Digital Egypt Pioneers Initiative - DEPI
Round 3, 2025

CLS Learning Solutions
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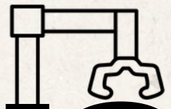
CAPSTONE PROJECT

MANUFACTURING DOWNTIME ANALYSIS



A data-driven look into production efficiency and downtime causes

TRACK:
Data Analytics

MAJOR:
Microsoft Power BI Specialist

PRESENTED BY:
CLS-CAI3-DAT2-G5 Team 1

PRESENTED TO:
DEPI

INSTRUCTOR:
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Ministry of Communications and Information Technology

Agenda

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Project Overview

This project analyzes manufacturing downtime using **Power BI** to identify key causes and improve production efficiency

1. OBJECTIVE

Reduce downtime and improve efficiency

2. SCOPE

Covers multiple products and batches and capturing incidents across operators

3. OUTCOME

Identify root causes and suggest improvements

1 Line

6 Products

38 Batches

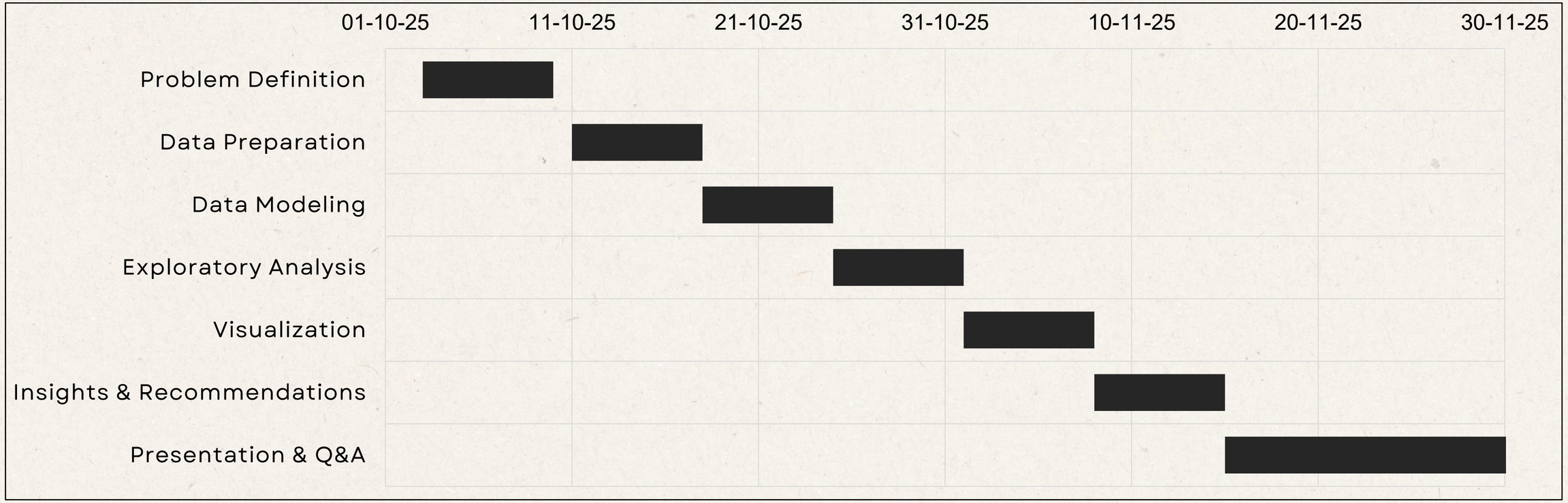
61 Incidents

4 Operators

5 Days

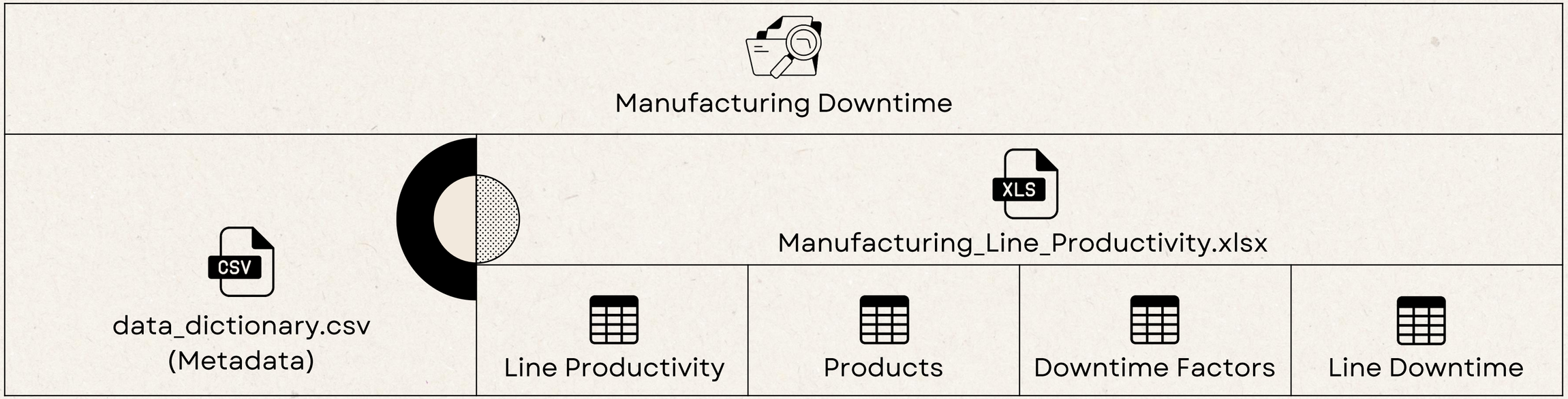
Timeline

Structured timeline ensured systematic progress toward reducing downtime



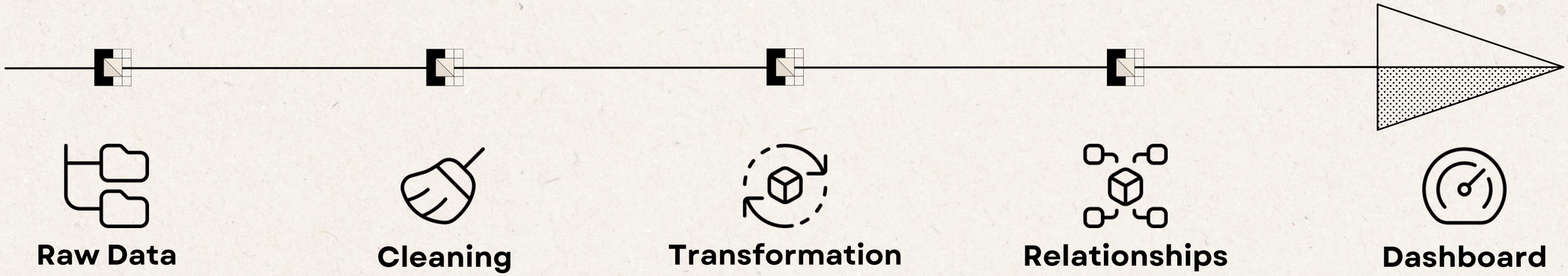
Data Source & Structure

This dataset was provided by the Initiative Management team and includes supporting files such as Excel sheets and metadata for analysis



Data Preparation Process

Structured preparation ensured reliable insights for downtime analysis



Tools Used

Analytical Workflow: From Data to Decisions

DATA PREPARATION

- Excel
- Power Query

DESIGN & VISUALIZATION

- Figma
- Power BI Desktop

MODELLING & ANALYSIS

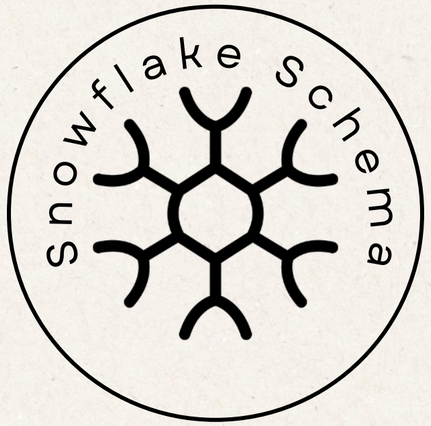
- Data Analysis eXpressions – DAX
- Chat-GPT
- DAX Studio

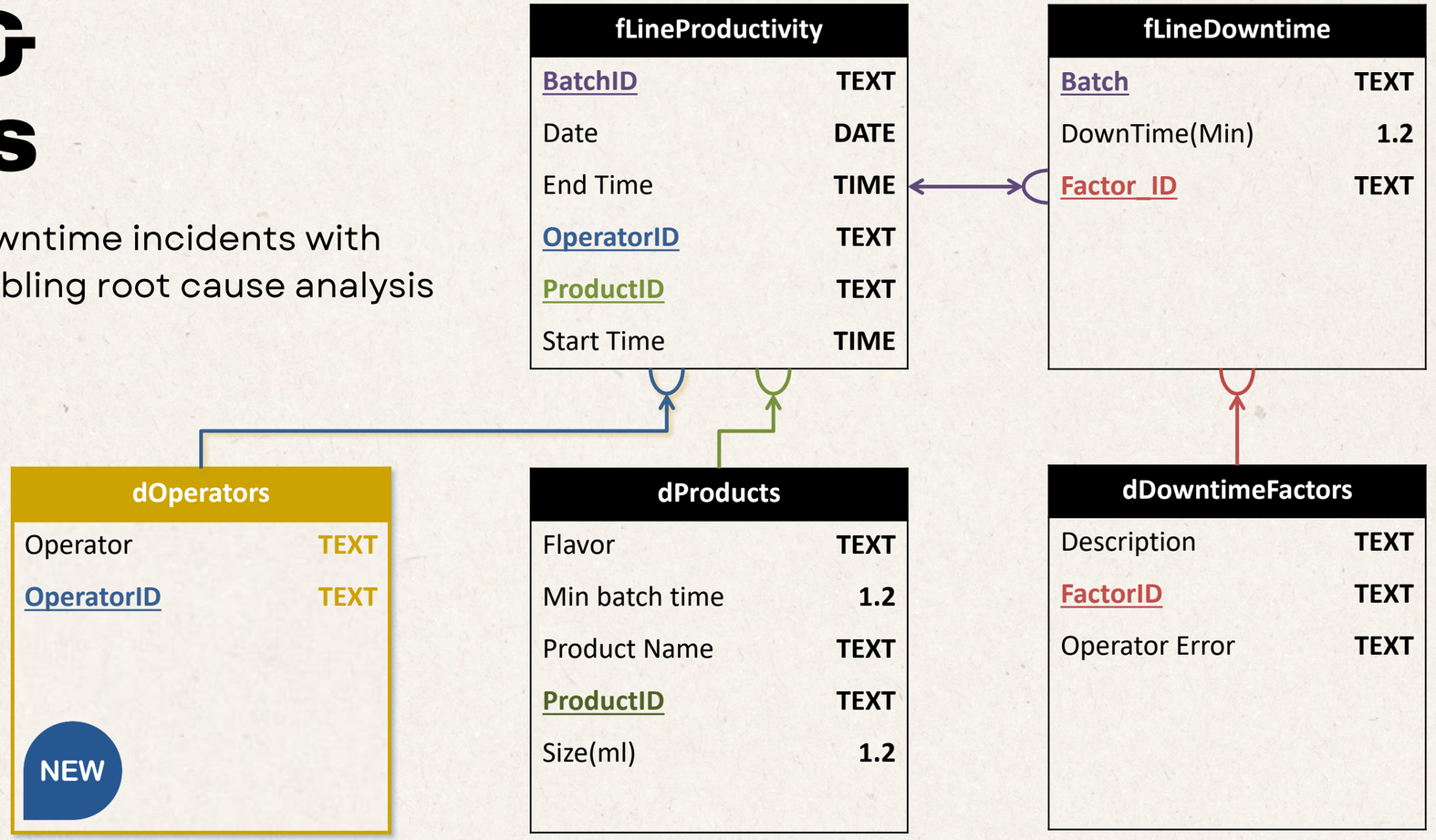
COLLABORATION & SHARING

- Power BI Service
- GitHub

Data Model & Relationships

This model allowed us to connect downtime incidents with specific operators and products, enabling root cause analysis





Key Performance Indicators

Our target is to Increase the line availability by 20%

Line Availability %

Present: 64%
Target: 84%

We need a 20% increase to achieve higher operational efficiency.

Operator Error %

Present: 56%
Target: 36%

Reducing operator errors will directly improve productivity

AVG Downtime

Present: 00:23
Target: 00:18

Lowering downtime is essential to boost overall output

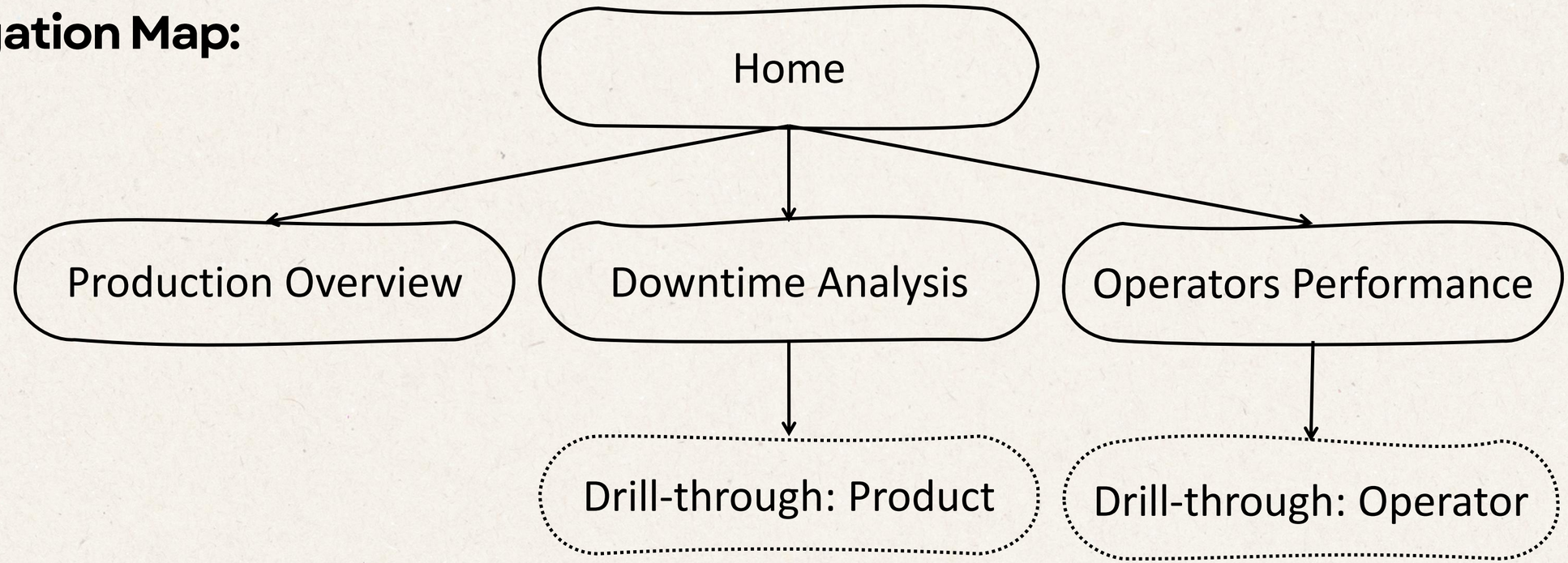
Downtime Operational Dashboard

Interactive visuals to track downtime trends and identify root causes

SKILLS SHOWCASED: Figma Design · Buttons and Bookmarks · Drill-through & Filter · Tool Tip · Calculated Tables & Measures

Downtime Operational Dashboard

Wireframe & Navigation Map:

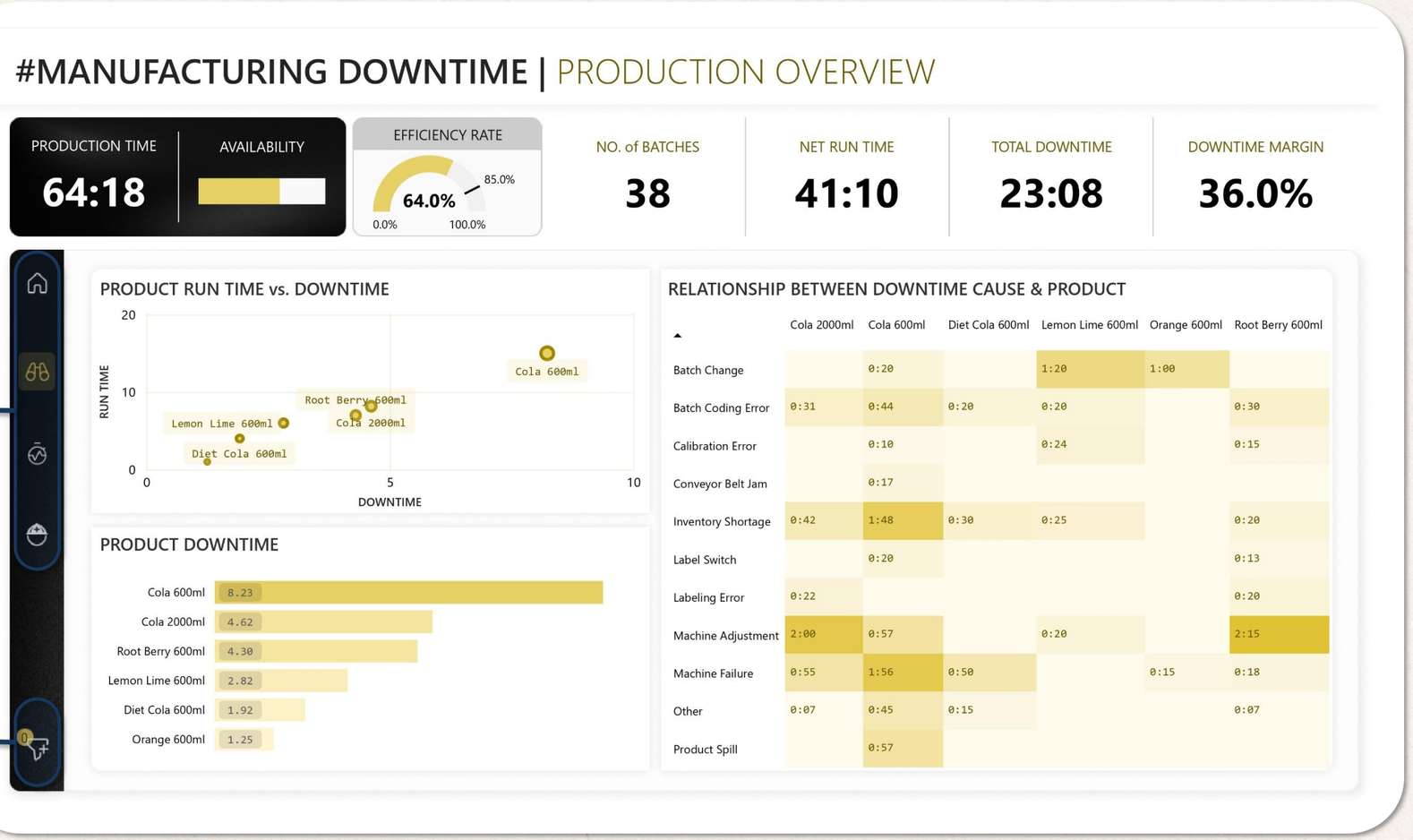


Downtime Operational Dashboard

Page 1:
Production Overview

Main page navigators

Filter button & counter



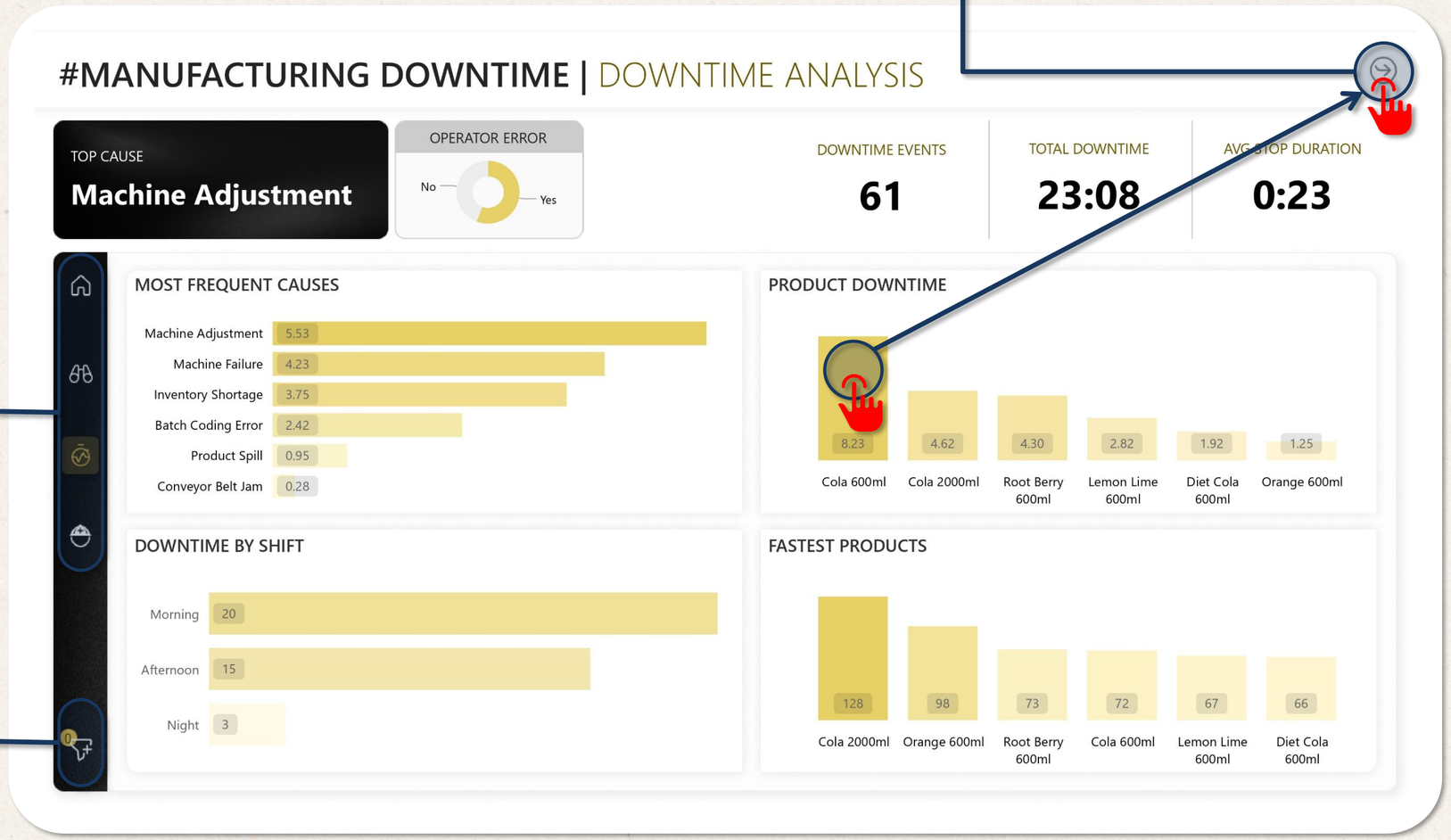
Downtime Operational Dashboard

Page 2:
Downtime Analysis

Product drill-through page

Main page navigators

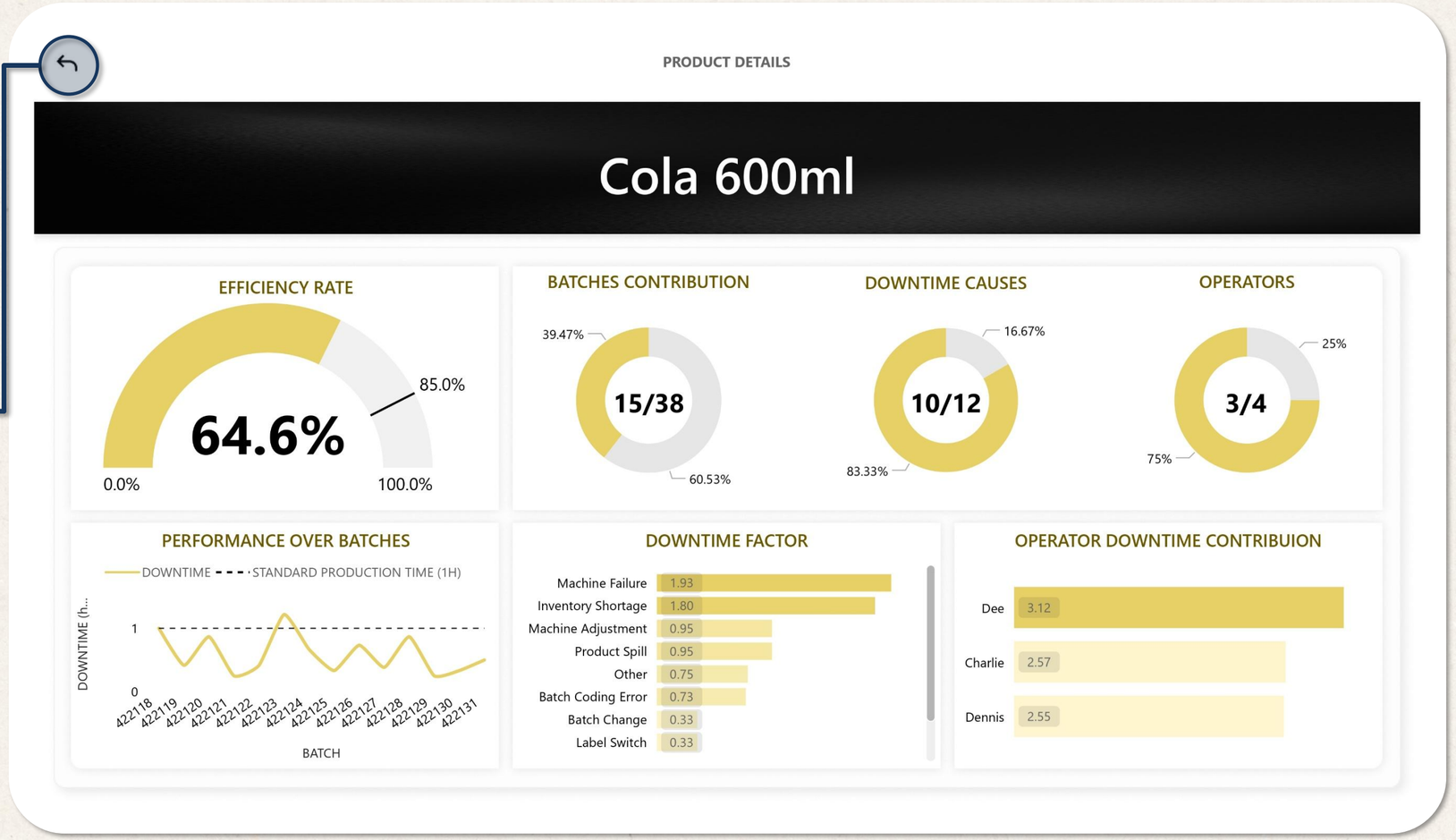
Filter button & counter



Downtime Operational Dashboard

Page 2.1:
Product Details

"Downtime Analysis" page



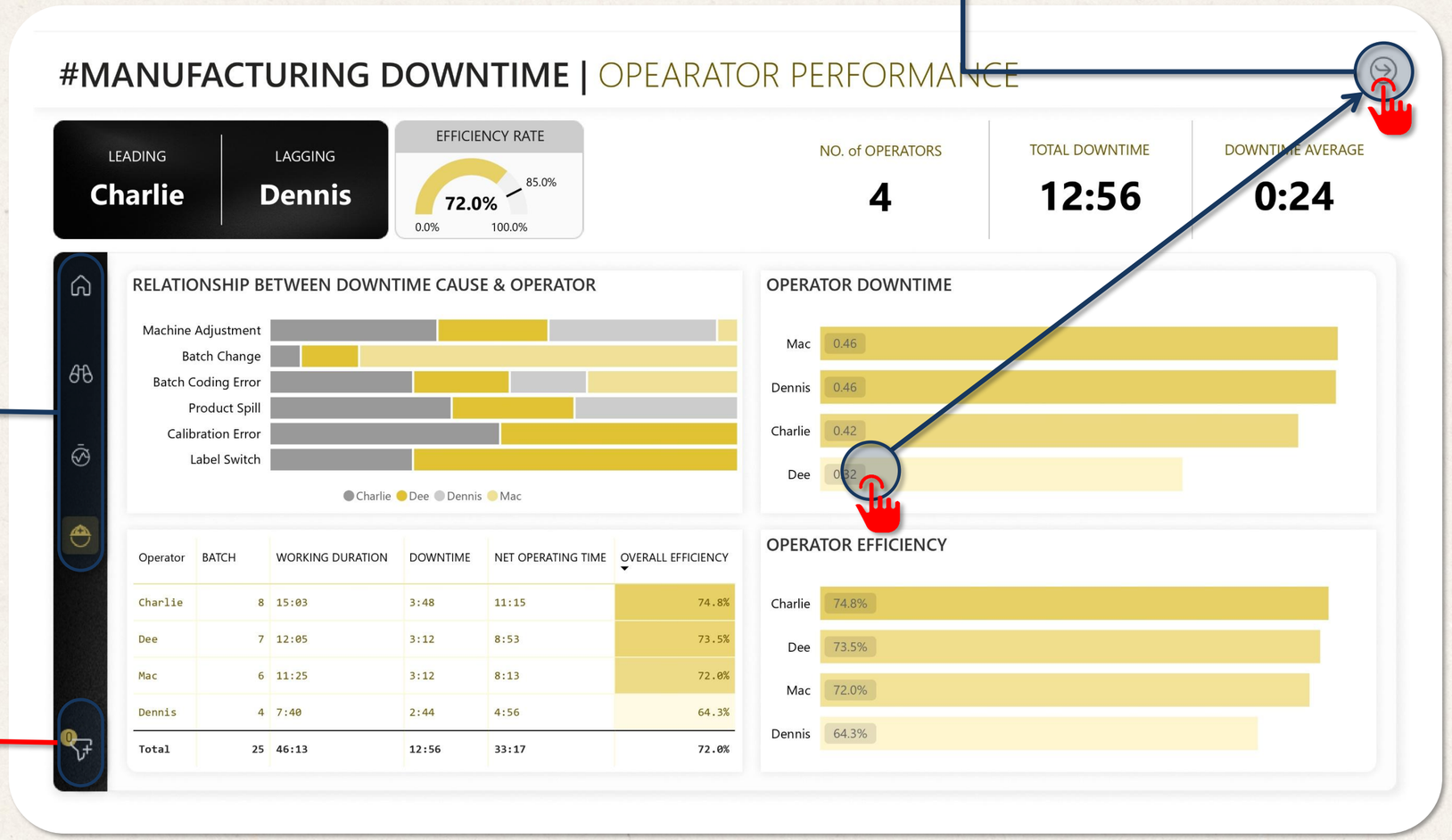
Downtime Operational Dashboard

Page 3:
Operator Performance

Operator drill-through page

Main page navigators

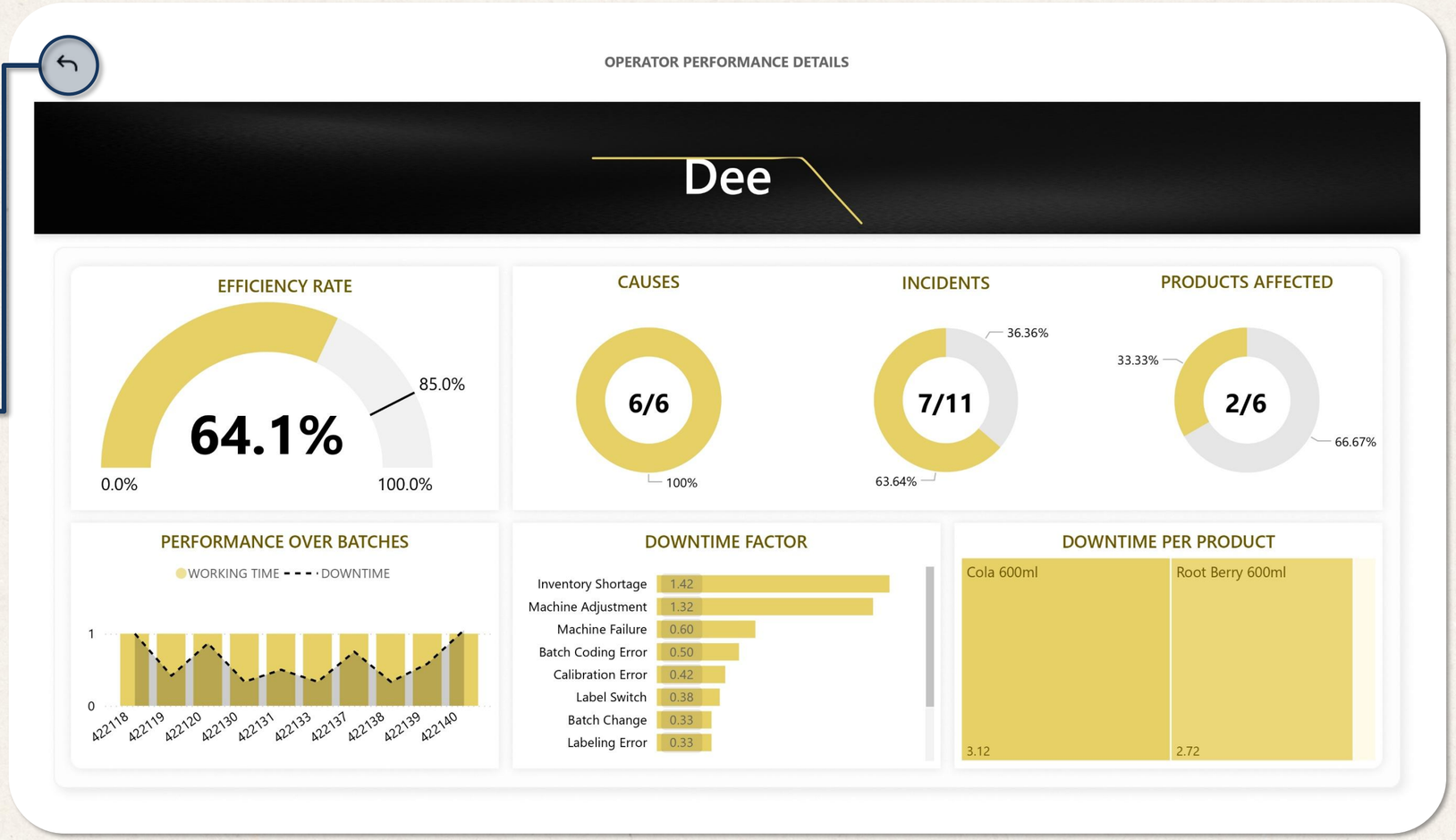
Filter button & counter



Downtime Operational Dashboard

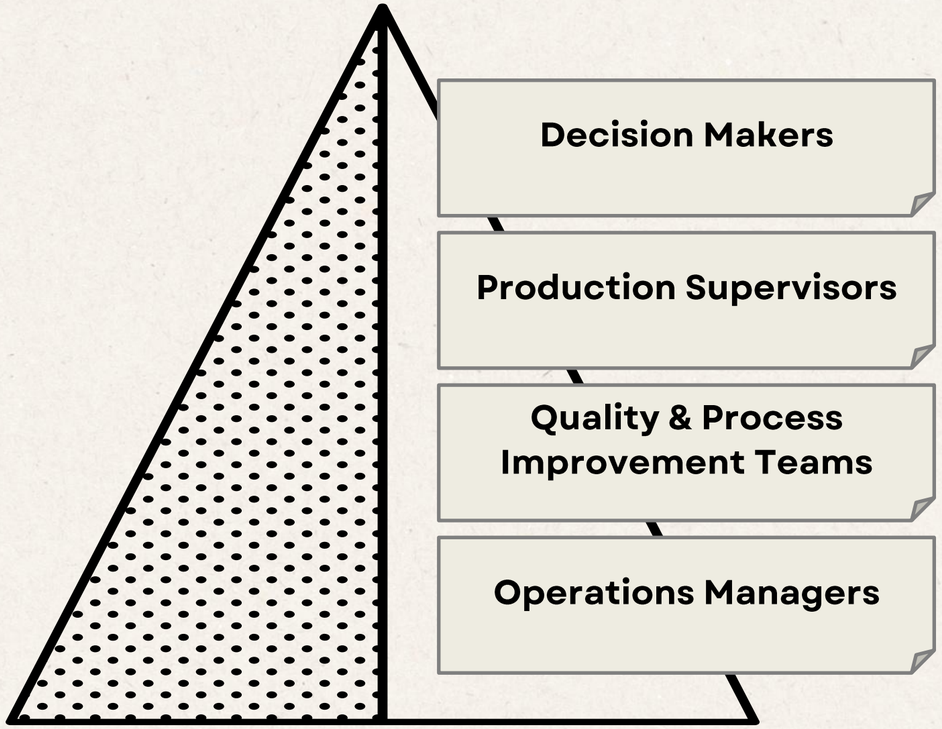
Page 3.1:
Operator Details

“Operator Performance” page



Audience

Our findings directly support the needs of key stakeholders across all levels of production



Evaluate whether the 20% downtime reduction target is achievable

Track operator-related issues and daily performance

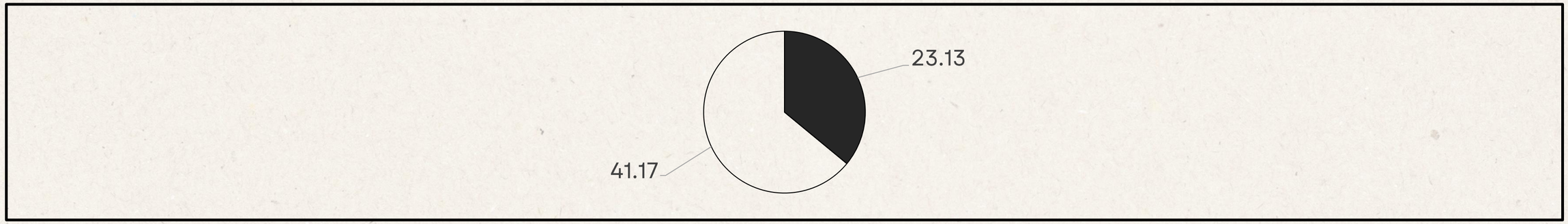
Identify root causes and reduce losses

Monitor downtime patterns and production efficiency

Key Insights

Our analysis revealed the main drivers of downtime and efficiency gaps

1. Downtime Is Significantly Above Normal Operational Limits



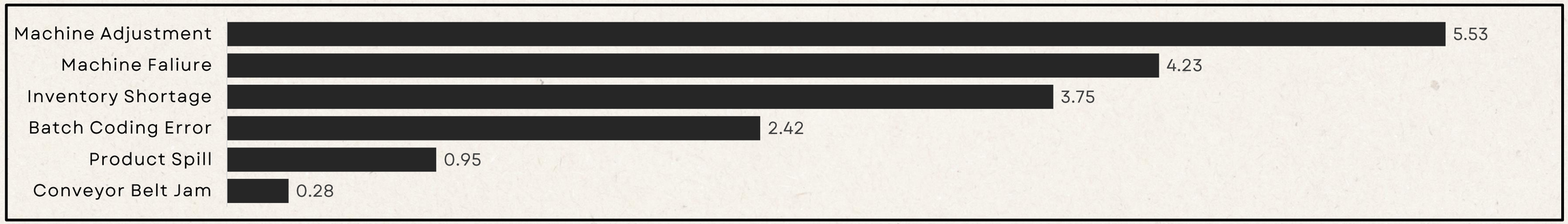
› Total downtime recorded was 36%, limiting line availability to 64%!

Why It Matters?

› Reduced availability puts pressure on delivery schedules and reduces total output capacity.

Key Insights

2. Machine-related Issues Account For Most Non-operator Downtime, Led By ‘Machine Adjustment’



› “Machine Adjustment” alone causes almost a quarter of total losses.

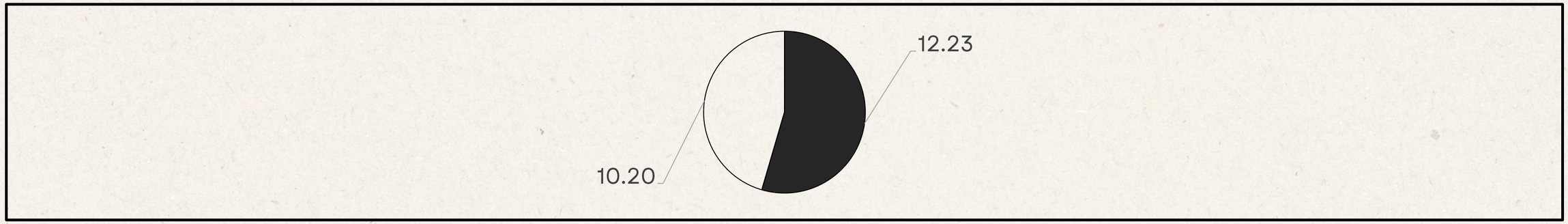
› “Machine Failure” and “Inventory Shortage” together add over 8 hours of extra downtime.

Why It Matters?

› Recurring mechanical problems slow production, reduce output, and increase maintenance workload.

Key Insights

3. Operator Errors Are the Main Driver



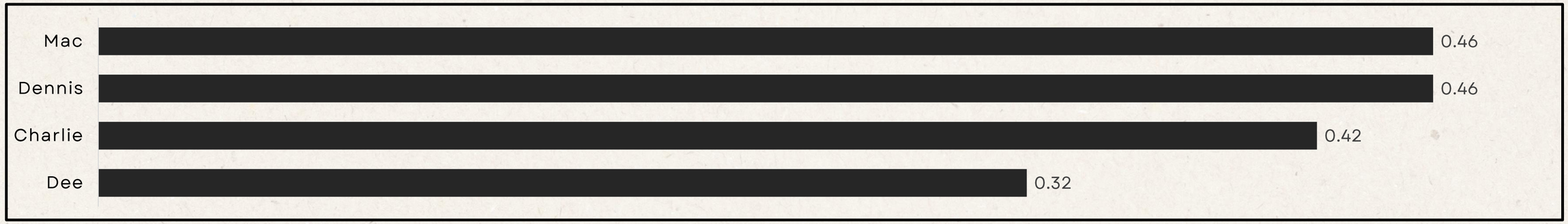
- 54% Operator Error – 46% Other Causes.
- More than half of all incidents came directly from operator mistakes.

Why It Matters?

- This makes operator performance the most critical factor affecting overall downtime.

Key Insights

4. Some Operators Consistently Contribute More Downtime Than Others



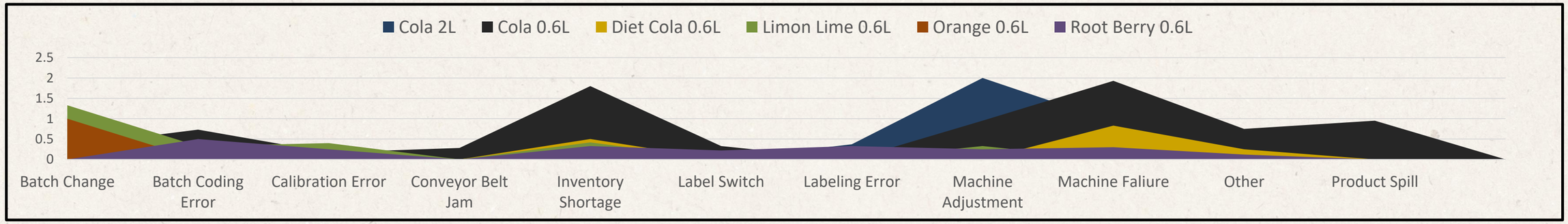
› Downtime per operator varies, with Mac & Dennis at the highest levels

Why It Matters?

› Targeted coaching can reduce error rates and stabilize performance across the team.

Key Insights

5. Certain Downtime Causes Are Concentrated on Specific Products



› There is a strong relationship between the “Cola 2L” and the “Machine Adjustment”.
› “Cola 600ml” -in particular- appears across multiple downtime.

Why It Matters?

› This suggests that targeted troubleshooting for these products can significantly reduce overall downtime.

Recommendations

Strategic Pillar	Core Objective	Key Actions (Highlights)
1. Operator Performance & SOPs	Standardize skills and enforce operational consistency.	**Targeted Retraining and Certification** (Set-up, Calibration). Implement **Standard Operating Procedures (SOPs)** for changeovers. Track performance using **weekly individual scorecards**.
2. Equipment Reliability & PM	Minimize unplanned downtime and ensure machine stability.	Execute **Structured Preventive Maintenance (PM)** with scheduled calibration. Conduct **full diagnostic inspections**; replace repetitive-failure components. Install **monitoring sensors** for early defect detection.

Recommendations

Strategic Pillar	Core Objective	Key Actions (Highlights)
3. Product-Specific Process Control	Address sensitivity issues for critical products.	Create **Dedicated Setup Checklists** for sensitive products (e.g., Cola 2L). Perform **Root-Cause Reviews** of key process paths. Conduct **Mandatory Test Verification Runs** after product changeovers.
4. Inventory & Material Flow	Eliminate line stops caused by material shortages.	Activate **Minimum Stock Alerts**. **Pre-stage materials** one shift in advance. Increase **Synchronization** between warehouse and production; assign a **Readiness Leader**.
5. Continuous Improvement (CI) & Governance	Establish a data-driven culture of learning and accountability.	Perform **Root Cause Analysis (RCA)** after major downtime events. Hold **Monthly Cross-Functional Reviews** (Production, Quality, Maintenance). **Track Downtime Segmented** by Operator, Machine, and Product.

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THANK YOU

Visit the GitHub Repo

Please get in touch if you have any questions
or concerns about this report.

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