A3 – CUJ Runthrough + Demo

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TL;DR

We researched how SMBs struggle with messy inventory data, then tested OpenRefine and ChatGPT on Smell & Smile's legacy export. OpenRefine handled simple clustering/normalization; complex joins and domain conversions failed. We switched to LLM-assisted transforms via prompt iterations to finish the job. Key insight: the best system mixes automation with user input, ultimately feeding a multi-source, LLM-powered data platform.

User Goal

As a small retailer with a messy legacy inventory system, I want to clean, normalize, and categorize my product data, flagging errors and low stock, so I can reorder with confidence and prepare for an AI-assisted data platform that unifies all my sources.

Persona Description

- **Role / Background:** Owner-operator of a small fragrance retailer (Smell & Smile); responsible for inventory, purchasing, and sales.
- **Experience:** Comfortable with Excel; first time using OpenRefine or LLMs for data work.
- **Context:** Time-constrained, domain knowledge heavy, limited technical background.

Tools Used

- **OpenRefine** (clustering, faceting, regex transforms)
- **Google Sheets** (quick checks, buy list filters)
- **ChatGPT** (LLM-assisted regex, column mapping, free-text → structured rules; prompt iteration)
- **Excel** (initial preview/export)

Summary of Findings

Research & Problem Framing

Before testing tools, the user researched typical SMB inventory issues: duplicate SKUs, inconsistent units (ml/ML/mL/tola), mixed item types (raw materials, finished products, packaging), negative stock, and missing costs. The success metric was: produce a clean, categorized dataset with low-stock flags and explainable steps.

Phase 1 — OpenRefine: quick wins, clear limits

What worked well:

- **Clustering:** Normalized “Oud 6ml,” “OUD 6 ML,” and “Oud – 6mL” into one label.
- **Simple unit fixes:** Standardized ml / ML / mL to mL; pcs/PCS → pcs.

- **Facets:** Surfaced anomalies like negative stock and blank costs quickly.

Where it failed:

- **Unit conversions:** Handling tola → mL was brittle across typos and spacing.
- **Compound parsing:** Extracting size + unit from messy free-text names often broke.
- **Rule collisions:** Categorization rules (“tester bottle” vs “bottle of tester oil”) became messy chains that were hard to maintain.

Result: OpenRefine handled straightforward normalization, but struggled with domain-specific conversions and edge cases, demanding heavy manual effort.

Phase 2 — Switching to ChatGPT (LLM-assisted transforms)

To go beyond OpenRefine, the user integrated ChatGPT to generate transformations:

- **Regex parsing:** Extracted `size_value` and `size_unit` from strings like “12 ml,” “.41 oz,” “1 tola.”
- **Unit conversions:** Proposed consistent logic: map tola → 11.66 mL, handle L/cL → mL, leave pcs/kg.
- **Categorization rules:** Built a keyword table with synonyms/negatives. An `_override` column was added for human review.

Prompt iteration: Early prompts failed on decimals/hyphens. Adding **dataset-specific examples** improved accuracy. Asking the LLM to generate explanations + test cases produced more reliable patterns.

Outcome: ChatGPT accelerated regex and logic authoring, but results still required checking. Lesson: automation + domain input outperforms either alone.

Phase 3 — Cleaned Data & Actionable Outputs

Combining both tools, the business owner produced a structured, decision-ready dataset:

- **Cleaned columns:** Standardized names, normalized units (mL, pcs, kg), extracted fields like `size_value`.

- **Custom flags:** Added `NEG_QTY`, `MISSING_COST`, and `REORDER` for low stock.
- **Categorization:** Grouped items into Raw, Packaging, Finished, clarifying what was low or inconsistent.
- **Buy list:** Exported to Google Sheets, filtering on `REORDER` produced a supplier-ready restocking list.

Key Insight

SMB data cleaning is socio-technical: tools automate repetitive work, but only business owners can validate messy, domain-specific edge cases. Sustainable workflows must combine automation with lightweight human review.

Recommendations

For Products

- **Schema-Aware Import Layer:** Auto-detects common SMB schemas and maps columns for review.
- **Domain Rule Packs:** Modular packs. Stored in JSON/YAML for reuse.
- **LLM Transforms w/ Confidence:** Suggestions tagged with confidence. High-confidence (>90%) apply automatically; others flagged for override.
- **Sample-Based Previews:** Let users apply transforms on sample rows and see before/after previews to refine rules.
- **Override Columns:** Auto-generate `_override` columns to preserve human judgment.
- **Snapshots & Sandboxing:** Version data cleaning steps like Git commits; easy rollback if errors occur.
- **Provenance & Audit:** Log every transformation (who, when, confidence). Allow replay on new datasets.
- **Dashboards:** Out-of-the-box connectors for inventory health, buy lists, and error monitoring.

For Future Users

- Start with a small slice of data to test.
- Use OpenRefine for simpler tasks; switch to LLMs for messy parsing.
- Always provide **examples** to LLMs, not vague prompts.
- Keep override columns and save snapshots, mistakes are inevitable.
- Expect context switching; keep notes on steps and timing.

Highlights & Lowlights Table

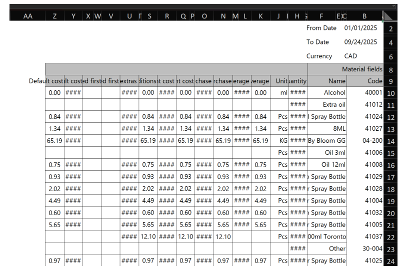
Task / Moment	Severity	Notes
OpenRefine clustering/unit fixes	Great	Quick normalization; surfaced anomalies fast.
Complex parsing in OpenRefine	Severe	Struggled with edge cases; required custom logic.
LLM regex & rule generation	Great	Faster + more accurate when fed examples.
Categorization & buy list export	Moderate	Needed overrides, but produced actionable output.

CUJ Overview Table

Task	Time	Switches
Open Excel export & inspect messy inventory	5 min	1
Load into OpenRefine, try clustering/facets	15 min	2
Attempt GREL transforms (unit normalization, regex) → docs/tutorials → back to tool	30 min	3
Switch to ChatGPT for regex/unit conversion help; iterate prompts with examples	40 min	3
Test ChatGPT-generated logic back in OpenRefine & Sheets	20 min	2
Move to Google Colab with ChatGPT-generated Pandas pipeline	50 min	2
Debug file import/export & generate clean CSVs	30 min	1
Export flagged data + buy list to Sheets/Data Studio for visualization	25 min	1

Total Time: ~3 hours 35 minutes
Total Context Switches: 15

Full CUJ Table (Step-by-Step Documentation)

<table>
<tr><th>Step</th><th>Notes (What + Why)</th><th>Screenshot</th></tr>
<tr><td>1</td><td>Opened messy Excel export in OpenRefine to inspect inventory. Skipped metadata rows and previewed columns. First goal: see duplicates and blanks.</td><td>
<table>
<tr><th>AA</th><th>Z</th><th>Y</th><th>X W</th><th>V</th><th>U T S</th><th>R</th><th>Q P</th><th>O</th><th>N</th><th>M L</th><th>K</th><th>J I</th><th>H</th><th>F</th><th>E C</th><th>B</th><th></th></tr>
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<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Currency</td><td>CAD</td><td></td><td>6</td></tr>
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<tr><td>Default cost</td><td>lt cost</td><td>ed first</td><td>d first</td><td>extras</td><td>ditions</td><td>nt cost</td><td>nt cost</td><td>chase</td><td>rchase</td><td>erage</td><td>verage</td><td>Unit</td><td>uantity</td><td>Name</td><td>Code</td><td></td><td>9</td></tr>
<tr><td>0.00</td><td>####</td><td></td><td></td><td>####</td><td>0.00</td><td>####</td><td>0.00</td><td>####</td><td>0.00</td><td>####</td><td>0.00</td><td>ml</td><td>####</td><td>Alcohol</td><td>40001</td><td></td><td>10</td></tr>
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<tr><td>0.84</td><td>####</td><td></td><td></td><td>####</td><td>0.84</td><td>####</td><td>0.84</td><td>####</td><td>0.84</td><td>####</td><td>0.84</td><td>Pcs</td><td>####</td><td>l Spray Bottle</td><td>41024</td><td></td><td>12</td></tr>
<tr><td>1.34</td><td>####</td><td></td><td></td><td>####</td><td>1.34</td><td>####</td><td>1.34</td><td>####</td><td>1.34</td><td>####</td><td>1.34</td><td>Pcs</td><td>####</td><td>8ML</td><td>41027</td><td></td><td>13</td></tr>
<tr><td>65.19</td><td>####</td><td></td><td></td><td>####</td><td>65.19</td><td>####</td><td>65.19</td><td>####</td><td>65.19</td><td>####</td><td>65.19</td><td>KG</td><td>####</td><td>By Bloom GG</td><td>04-200</td><td></td><td>14</td></tr>
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<tr><td>0.75</td><td>####</td><td></td><td></td><td>####</td><td>0.75</td><td>####</td><td>0.75</td><td>####</td><td>0.75</td><td>####</td><td>0.75</td><td>Pcs</td><td>####</td><td>Oil 12ml</td><td>41008</td><td></td><td>16</td></tr>
<tr><td>0.93</td><td>####</td><td></td><td></td><td>####</td><td>0.93</td><td>####</td><td>0.93</td><td>####</td><td>0.93</td><td>####</td><td>0.93</td><td>Pcs</td><td>####</td><td>Spray Bottle</td><td>41029</td><td></td><td>17</td></tr>
<tr><td>2.02</td><td>####</td><td></td><td></td><td>####</td><td>2.02</td><td>####</td><td>2.02</td><td>####</td><td>2.02</td><td>####</td><td>2.02</td><td>Pcs</td><td>####</td><td>r Spray Bottle</td><td>41028</td><td></td><td>18</td></tr>
<tr><td>4.49</td><td>####</td><td></td><td></td><td>####</td><td>4.49</td><td>####</td><td>4.49</td><td>####</td><td>4.49</td><td>####</td><td>4.49</td><td>Pcs</td><td>####</td><td>r Spray Bottle</td><td>41004</td><td></td><td>19</td></tr>
<tr><td>0.60</td><td>####</td><td></td><td></td><td>####</td><td>0.60</td><td>####</td><td>0.60</td><td>####</td><td>0.60</td><td>####</td><td>0.60</td><td>Pcs</td><td>####</td><td>Spray Bottle</td><td>41032</td><td></td><td>20</td></tr>
<tr><td>5.65</td><td>####</td><td></td><td></td><td>####</td><td>5.65</td><td>####</td><td>5.65</td><td>####</td><td>5.65</td><td>####</td><td>5.65</td><td>Pcs</td><td>####</td><td>r Spray Bottle</td><td>41005</td><td></td><td>21</td></tr>
<tr><td></td><td></td><td></td><td></td><td>####</td><td>12.10</td><td>####</td><td>12.10</td><td>####</td><td>12.10</td><td></td><td></td><td>Pcs</td><td>####</td><td>00ml Toronto</td><td>41037</td><td></td><td>22</td></tr>
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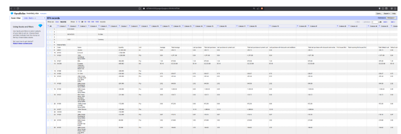
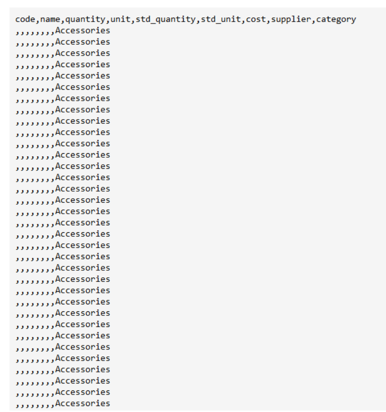
<tr><td>0.97</td><td>####</td><td></td><td></td><td>####</td><td>0.97</td><td>####</td><td>0.97</td><td>####</td><td>0.97</td><td>####</td><td>0.97</td><td>Pcs</td><td>####</td><td>r Spray Bottle</td><td>41025</td><td></td><td>24</td></tr>
</table></td></tr>
<tr><td>2</td><td>Used clustering and faceting in OpenRefine to merge similar product names. Also normalized simple units.</td><td>
</td></tr>
<tr><td>3 (switch)</td><td>Tried to handle complex cases but OpenRefine transforms broke down. Switched to ChatGPT to draft regex + unit conversion logic. Iterated prompts with sample rows.</td><td>
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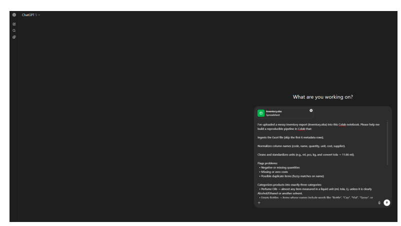
<tr><td>4</td><td>Took the regex and categorization rules generated by ChatGPT, applied them in OpenRefine/Sheets. Created derived columns: size_value, size_unit, standardized_unit. Some mismatches still needed override.</td><td>
</td></tr>
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<tr>
<td>5
(switch)</td>
<td>Moved to Google Colab with ChatGPT-generated Pandas script for reproducibility. Cleaned dataset, applied conversion, flagged negatives (NEG_QTY), missing costs, and reorder threshold.</td>
<td>I've uploaded a messy inventory export (`Inventory.xlsx`) into this Colab notebook. Please help me build a **reproducible pipeline in Colab** that:

1. Ingests the Excel file (skip the first 6 metadata rows).

2. Normalizes column names (`code, name, quantity, unit, cost, supplier`).

3. Cleans and standardizes units (e.g., `ml`, `pcs`, `kg`, and convert `tola` → `11.66 ml`).

4. Flags problems:
• Negative or missing quantities
• Missing or zero costs
• Possible duplicate items (fuzzy matches on name)

5. Categorizes products into exactly **three categories**:
• **Perfume Oils** → almost any item measured in a liquid unit (ml, tola, L), unless it is clearly Alcohol/Ethanol or another solvent.
• **Empty Bottles** → items whose names include words like "Bottle", "Cap", "Vial", "Spray", or "Atomizer".
• **Accessories** → everything else (e.g., packaging parts, tools, non-liquid items).

6. Generates three CSV outputs into the Colab environment:
• `items_clean.csv` with normalized data
• `flags.csv` with all detected issues
• `BuyList_YYYY-MM-DD.csv` for *Perfume Oils* below a stock threshold of 20 units, grouped by supplier

Please propose the steps first, then generate **deterministic Pandas code cells** I can run in Colab. Keep LLM use minimal (only for categorization suggestions if needed); all math and conversions must be reproducible. Also include any Colab-specific snippets (e.g., `files.upload()` for file import, `files.download()` for export).</td>
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<tr>
<td>6</td>
<td>Exported cleaned CSVs to Google Sheets. Used filters to generate a buy list for low-stock oils, grouped by supplier. The final dataset now had standardized names, normalized units, and actionable flags.</td>
<td>supplier,code,name,quantity,unit,std_quantity,std_unit,cost,stock_threshold
,03-003,(1) Aqua Serenade - Inspired By Acqua Di Gio AR,0.423,kg,0.423,kg,103.37824436906348,20
,03-052,(1) Floral Radiance - Inspired By 1 Million P.R,0.2,kg,0.2,kg,155.0673665535952,20
,01-135,(1) Ivory Journey - Inspired By White L,0.9990000000000001,kg,0.9990000000000001,kg,67.61834813549177,20
,04-272,(2) Aqua Serenade - Inspired By Acqua Di Gio AR,1.0,kg,1.0,kg,112.58813331381702,20
,05-540,(2) Floral Radiance - Inspired By 1 Million P.R,2.214,kg,2.214,kg,131.01049567244957,20
,02-099,(2) Ivory Journey - Inspired By White L,0.912,kg,0.912,kg,61.598721653895296,20
,41037,100ml Toronto,-165.0,pcs,-165.0,pcs,0.0,20
,23-012,10ML Glass syringe Italian,4.0,pcs,4.0,pcs,11.42731978297175,20
,23-024,10ML Plastic Syringe,2.0,pcs,2.0,pcs,3.8091065943239166,20
,23-013,20ML glass Syringe Italian,15.0,pcs,15.0,pcs,9.858193110586082,20
,40002,27L Plastic Gallon,3.0,pcs,3.0,pcs,37.59111107720269,20
,08-026,AL Qurashi Musk,0.968,kg,0.968,kg,114.27319782971749,20
,15-013,Abu Saud Oud,0.9615,kg,0.9615,kg,593.4138836426231,20
,26-199,Accord Particulier Givenchy   2.997,اكورد بارتيكولير جيفينشي,kg,2.997,kg,120.21367162877849,20
,07-018,African Sunset - Inspired By Bal d'Afrique BY,2.847,kg,2.847,kg,212.54170079172835,20
,05-004,Al Habshi Musk,0.965,kg,0.965,kg,73.53804894164116,20
,27-245,Alloy Extreme - Inspired By L'Homme Le Parfum YSL - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,03-048,Almond Smoothie - Inspired By Pegasus PDM,0.8330000000000001,kg,0.8330000000000001,kg,153.99680413473823,20
,01-144,Almond Soleil - Inspired By L'Homme Ideal G,0.939,kg,0.939,kg,114.27319782971749,20
,26-028,Amber Aura - Inspired By Ambre Absolute T.F,1.45,kg,1.45,kg,122.55046493373372,20
,05-103,Amber Bloom - Inspired By More Than Words X,0.9760000000000001,kg,0.9760000000000001,kg,192.0362804543032,20
,27-169,Amber Cacao - Inspired By Choco Musk A.R - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,26-040,Amber Celestial - Inspired By Elysium R.P,1.894,kg,1.894,kg,197.99589103037775,20
,01-236,Amber Dawn - Inspired By Burberry Black BB,0.9300000000000002,kg,0.9300000000000002,kg,72.50851644492654,20
,05-065,Amber Eclipse - Inspired By Interlude AM,0.7760000000000001,kg,0.7760000000000001,kg,205.6917560934915,20
,27-099,Amber Eclipse - Inspired By Interlude AM - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,02-438,Amber Embrace - Inspired By SWY Amber AR,1.092,kg,1.092,kg,143.26943519211673,20
,03-095,Amber Glow - Inspired By Narcisco Ambrée N.R,0.8910000000000001,kg,0.8910000000000001,kg,114.27319782971749,20
,02-252,Amber Kick - Inspired By Grand Soir MFK,2.454,kg,2.454,kg,110.90205116823073,20
,05-044,Amber Legacy - Inspired By Epic Man AM,0.9430000000000001,kg,0.9430000000000001,kg,222.34734545021746,20
,02-014,Amber Musk - Inspired By Body BB,0.9320000000000002,kg,0.9320000000000002,kg,61.5987216538953,20
,27-006,Amber Musk - Inspired By Body BB - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,27-064,Amber Musk - Inspired By Molecule 02 E.M - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,27-056,Amber Nectar Oud - Inspired By Shay Oud A.D - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,27-162,Amber Rose - Inspired By Touch Me NB - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,01-298,Amber Smoke - Inspired By Aoud Amber Mon,1.462,kg,1.462,kg,89.0980803312808,20
,27-240,Amber Spice - Inspired By Alexandria II Xerjoff - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,02-496,Amber Sultan - Inspired By Al Fareed AF,0.9710000000000001,kg,0.9710000000000001,kg,142.99703241082838,20
,26-053,Amber Sunrise - Inspired By Amber Oud AJ,0.969,kg,0.969,kg,114.27319782971749,20
,27-289,Amber Tango - Inspired By Amber Romance V.S - Eco,2.0,kg,2.0,kg,43.9990868956395,20
,02-482,Amber Tree - Inspired By Opus XV King Blue AM,0.9360000000000002,kg,0.9360000000000002,kg,208.99566275428762,20</td>
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