Optimizing Technician Workflow at Ohm Depot

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Who Are We?

- The Ohm Depot, an Electrical Maintenance Company

- We repair defective & aging equipment to prevent harming our ecosystem (i.e., wildfires) and improve the general safety of residential spaces.

- We employ thousands of electricians throughout the United States of America and need to determine how we can be more efficient in delegating repairs allowing us to maximize revenue across each job!

Business Questions

1. What would each technician's optimal schedule(s) look like?

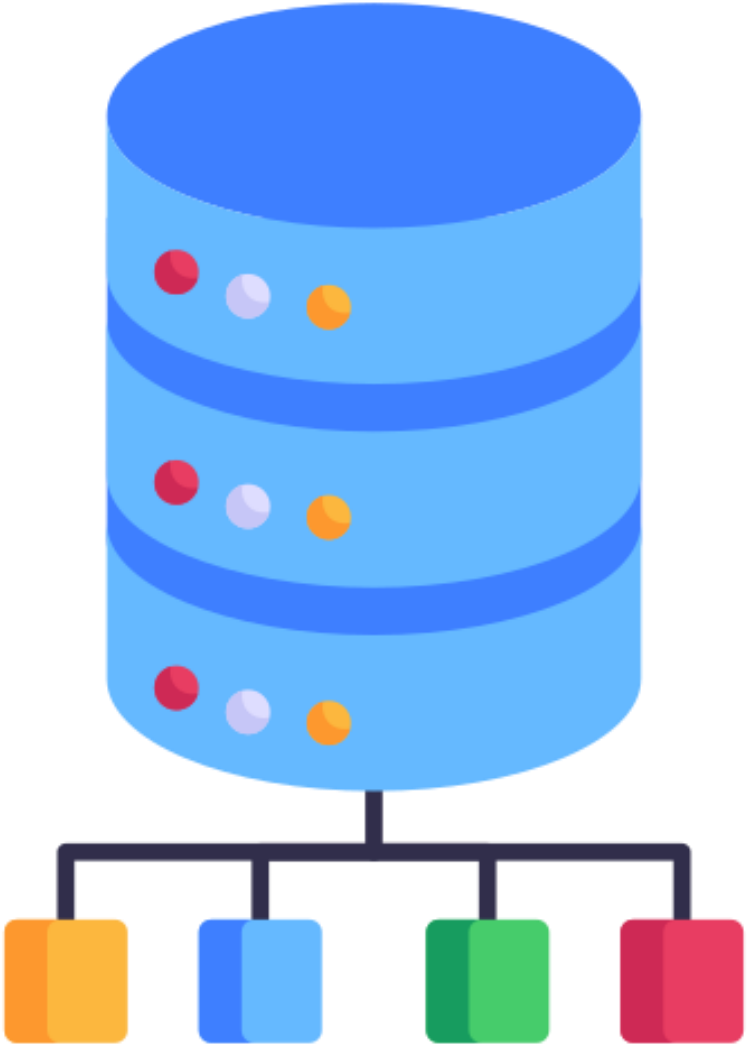
2. What are the most impactful hardware failures? Most common, highest severity, etc.

3. What technicians should we assign to the upcoming repairs?

End Goals and Value

The Datasets

- Repair Types (repair_types.csv)
  - Fields: repair_type_id, repair_name, repair_value, and time_in_minutes
- Technicians (technicians.csv)
  - Fields: employee_name, employee_id, start_time, end_time, and number_of_days
- Upcoming Repairs (upcoming_repairs.csv)
  - Fields: repair_id, severity, repair_name, and employee_id

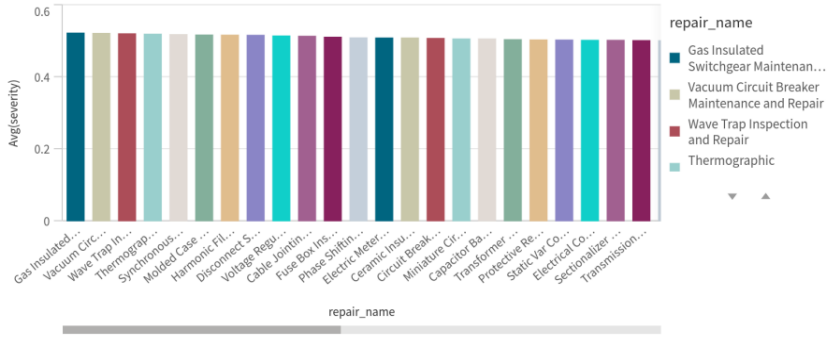


Task 1

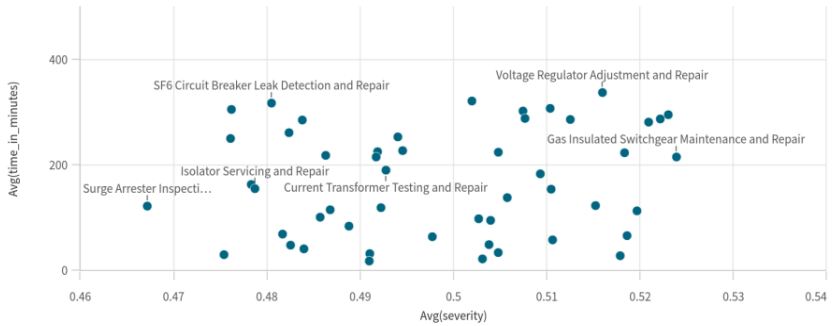
Understanding Severity & Priority

Severity and Priority Dashboard

Severity of Repair Types



Relationship Between Repair Time and Repair Severity



Repair Count per Repair Type

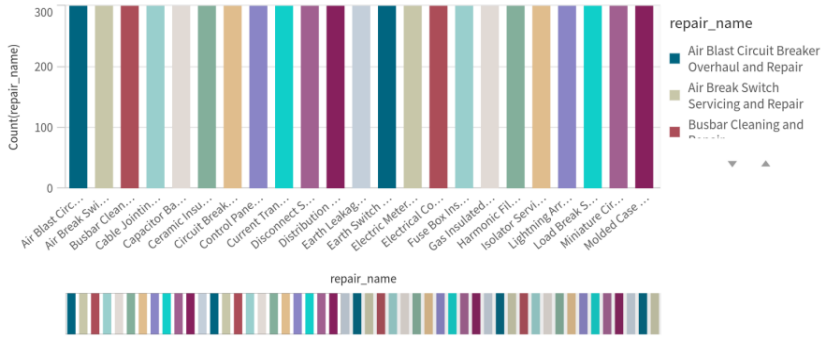
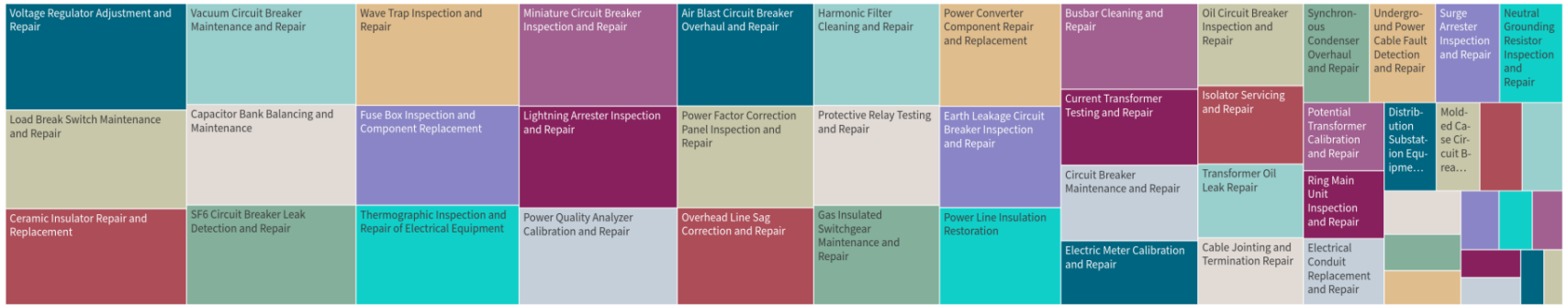


Table of Repair Types and Priority Rating

Sorted by Priority Rating

repair_name	Priority Rating
Totals	**84.584663188749**
Voltage Regulator Adjustment and Repair	174.38195185424
Load Break Switch Maintenance and Repair	161.62518473393
Ceramic Insulator Repair and Replacement	157.17858488127
Vacuum Circuit Breaker Maintenance and Repair	154.79997270891
Capacitor Bank Balancing and Maintenance	153.74566545241
SF6 Circuit Breaker Leak Detection and Repair	152.7926764852
Wave Trap Inspection and Repair	150.36791243328
Fuse Box Inspection and Component Replacement	147.08207285966
Thermographic Inspection and Repair of Electrical Equipment	146.88402324236
Miniature Circuit Breaker Inspection and Repair	146.70441169364
Lightning Arrester Inspection and Repair	145.71432436908

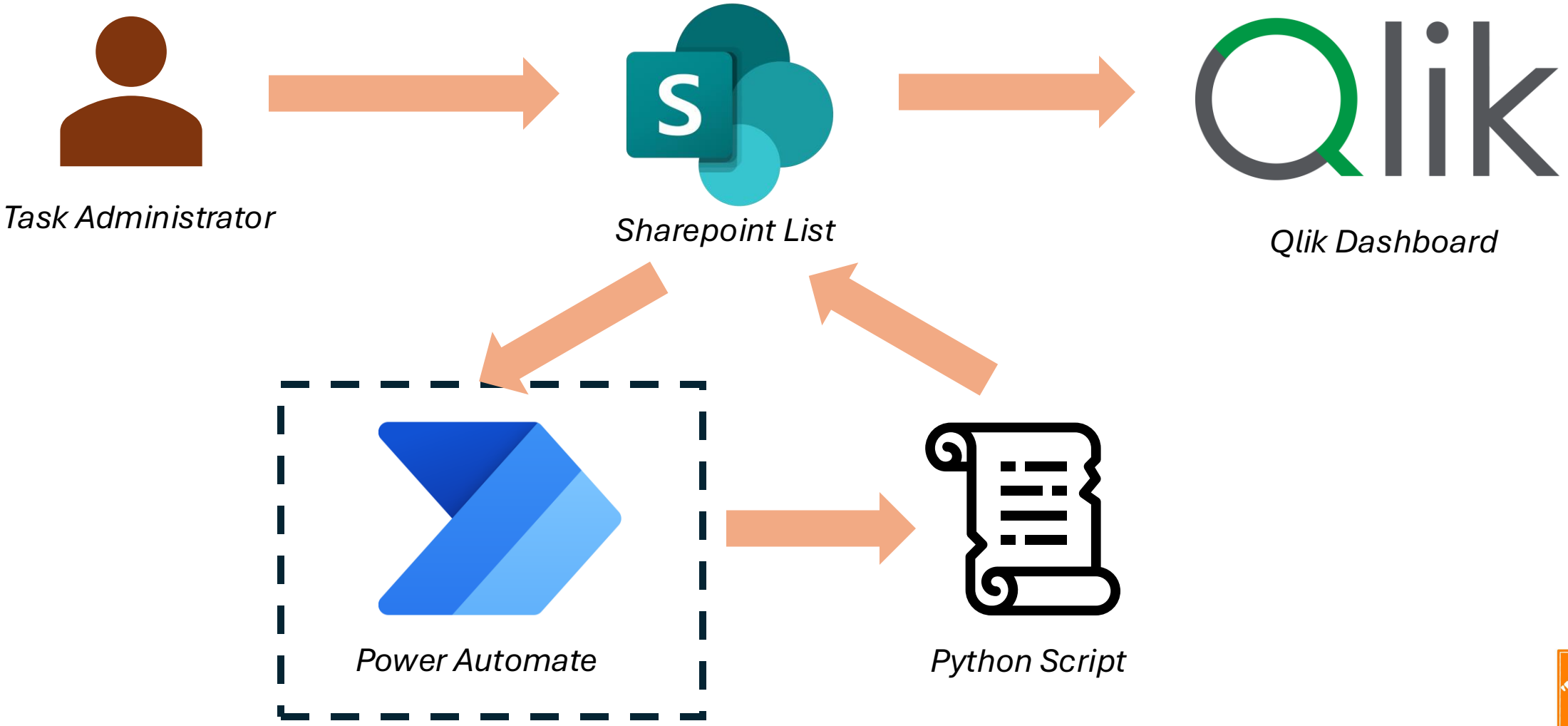
Repair type and Priority Rating Visually Mapped



Task 2

Understanding Employee Assignment Status

Overall data pipeline



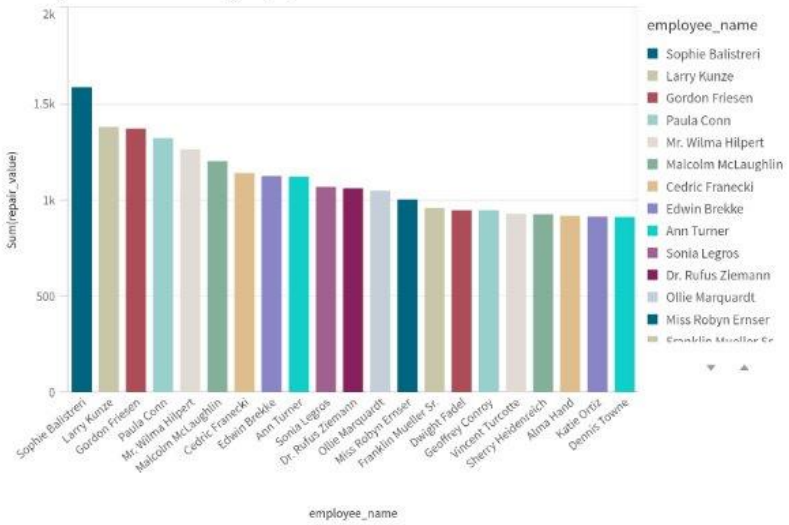
Programmatic Assignment

```python
import pandas as pd

# Load data
repair_types = pd.read_csv("repair_types.csv")
technicians = pd.read_csv("technicians.csv")
upcoming_repairs = pd.read_csv("upcoming_repairs.csv")

# Strip whitespace
repair_types.columns = repair_types.columns.str.strip()
technicians.columns = technicians.columns.str.strip()
upcoming_repairs.columns = upcoming_repairs.columns.str.strip()

# Merge on repair_name since that worked for your data
upcoming_repairs_merged = upcoming_repairs.merge(
    repair_types[['repair_name', 'time_in_minutes']],
    on='repair_name',
    how='left'
)

# Sort by severity
if 'severity' not in upcoming_repairs_merged.columns:
    raise ValueError("No 'severity' column found.")

upcoming_repairs_merged = upcoming_repairs_merged.sort_values(by='severity', ascending=False).reset_index(drop=True)

def time_to_minutes(t):
    h, m, s = t.split(':')
    return int(h)*60 + int(m) + int(float(s))

if 'start_time' not in technicians.columns or 'end_time' not in technicians.columns:
    raise ValueError("Technicians must have 'start_time' and 'end_time' columns.")

# Calculate technician available time
technicians['start_min'] = technicians['start_time'].apply(time_to_minutes)
technicians['end_min'] = technicians['end_time'].apply(time_to_minutes)
technicians['available_minutes'] = technicians['end_min'] - technicians['start_min']

if 'employee_id' not in technicians.columns:
    raise ValueError("No 'employee_id' column in technicians.")

# Print technicians available minutes
print("Technicians available minutes:")
```

1. **Data Preparation & Cleaning:**
   - Strip whitespace from column headers
   - Validate presence of required columns (`severity` , `start_time` , `end_time` , `employee_id`)
2. **Merging & Prioritizing Repairs:**
   - Merge `upcoming_repairs` with `repair_types` to determine required time
   - Sort repairs by severity (highest first) to address the most critical tasks early ⏱️
3. **Calculating Technician Availability:**
   - Convert `start_time` / `end_time` into total available minutes
   - Create a dictionary to track each technician's remaining available minutes
4. **Assigning Repairs:**
   - Iterate over the sorted `upcoming_repairs` list
   - Assign repairs to a technician with sufficient available time
   - Reduce that technician's available time accordingly 🎯
5. **Results:**
   - Output assignments to `upcoming_repairs_assigned.csv` including `repair_id` , `severity` , `repair_name` , and `employee_id`

Repair Task Assignment Dashboard

Total Expected Values Created by Employees



Calculated measure (KPI)

- The total Sum(repair_value) is 15.19k.

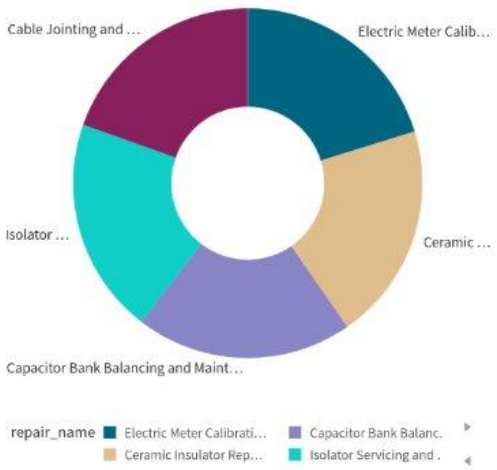
Ranking

- The top employee_name is Sophie Balistreri with Sum(repair_value) that is 10.4% of the total.
- The largest employee_name, Sophie Balistreri, is 13% larger than the second largest employee_name, Larry Kunze.
- 75.8% of Sum(repair_value) is represented by top 9 employee_name.
- Sophie Balistreri has the largest number of Sum(repair_value) at 1.59k.
- Doyle Donnelly has the lowest number of Sum(repair_value) at 53.
- 780 items in Sum(repair_value) are not associated with employee_name. This may indicate a data quality issue.

Mutual information

- The mutual dependence between

Top 5 Assigned Repairs



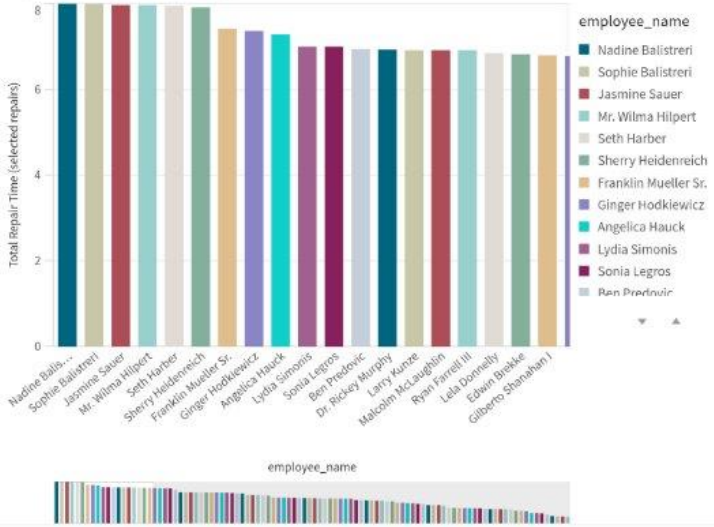
Search Tool for Employee Assigned Repairs

employee_name | Values

repair_name

	Number or Repairs	Severity	Repair Value	Time
Alma Hand	4	3.998684194	920	326
Sophie Balistreri	4	3.953956862	1587	480
Aaron Haley	3	2.961035452	574	403
Angelica Hauck	3	2.98126514	899	437
Ann Turner	3	2.989507611	1123	268
Arnold Gerhold	3	2.971162465	399	404
Benjamin Osinski	3	2.988226336	778	298
Cedric Franecki	3	2.993752706	1141	266
Charlotte Bradtke	3	2.973053491	641	326
Dr. Rufus Ziemann	3	2.93813831	1061	351
Edwin Brekke	3	2.976329002	1126	409
Franklin Mueller Sr.	3	2.978597225	960	445
Gordon Friesen	3	2.948201834	1371	210
Guillermo Hessel	3	2.982169389	677	358
Hazel Aufderhar	3	2.970977482	693	355
Larry Kunze	3	2.986426914	1381	415
Lela Donnelly	3	2.99356153	474	411

Assigned Working Hours (Weekly)



Efficient and Precise Workflow

Efficient Ohm Depot Operations

Understanding Severity & Priority

Understanding Employee Assignment Status