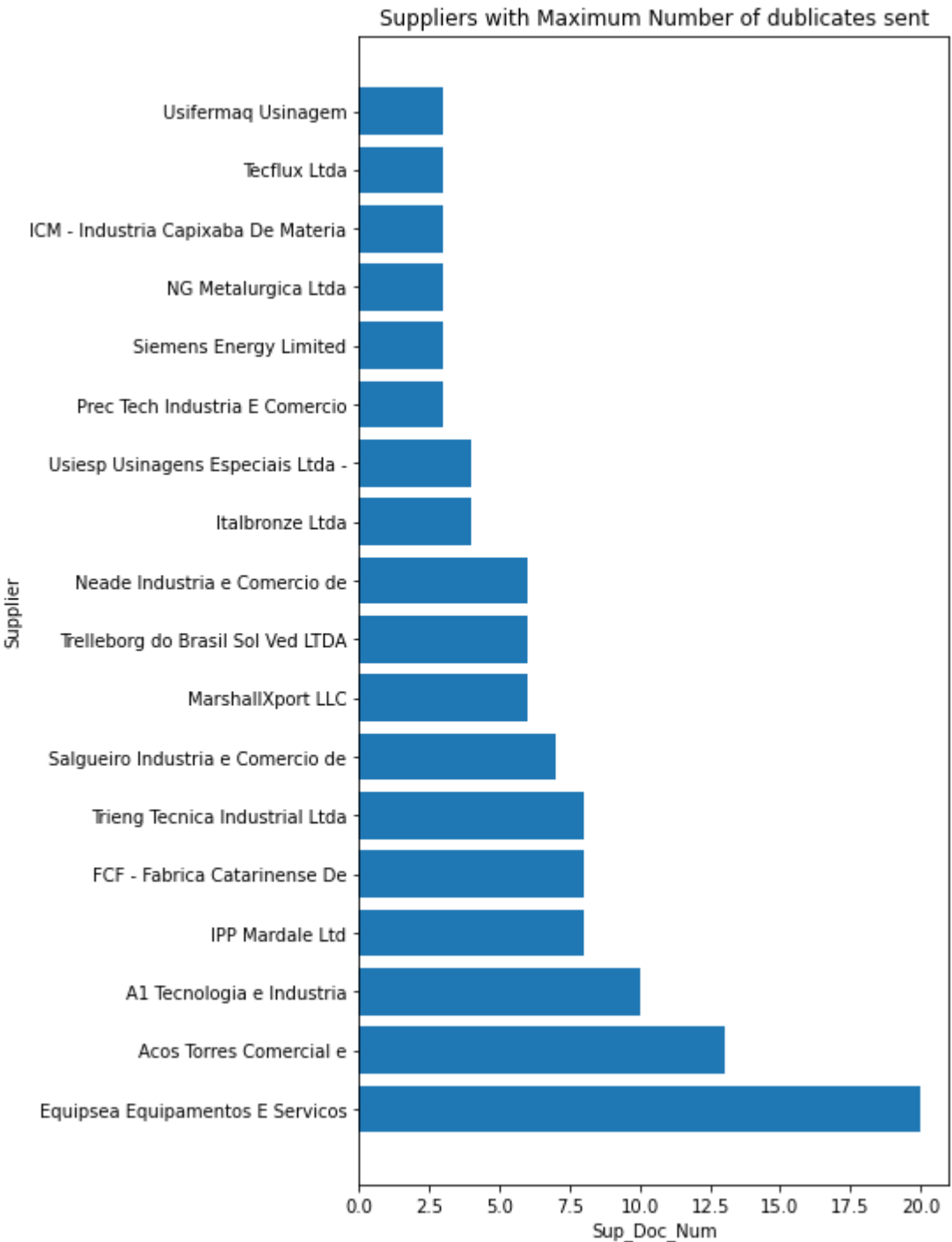
		Docs_num	Overdue
Supplier	Documents		
Tequaly Tecnica Industrial Ltda	Coating Procedure; \nCoating Specification	2	2
Trieng Tecnica Industrial Ltda	Welding Proc. Appr./Qual. Rec.	2	2
	Welding Proc. Appr./Qual. Rec.; \nWelder App./Qual. Record	2	2
Tecflux Ltda	Mech. Comp. Check Record(MCCR); \nWeight Certificate	2	1
	Mech. Comp. Check Record(MCCR)	2	1
Trieng Tecnica Industrial Ltda	Dimensional Control Procedure	2	2
Siemens Energy Limited	Technical Data Sheet; \nCANopen Electronic Data Sheet	2	2
Tecflux Ltda	Pitting Corros.Resis. Test Rep; \nMaterial Traceability List	2	2
Siemens Energy Limited	Ship/Trans/Pres/Stor/Hand Proc; \nObsolescence Plan	2	1
	Ship/Trans/Pres/Stor/Hand Proc; \nManufacturing Record Book (MRB	2	1
Tequaly Tecnica Industrial Ltda	Magnetic Test (MT) Procedure	2	2
Trieng Tecnica Industrial Ltda	Material Traceability List	2	0
Usifermaq Usinagem	Magnetic Test (MT) Procedure	2	2
Siemens Energy Limited	Material Specification	2	2
Tequaly Tecnica Industrial Ltda	Manufacturing Record Book (MRB; \nCoating Procedure	2	1
A1 Tecnologia e Industria	Coating Procedure	2	1
Quality Hydraulic Power Ltd	Pressure Vessel Certificate	2	0
Cladtek do Brasil Industria e	Manuf. Procedure Spec. (MPS)	2	2
FCF - Fabrica Catarinense De	Dimensional Control Procedure; \nManufacturing Procedure	2	2
	Coating Specification	2	2
Eurometall - Industria de Cabos e	Supplier's Decl. of Conformity	2	0
Equipsea Equipamentos E Servicos	Visual Inspection Report	2	0
	Inspection and Test Plan (ITP)	2	2
	Coating Specification; \nCoating Procedure	2	2
ESI Technology Ltd	Manufacturing Record Book (MRB; \nMaterial Traceability List	2	0
	Manufacturing Record Book (MRB	2	0
Cladtek do Brasil Industria e	Welding Proc. Appr./Qual. Rec.; \nWelding Procedure Spec. (WPS)	2	2
	Magnetic Test (MT) Procedure	2	2
Fugro GB (North) Marine Limited	Assembly Drawing; \nGeneral Arrangement Drawing	2	2
Bubamaster Usinagem de Pecas Ltda	Manufacturing Record Book (MRB	2	0
Aker Solutions AS	Mech. Comp. Check Record(MCCR)	2	1
	Manufacturing Record Book (MRB	2	1
	Int. Pressure Test Procedure	2	1
Acos Torres Comercial e	Manuf. Procedure Spec. (MPS); \nManuf. Procedure Qual. (MPQ)	2	2
	Magnetic Test (MT) Procedure	2	2
Acos F. Sacchelli Ltda	Ultrasonic Test (UT) Procedure; \nNDT Operator Qualification	2	2
	Heat Treatment Procedure	2	2
A1 Tecnologia e Industria	Visual Inspection Procedure	2	2
FCF - Fabrica Catarinense De	Manufacturing Record Book (MRB; \nCoating Report	2	0
Fugro GB (North) Marine Limited	Technical Data Sheet	2	2
Qualiferr Qualidade em Ferramentas	Inspection and Test Plan (ITP)	2	2
Metalinox Cogne Acos Inoxidaveis	Dimensional Control Report; \nManufacturing Record Book (MRB	2	0
Qualiferr Qualidade em Ferramentas	Heat Treatment Procedure; \nCoating Procedure	2	2
Prec Tech Industria E Comercio	Supplier's Decl. of Conformity; \nManufacturing Record Book (MRB	2	0
Petrolane Servicos Em Petroleo Ltda	Welding Proc. Appr./Qual. Rec.; \nGeneral Arrangement Drawing	2	2
	Coating Procedure	2	2
Parker Hannifin Industria e	Supplier's Decl. of Conformity	2	0



		Docs_num	Overdue
Supplier	Documents		
Neade Industria e Comercio de	Weight Certificate; \nIOM Manual	2	2
	Material Insp. Cert. 3.1; \nCoating Specification	2	2
	Coating Specification; \nWeight Certificate	2	1
Metalinox Cogne Acos Inoxidaveis	Ship/Trans/Pres/Stor/Hand Proc	2	2
Master Flo Valve Inc	IOM Manual	2	2
HOWCO Metals Management	Inspection and Test Plan (ITP); \nManufacturing Procedure	2	0
MarshallXport LLC	Supplier's Decl. of Conformity; \nManufacturing Record Book (MRB	2	0
	Supplier's Decl. of Conformity	2	2
	Mech. Comp. Check Record(MCCR)	2	2
	Manufacturing Record Book (MRB; \nSupplier's Decl. of Conformity	2	1
	Manufacturing Record Book (MRB; \nHSE/Safety/COSHH Data Sheet	2	2
	Manufacturing Record Book (MRB	2	0
	3D Model; \nHSE/Safety/COSHH Data Sheet	2	2
L B Bentley Limited	Bill of Materials (BoM)	2	2
Haskel International, LLC	Manufacturing Record Book (MRB; \nSupplier's Decl. of Conformity	2	0
Zamet Industry Spolka Z	Manufacturing Record Book (MRB	2	0

In [232...

```
plt.figure(figsize=(6, 12))
plt.barh(gr_bar['Supplier'], width=gr_bar['Project'])
plt.xlabel('Sup_Doc_Num')
plt.ylabel('Supplier')
plt.title('Suppliers with Maximum Number of duplicates sent');
```



```
plt.figure(dpi=180) top.plot(kind='barh', cmap=cmap) plt.grid(True);
```

One of the reasons for the significant share of duplicated supplier documents can be attributed to the following factors:

- SMDL Training: As part of the supplier's training conducted by AKSO, filling in the DIR number from the previous submission is optional. Suppliers who deal with a substantial volume of paperwork with AKSO may not prioritize inserting our internal information



for the sake of OUR efficient document management. When the old DIR number field is blank, Doc Control in Pune creates a new DIR in SAP, and even the document remains the same content.

- Lack of Document Analyst Responsible in Pune: The team in Pune currently needs a dedicated document coordinator, resulting in only new DIRs being generated without sufficient checks for duplication.
- Absence of a Single Source for Verified Documents: The absence of a centralized and verified document repository for suppliers, FUP, doc controls, and projects contributes to the challenges in managing duplicate documents effectively.
- Multiple Gates and Information Sharing: The process of sharing comments from document control to suppliers involves additional steps and does not directly reach the suppliers, requiring facilitation through a follow-up person.

## Based on the analysis, the following suggestions can help address these issues:

- Establish a Common Database: Create a shared database containing vendor-approved documents. Make it a prerequisite step before creating new DIRs, enabling efficient document control, smothering paperwork for suppliers, and project management (PPM; PPL).
- Streamline Document Verification with a commercial mindset: Take the lead in the document verification process, decrease code 3 approval, and be overly stringent in returning vendor documents due to minor syntax errors or similar reasons.
- Conduct Further Research: Perform in-depth research on the most common reasons for document returns. Identify patterns and areas of improvement to enhance the document submission and verification process.
- Develop Supplier Onboarding Support Materials: Create supplementary support materials such as short videos as part of the PPD (Pre-Project Documentation) documents. These resources will aid in the smooth onboarding of suppliers and provide clear guidelines for document submission.

## Part two:

## Identify pre-production infotypes that receives little to no comments and playing not essential role in the further process

Lets see all the Pre-manufacturing Infotypes:

In [233...

```
df['Doc_type'] = df['Doc_type'].str.strip()
pre_manuf_infotypes = df.loc[df['Doc_type'] == 'Pre-Manuf.', 'Infotype'].unique()

PPDs = pd.DataFrame(pre_manuf_infotypes)
PPDs
```

Out[233...

0

0	Supplier Master Document List
1	Welding Procedure Spec. (WPS)
2	Inspection and Test Plan (ITP)
3	Welding Proc. Appr./Qual. Rec.
4	Ultrasonic Test (UT) Procedure
5	Magnetic Test (MT) Procedure
6	Visual Inspection Procedure
7	Coating Procedure
8	Calibration Procedure
9	Assembly Procedure
10	Heat Treatment Procedure
11	NDT Operator Qualification
12	Manuf. Procedure Qual. (MPQ)
13	Manuf. Procedure Spec. (MPS)
14	IOM Manual
15	Ship/Trans/Pres/Stor/Hand Proc
16	Interface Drawing
17	3D Model
18	General Arrangement Drawing
19	Technical Data Sheet
20	Int. Pressure Test Procedure
21	Material Safety Data Sheet (MS
22	EC Declaration of Conformity
23	Obsolescence Plan

0	
24	Function Test Procedure
25	Comm/Software Interface Spec.
26	Manufacturing Procedure
27	Detail Drawing
28	Tube Flattering Test Proc
29	Coating Specification
30	Dimensional Control Procedure
31	Assembly Drawing
32	Bill of Materials (BoM)
33	FAT Procedure
34	Operating System Procedure
35	Sub-Assembly Drawing
36	Qualification Test Procedure
37	Manufacturing Specification
38	HSE/Safety/COSHH Data Sheet
39	Welder App./Qual. Record
40	Bending Test Procedure
41	Sacrificial Anode Calculations
42	Design Calculations Report
43	Material Specification
44	Penetrant Test (PT) Procedure
45	Flushing Test Procedure
46	Hardness Test Procedure
47	Tensile Test Proc-Metall Prod
48	Charpy Impact Test Procedure
49	Block Diagram (Sys. overviews)
50	Wiring Diagram
51	PMI Test Plan
52	ESS Test Procedure
53	CANopen Electronic Data Sheet
54	FMECA Report
55	IOM Manual Index
56	Earth Bond/Continuity TestProc
57	MRB Index
58	Radiographic Test (RT) Proc.
59	Proof Load Test Procedure
60	Compatibility Analysis Report
61	Work Plan

First I take a look on the Info types with least "Internal review" and "Returned to Vendor" rating:

In [294...

```
# Clean the 'Doc_type' column by removing leading/trailing whitespaces and making it consistent
df['Doc_type'] = df['Doc_type'].str.strip()

# Clean the 'Actual_Status' column by removing leading/trailing whitespaces and convert to lowercase
df['Actual_Status'] = df['Actual_Status'].str.strip().str.lower()

# Filter the DataFrame to show only 'Pre-Manuf' infotypes
pre_manuf_df = df[df['Doc_type'] == 'Pre-Manuf.']

# Create a dictionary to store the counts of 'Internal Review' and 'Retd to Vendor' statuses for each 'Infotype'
status_counts = {}

for infotype in pre_manuf_df['Infotype']:
    # Filter the original DataFrame 'pre_manuf_df' to get only the rows with the current 'Infotype'
    infotype_data = pre_manuf_df[pre_manuf_df['Infotype'] == infotype]

    # Count the occurrences of 'Internal Review' and 'Retd to Vendor' for the current 'Infotype'
    internal_review_count = (infotype_data['Actual_Status'] == 'internal review').sum()
    ret_to_vendor_count = (infotype_data['Actual_Status'] == 'retd to vendor').sum()

    # Store the counts in the dictionary
    status_counts[infotype] = {
```

```
        'Internal review': internal_review_count,
        'Retd to Vendor': ret_to_vendor_count
    }

    # Create a new DataFrame with the counts of 'Internal Review' and 'Retd to Vendor' for each 'Infotype'
    status_counts_df = pd.DataFrame(status_counts).T

    # Sort the DataFrame by 'Internal Review' and 'Retd to Vendor' counts in ascending order to get the Least amount of statu
    sorted_status_counts = status_counts_df.sort_values(by=['Internal review', 'Retd to Vendor'], ascending=True)

    print(sorted_status_counts)
```

	Internal review	Retd to Vendor
Calibration Procedure	0	0
Heat Treatment Procedure	0	0
NDT Operator Qualification	0	0
Interface Drawing	0	0
EC Declaration of Conformity	0	0
Coating Specification	0	0
Operating System Procedure	0	0
Tensile Test Proc-Metall Prod	0	0
Charpy Impact Test Procedure	0	0
Block Diagram (Sys. overviews)	0	0
Wiring Diagram	0	0
PMI Test Plan	0	0
CANopen Electronic Data Sheet	0	0
FMECA Report	0	0
IOM Manual Index	0	0
MRB Index	0	0
Radiographic Test (RT) Proc.	0	0
Proof Load Test Procedure	0	0
Sub-Assembly Drawing	0	1
HSE/Safety/COSHH Data Sheet	0	1
Sacrificial Anode Calculations	0	1
Penetrant Test (PT) Procedure	0	1
Work Plan	0	1
Comm/Software Interface Spec.	0	2
Tube Flattering Test Proc	0	2
FAT Procedure	0	2
Bending Test Procedure	0	2
ESS Test Procedure	0	2
Assembly Procedure	1	0
IOM Manual	1	0
Material Safety Data Sheet (MS	1	0
Obsolescence Plan	1	0
Function Test Procedure	1	0
Design Calculations Report	1	0
Material Specification	1	0
Flushing Test Procedure	1	0
Hardness Test Procedure	1	0
Earth Bond/Continuity TestProc	1	0
Compatibility Analysis Report	1	0
Visual Inspection Procedure	1	1
Int. Pressure Test Procedure	1	1
Manuf. Procedure Qual. (MPQ)	1	3
Manufacturing Specification	1	3
Detail Drawing	1	4
Ultrasonic Test (UT) Procedure	1	6
Ship/Trans/Pres/Stor/Hand Proc	2	0
Assembly Drawing	2	0
Welding Proc. Appr./Qual. Rec.	2	4
Dimensional Control Procedure	3	0
Magnetic Test (MT) Procedure	3	2
Coating Procedure	3	10
Welder App./Qual. Record	4	1
Bill of Materials (BoM)	5	1
Qualification Test Procedure	6	5
3D Model	6	7
Manufacturing Procedure	9	4
Welding Procedure Spec. (WPS)	9	15
Technical Data Sheet	16	12
General Arrangement Drawing	21	10
Manuf. Procedure Spec. (MPS)	29	19
Inspection and Test Plan (ITP)	126	111
Supplier Master Document List	151	61

To make sure my function filter worked properly we check the amount by status. Everything looks right.

In [295...

```
# Clean the 'Doc_type' column by removing leading/trailing whitespaces and making it consistent
df['Doc_type'] = df['Doc_type'].str.strip()

# Clean the 'Actual_Status' column by removing leading/trailing whitespaces and convert to lowercase
df['Actual_Status'] = df['Actual_Status'].str.strip().str.lower()

# Filter the DataFrame to show only 'Pre-Manuf' infotypes
pre_manuf_df = df[df['Doc_type'] == 'Pre-Manuf.']

# Count the occurrences of 'Internal Review' (ignoring capitalization and extra spaces) in the 'Actual_Status' column of
internal_review_count = (pre_manuf_df['Actual_Status'] == 'internal review').sum()

print("Count of 'Internal Review' in pre-manufacturing documents:", internal_review_count)
```

Count of 'Internal Review' in pre-manufacturing documents: 414

In [297...

```
# Clean the 'Doc_type' column by removing leading/trailing whitespaces and making it consistent
df['Doc_type'] = df['Doc_type'].str.strip()

# Clean the 'Actual_Status' column by removing leading/trailing whitespaces
df['Actual_Status'] = df['Actual_Status'].str.strip()

# Filter the DataFrame to show only 'Pre-Manuf' infotypes
pre_manuf_df = df[df['Doc_type'] == 'Pre-Manuf.']

# Count the occurrences of 'Internal Review' in the 'Actual_Status' column of 'pre_manuf_df'
internal_review_count = (pre_manuf_df['Actual_Status'] == 'retd to vendor').sum()

print("Count of 'Retd to Vendor' in pre-manufacturing documents:", internal_review_count)
```

Count of 'Retd to Vendor' in pre-manufacturing documents: 295

Now I extract the new verification dataset from SAP containing documents with status 59(accepted) within the version 00.

In [304...

```
newdf = pd.read_csv('0059.csv', header=0, encoding='latin-1')
newdf.dropna(inplace=True)
newdf.head(5)
```

Out[304...

	Document Type	Document	Document Version	Information Type	Status Text	Material Number	Output date	Work Package
0	SUP	10008095667	0	Coating Procedure	Accepted	10334212	6/8/2022	Controls
4	SUP	10008229853	0	List of Certificates	Accepted	10149891	11/3/2022	Controls
5	SUP	10008251151	0	Supplier's Decl. of Conformity	Accepted	BBETQ000003	11/22/2022	Subsea Lifecycle Services
6	SUP	10008163033	0	Supplier's Decl. of Conformity	Accepted	BBFSV002088	8/23/2022	Subsea Lifecycle Services
7	SUP	10008221851	0	Supplier's Decl. of Conformity	Accepted	BBCES000104	10/25/2022	Subsea Lifecycle Services

Considering this dataset contain not only PPDs.

In [302...

```
newdf['Information Type'].unique()
```

Out[302...

```
array(['Coating Procedure', 'List of Certificates',
      "Supplier's Decl. of Conformity", 'Material Insp. Cert. 3.1',
      'Dimensional Control Report', 'Coating Report',
      'Material Traceability List', 'Coating Specification',
      'Manufacturing Record Book (MRB)', 'Technical Data Sheet',
      'Dimensional Control Procedure', 'General Arrangement Drawing',
      'FAT Procedure', 'Eng., Proc., Manuf. Schedule', 'IOM Manual',
      'Hardness Test Procedure', 'Heat Treatment Procedure',
      'Ext. Pressure Test Procedure', 'Inspection and Test Plan (ITP)',
      'Welding Procedure Spec. (WPS)', 'Weld Traceability Record',
      'Penetrant Test (PT) Procedure', 'Magnetic Test (MT) Procedure',
      'Manufacturing Procedure', 'Manuf. Procedure Spec. (MPS)',
      'Manufacturing Specification', 'Visual Inspection Report',
      'EC Declaration of Conformity', 'Welding Proc. Appr./Qual. Rec.',
      'Mech. Comp. Check Record(MCCR)', 'Supplier Master Document List',
      'PMI Procedure', 'Ship/Trans/Pres/Stor/Hand Proc',
      'Int. Pressure Test Procedure', 'Technical & Functional Descr.',
      'Ultrasonic Test (UT) Procedure', 'Visual Inspection Procedure',
      'Welder App./Qual. Record', 'Weld Location Plan / Map'],
      dtype=object)
```

Dislike the previous data set, here we need the most frequent data types to observe.

\*\*Running the requested analysis on Infotype A06 (Supplier's Decl. of Conformity), we see it has one of the highest rate of acceptance within first version, and only 13% of this infotypes have been returned to vendor with no critical comments.

In [303...

```
info_type_counts = newdf['Information Type'].value_counts()

# Display the most frequent accepted in 00 information types
print(info_type_counts)
```

Manufacturing Record Book (MRB)	630
Supplier's Decl. of Conformity	325
Inspection and Test Plan (ITP)	114
Dimensional Control Report	21
Manuf. Procedure Spec. (MPS)	20
Material Insp. Cert. 3.1	16
Material Traceability List	8
Technical Data Sheet	8
Coating Report	7
Mech. Comp. Check Record(MCCR)	7
Coating Procedure	6
Dimensional Control Procedure	5

Magnetic Test (MT) Procedure	5
Manufacturing Specification	4
Manufacturing Procedure	4
PMI Procedure	3
Welding Procedure Spec. (WPS)	3
List of Certificates	2
Weld Traceability Record	2
Hardness Test Procedure	2
Ultrasonic Test (UT) Procedure	2
Technical & Functional Descr.	2
Ship/Trans/Pres/Stor/Hand Proc	2
Heat Treatment Procedure	2
General Arrangement Drawing	2
Ext. Pressure Test Procedure	1
Coating Specification	1
Welder App./Qual. Record	1
Visual Inspection Procedure	1
Int. Pressure Test Procedure	1
Welding Proc. Appr./Qual. Rec.	1
Supplier Master Document List	1
EC Declaration of Conformity	1
Visual Inspection Report	1
FAT Procedure	1
Eng., Proc., Manuf. Schedule	1
IOM Manual	1
Penetrant Test (PT) Procedure	1
Weld Location Plan / Map	1
Name: Information Type, dtype: int64	

To narrow the scope, I run the comparative analysis of two datasets, focusing on info types that share the minor occurrences of 'Internal Review' and 'Returned to Vendor' ratings while being accepted within version 00.

This way, I identify and highlight the matched info types with potential input for workflow improvement.

In [317...

```
matched = [
    ["Calibration Procedure"],
    ["Coating Procedure"],
    ["Coating Specification"],
    ["Dimensional Control Procedure"],
    ["EC Declaration of Conformity"],
    ["Int. Pressure Test Procedure"],
    ["IOM Manual"],
    ["IOM Manual Index"],
    ["Ship/Trans/Pres/Stor/Hand Proc"],
    ["Technical Data Sheet"],
    ["Work Plan"]
]

matchedinfotypes = pd.DataFrame(matched, columns=["PPDs to investigate"])
matchedinfotypes
```

Out[317...

	PPDs to investigate
0	Calibration Procedure
1	Coating Procedure
2	Coating Specification
3	Dimensional Control Procedure
4	EC Declaration of Conformity
5	Int. Pressure Test Procedure
6	IOM Manual
7	IOM Manual Index
8	Ship/Trans/Pres/Stor/Hand Proc
9	Technical Data Sheet
10	Work Plan

To unlock the full value of these findings, I highly recommend conducting an in-depth investigation into each of the identified documents collaborating with AKSO Eng.

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25.07.23 Brazil, SJP