
Seeq
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IEM & AI Track
#allin

Seeq

Jeff Skarda

Digital Solutions Sr. Consultant

Kimberly-Clark

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Better Care for a Better World

Kimberly-Clark

Countries where our leading brands are sold

Number of countries in which our products hold the #1 or #2 brand share

Of the world's population use one or more of our products each day

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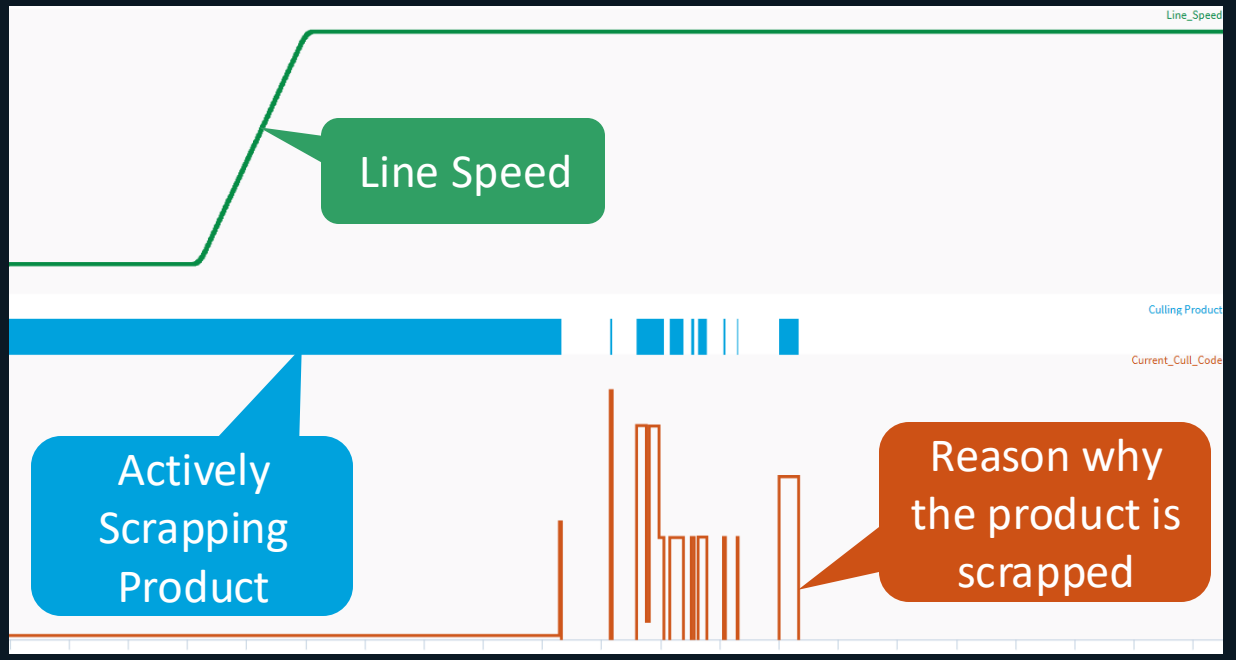
Diaper assets scrap product during ramp up



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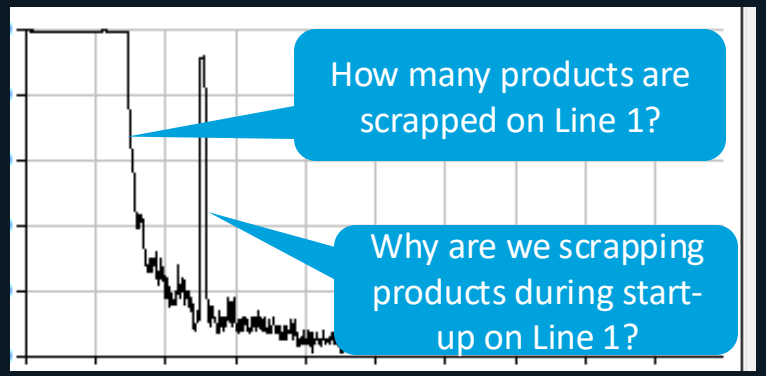
Analyzing startup waste using a legacy application



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1-2 distinct user
2-4 views per year

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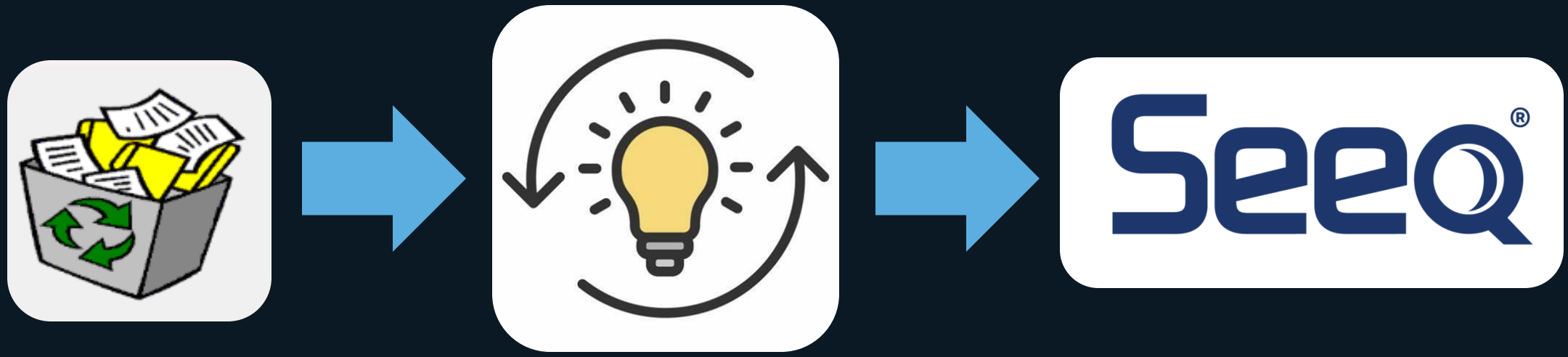
The need to re-imagine



Requirements

Requirements	Response:
Easy access to MES Waste Events	**Seeq already has access**
Data processing is required to reconstruct the machine start-up waste profile based on individual on waste events	**Seeq Data lab uses Python. Let's do it in Python**
Determine and visualize best in class, worst in class	**There are lots of options for data visualization using Python Libraries. How about a bubble chart?**
Tree Map of Waste Events by Reasons	**Plotly has tree maps**
Add $$$ cost impact to bring the data to life for the team	**That's easy**
Provide an always accessible dashboard	**We can schedule the Seeq Data Lab project to pull and stage the data each night**

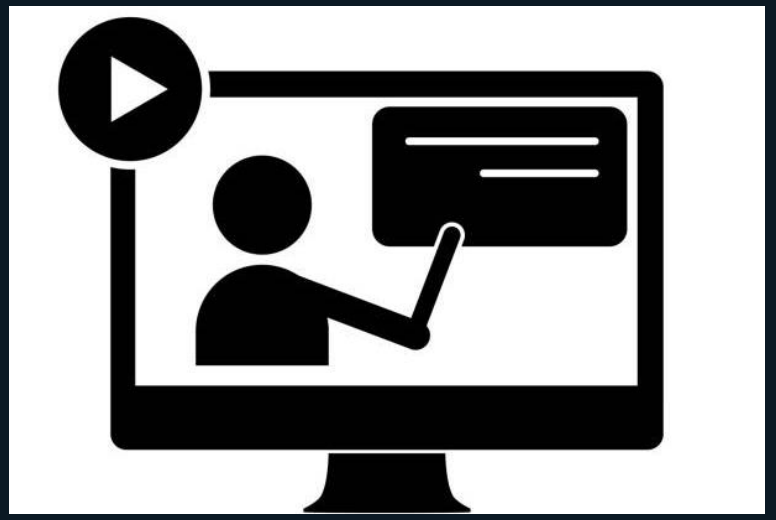
Foundational knowledge to speak the language

"An electrical engineer trying to write python code"

pandas

plotly

Seeq DATA LAB



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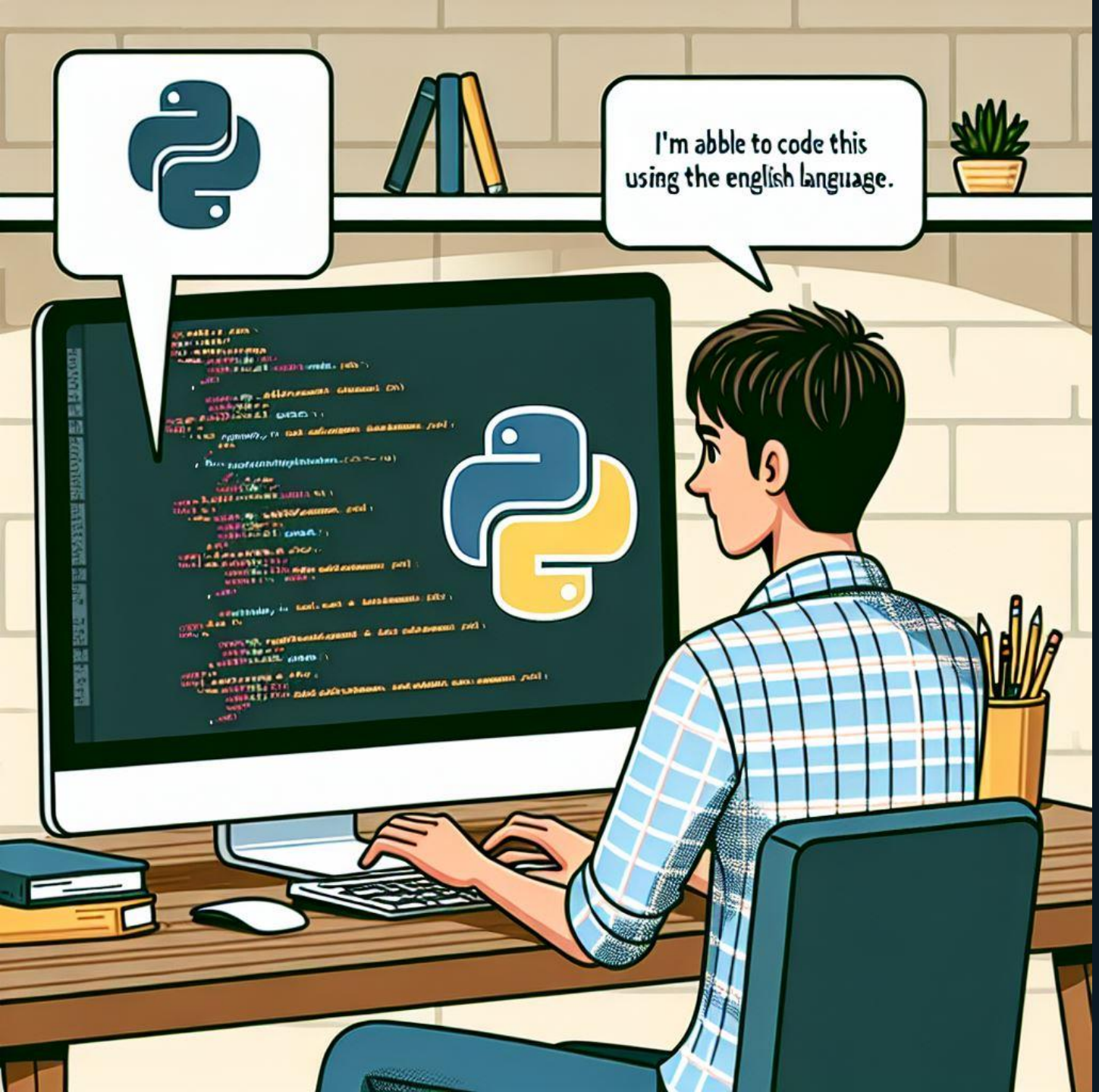
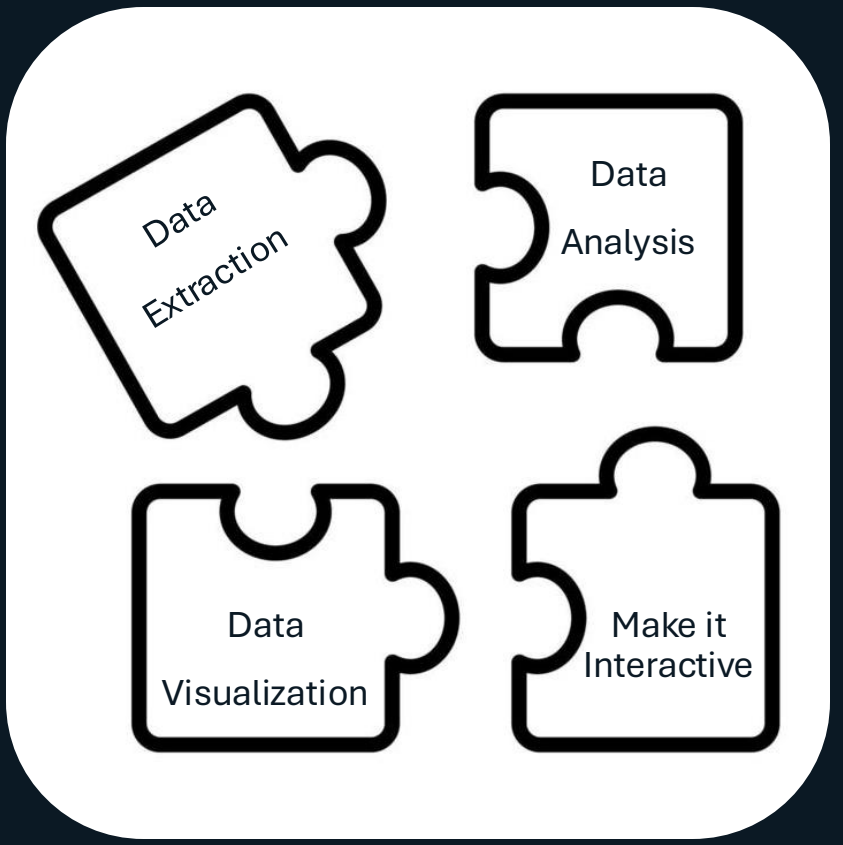

I'm abble to code this using the english language.


Data Extraction
Data Analysis
Data Visualization
Make it Interactive

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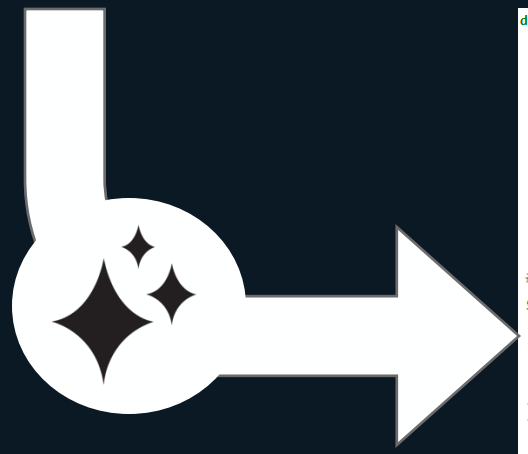
Puzzle Piece #1: Data Extraction

- “Find all tags called “Waste Events”
- “Query the last 6 months of data for each asset’s waste event”
- “Remove data where production mode is Trial or Project Startup”
- “Now re-write this code as a function called get waste events”

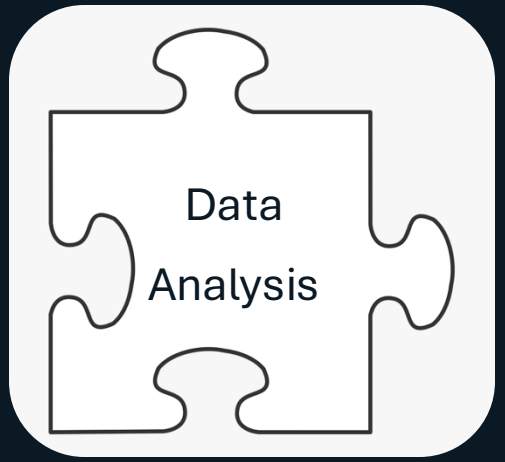


```python
def get_waste_events(asset, startDateTime, endDateTime):
    """
    Function to search for 'WasteEvents' in a specified asset path and pull the data within a given time range.

    Parameters:
    asset (str): The asset path to search within.
    startDateTime (str): The start date and time for the data pull.
    endDateTime (str): The end date and time for the data pull.

    Returns:
    pd.DataFrame: A DataFrame containing the pulled data, sorted by 'Capsule Start' and 'current_cut_count'.
    """
# Define the search query
search_query = {
    'Name': f'{asset} Waste Events',
    'DataSource': 'PIPE',
    'Type': 'StoredCondition'
}

# Execute the search query
search_results = spy.search(search_query,quiet=True)


# Pull data from the worksheet with the search query
waste_df = spy.pull(search_results, start=startDateTime, end=endDateTime,quiet=True)
```

Data Extraction

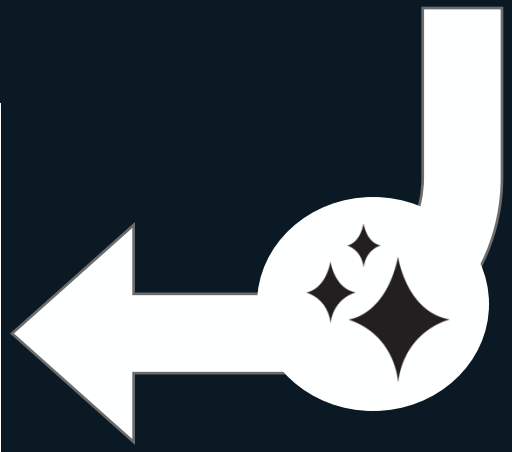
Puzzle Piece #2: Data Analysis

Data Analysis



- “Given the waste events dataframe, identify the zero-reference indicating this is a new machine start-up event”
- “Compute the number of products between the zero reference and this event”
- “Calculate the total number of good products, scrapped products and percent waste for each machine start-up”
- “Now re-write this code as a function called calculate startup waste”

```
def calculate_startup_waste(startUp_DF, waste_df, max_cut_count):
    try:
        """
        Function to calculate startup waste and save the results to a CSV file.

        Parameters:
        startUp_DF (pd.DataFrame): The DataFrame containing startup events.
        waste_df (pd.DataFrame): The DataFrame containing waste data.
        max_cut_count (int): The maximum cut count to consider.

        Returns:
        pd.DataFrame: A DataFrame containing the calculated startup waste.
        """
 #Iterate through the data set and identify the zero reference of each cut count indicating this is a new start-up.
 for i in range(len(waste_df)):
     if waste_df.loc[i, 'machine_state'] <= 2:
         stop_event_occurred = True
         waste_df.loc[i, 'ZeroReference'] = False
     elif stop_event_occurred and waste_df.loc[i, 'machine_state'] == 3:
         stop_event_occurred = False  # Reset the flag after marking the first 3.
         waste_df.loc[i, 'ZeroReference'] = True
     else:
         waste_df.loc[i, 'ZeroReference'] = False
```



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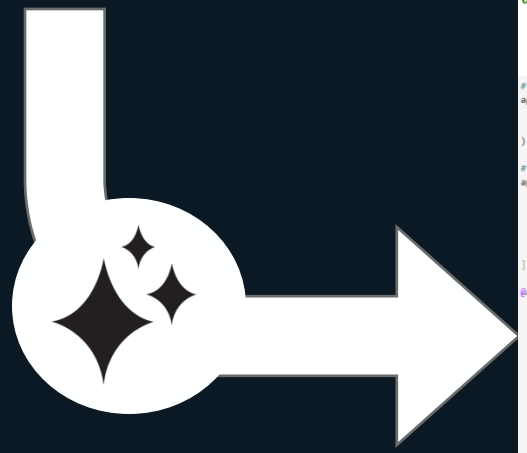
Puzzle Piece #3: Data Visualization

- “Create a Plotly Dash App used to visualize data staged as a .CSV file. This app should have 3 tabs, summary, graphs and table.”
- “Load data from the summary_data.CSV as a bubble chart”
- “Make the background red anytime start-up waste is above x%”
- “Create a tree map showing the distribution of waste reasons”



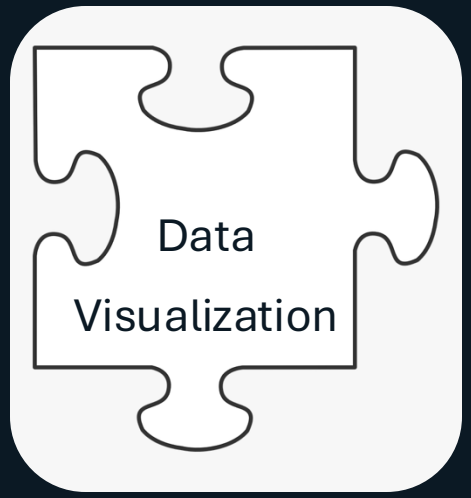
```python
def plot_distribution(combined_data_dict):
    fig = go.Figure()
    if not combined_data_dict:
        return fig

# Initialize the Dash app
app = Dash(
    "Kimblery-Clark Waste Analysis Suite",
    requests_pathname_prefix=requests_pathname_prefix
)

# Define the layout
app.layout = html.Div([
    get_layout(),
    dcc.Store(id='queried-data'),  # Store to hold queried data
    dcc.Store(id='startup-waste-data'),  # Store to hold startup_waste_df
    dcc.Store(id='selected-cell-store'),  # Store to hold clicked cell information
    dcc.Download(id="download")  # Ensure this component is included
])

@app.callback(
    [Output('queried-data', 'data'),
     Output('startup-waste-graph', 'figure'),
     Output('startup-waste-dist', 'figure'),
     Output('main-tabs', 'value'),
     Output('loading-placeholder', 'children'),],
    [Input('submit-button', 'n_clicks'),
     Input('trend-button', 'n_clicks')],
    [State('start-date', 'date'),
     State('start-time', 'value'),
     State('end-date', 'date'),
     State('end-time', 'value'),
     State('asset-selector', 'value'),
     State('include-aborted-toggle', 'value'),
     State('cut-count-slider', 'value'),
     State('summary-grid', 'selectedRows')]
)
def handle_submit(config_clicks, table_clicks, start_date, start_time, end_date, end_time, config_selected_assets, include_aborted_toggle, max_cut
```

Data Visualization



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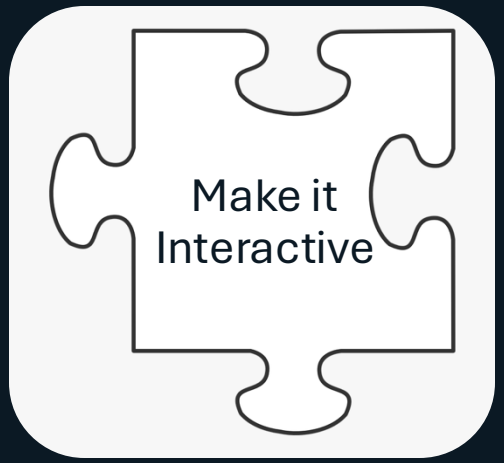
Puzzle Piece #4: Make it Interactive

Make it Interactive

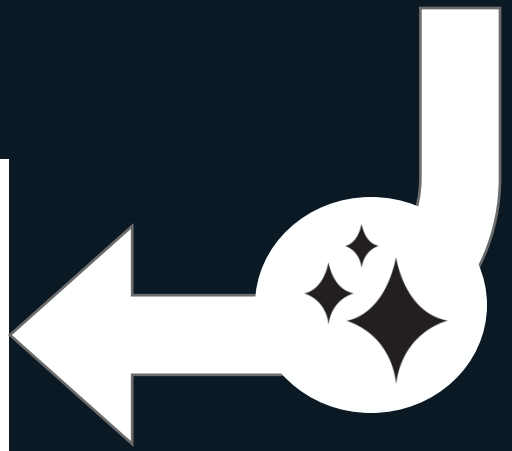


"Provide an input field to allow a user to select asset class"
"When a user selects a specific asset class, filter the bubble chart for only assets of that class"
"Allow a user to select 1 or more assets to trend and compare similar assets"
"Add an ability to download the summarized data set"

```
@app.callback(
    Output('summary-grid', 'selectedRows'),
    Input('bubble-chart', 'clickData'),
    State('summary-grid', 'rowData')
)
def handle_bubble_click_update_table(clickData, rowData):
    if not clickData or not rowData:
        return []

    # Get clicked bubble data
    point = clickData['points'][0]
    asset_name = point['text']  # Assuming 'Asset Name' is in the hover text

    # Find the corresponding row in the table
    for row in rowData:
        if row['Asset'] == asset_name:  # Match asset name
            return [row]  # Highlight this row
# Callback to download data
@app.callback(
    Output("download", "data"),
    Input("download-button", "n_clicks"),
    prevent_initial_call=True,
)
def download_data(n_clicks):
    asset_summary_df = pd.read_csv('Storage/asset_summaries.csv')
    return dcc.send_data_frame(asset_summary_df.to_csv, "asset_summary_df.csv")
```



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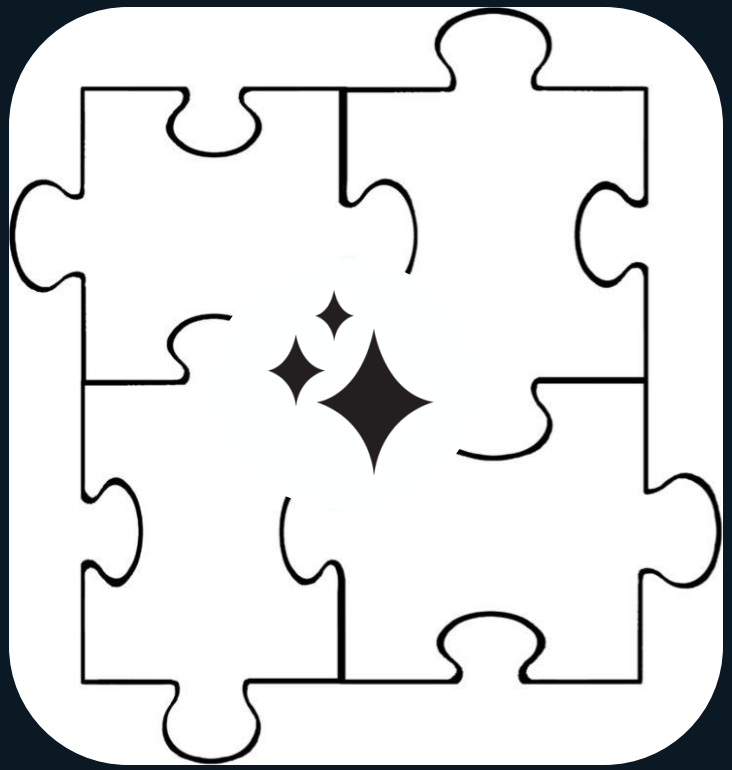
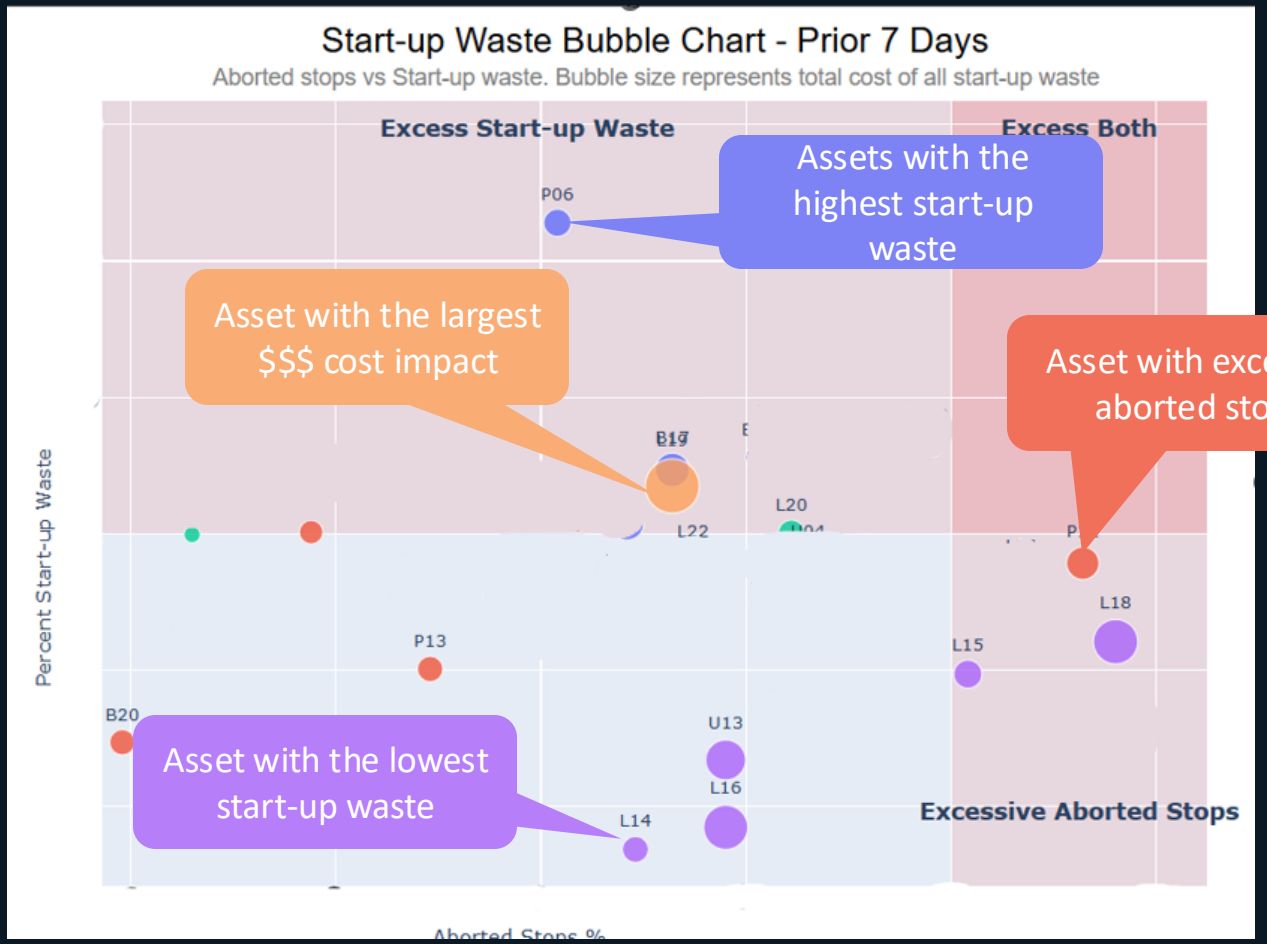
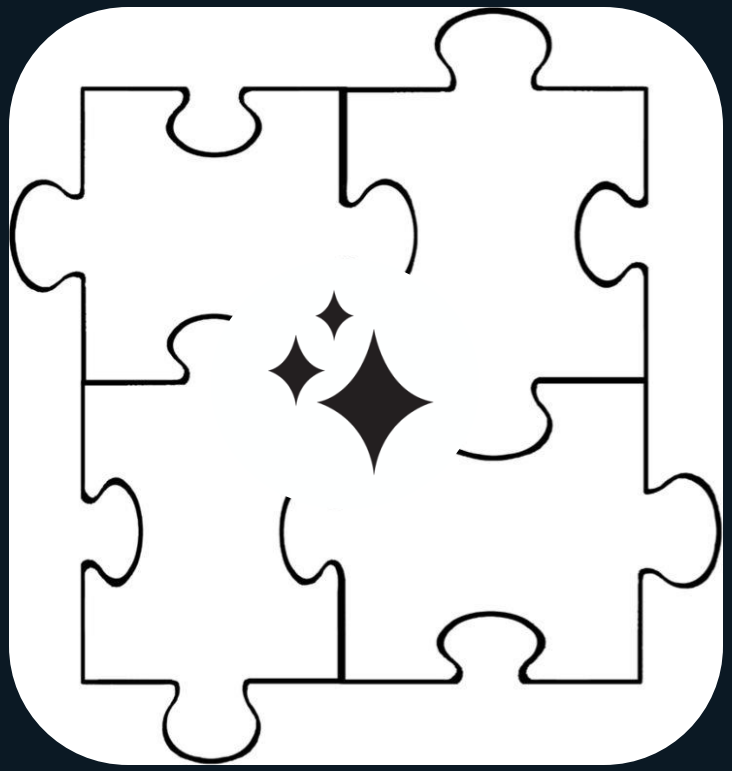
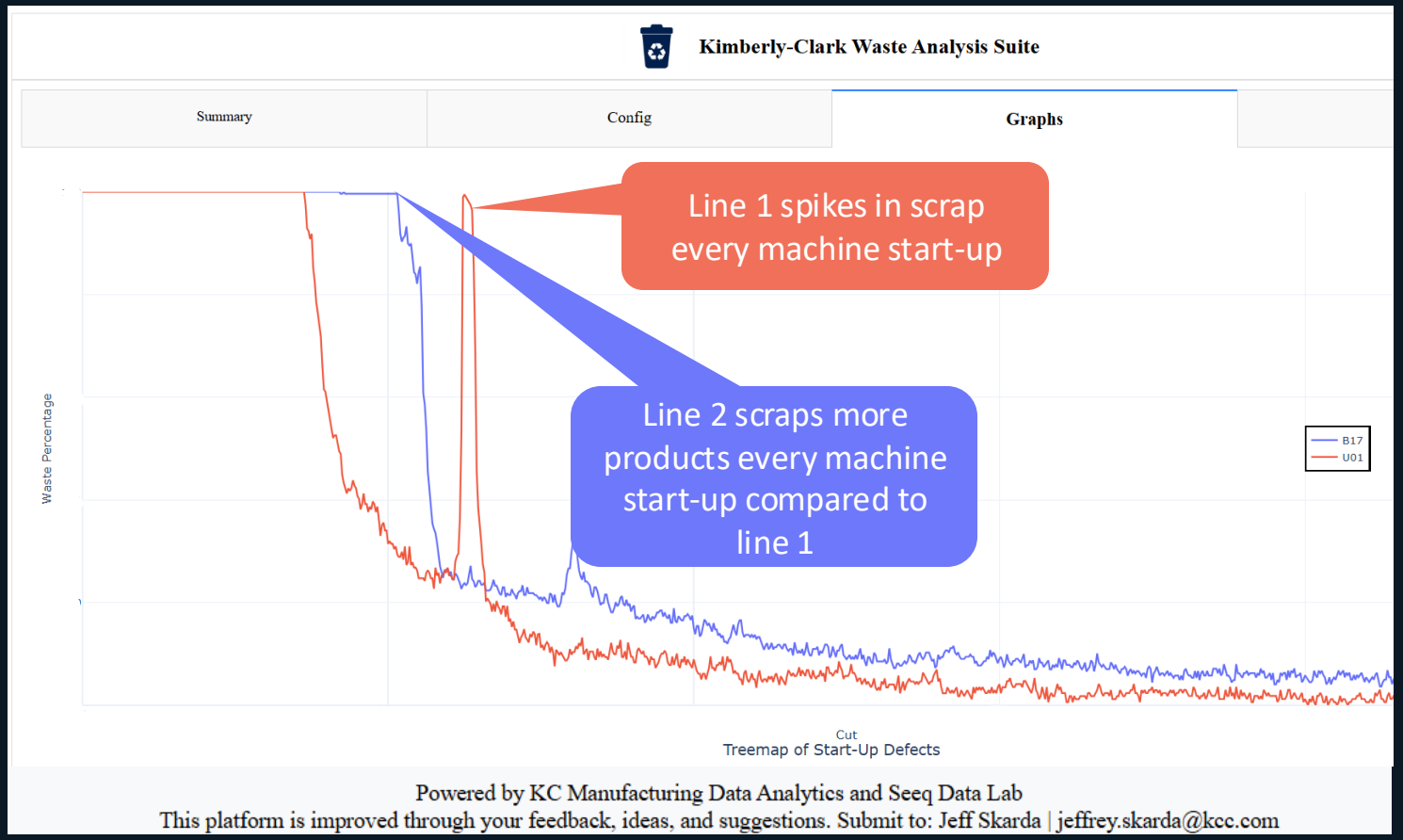
Putting the pieces of the puzzle together



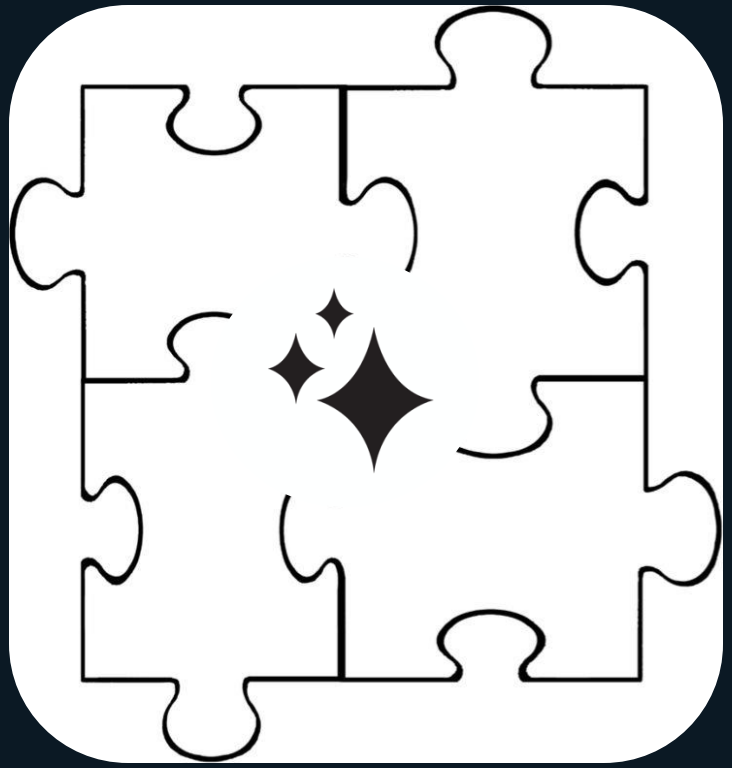


Putting the pieces of the puzzle together





Putting the pieces of the puzzle together



Focus Here

Focus Here

Not Here

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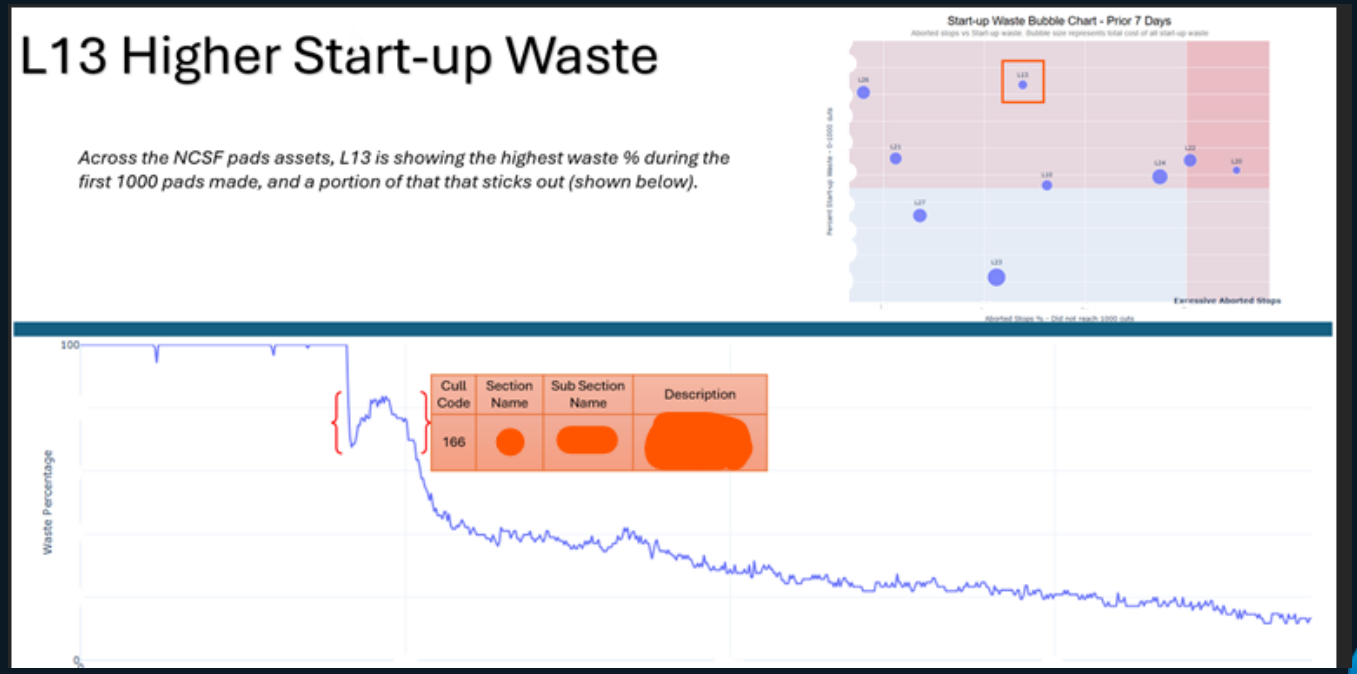
Democratizing start-up waste data provides quick wins

"Thanks to the tool, I was able to identify cull 414 as a problem cull on P4 vs the other assets. I shared the info with the mill so they can act."

"*This was the info I mentioned to you on the way out yesterday. I am not sure how fixable this material movement is, but I wanted to put it on your radar to get a small waste win for the year-on-year results.*"



Democratizing start-up waste data visualization

1-2 distinct users
2-4 views per year

65 distinct viewers
13 views per week

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Thank you!

Jeff Skarda

Kimberly-Clark