

# ELIMINATING FAILURES

Improving quality and reducing waste

Thomas Widdows

Capstone 1 Project Presentation

# Presentation Overview

- Objective
- Facility Overview
- The Data
- Enhancing the Data
- Our Solution

Objective

Facility Overview

The Data

Enhancing the Data

Our Solution

# Predict product failures utilizing manufacturing data

## Objective

Facility Overview

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# The Bosch Facility

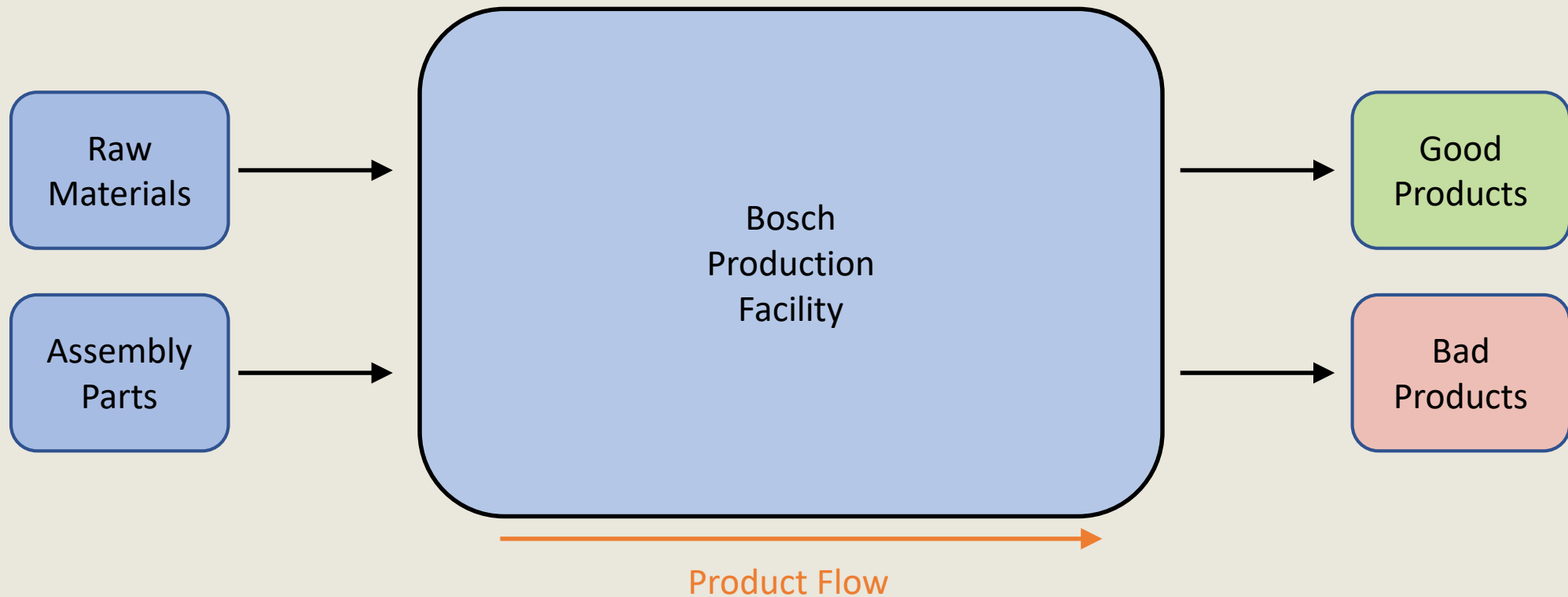
Objective

Facility Overview

The Data

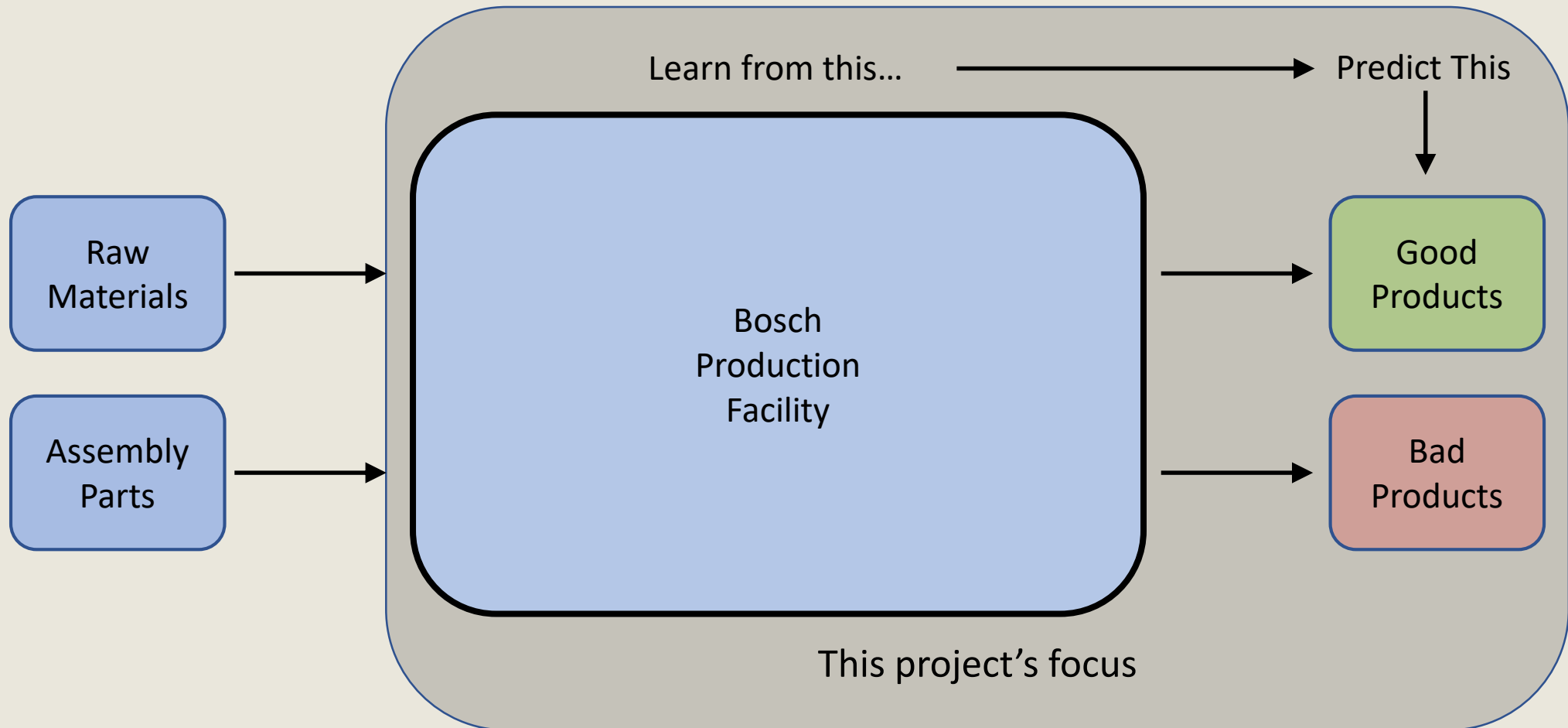
Enhancing the Data

Our Solution



# Project Focus

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Our Solution

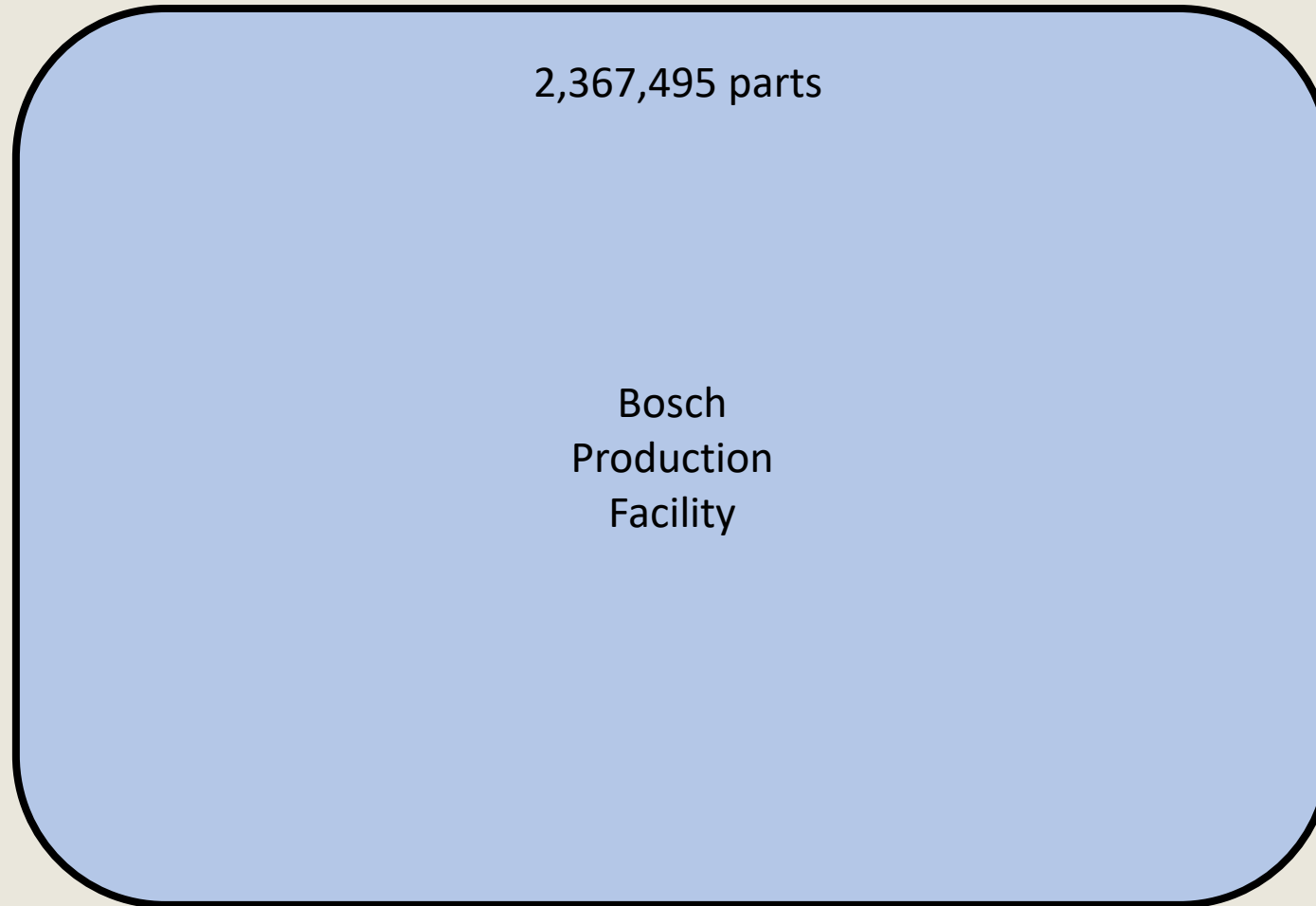


# The Data

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# Parts produced

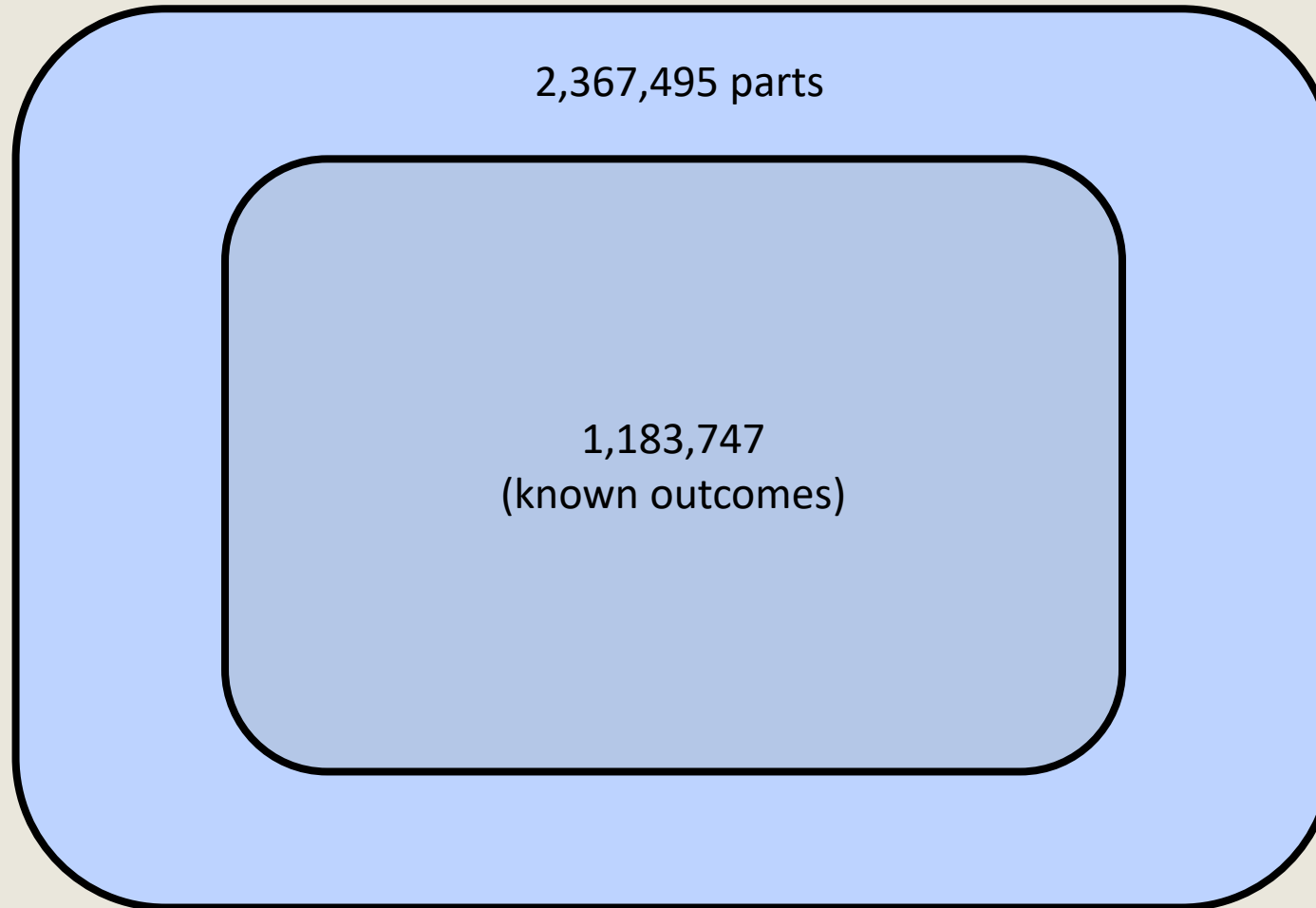
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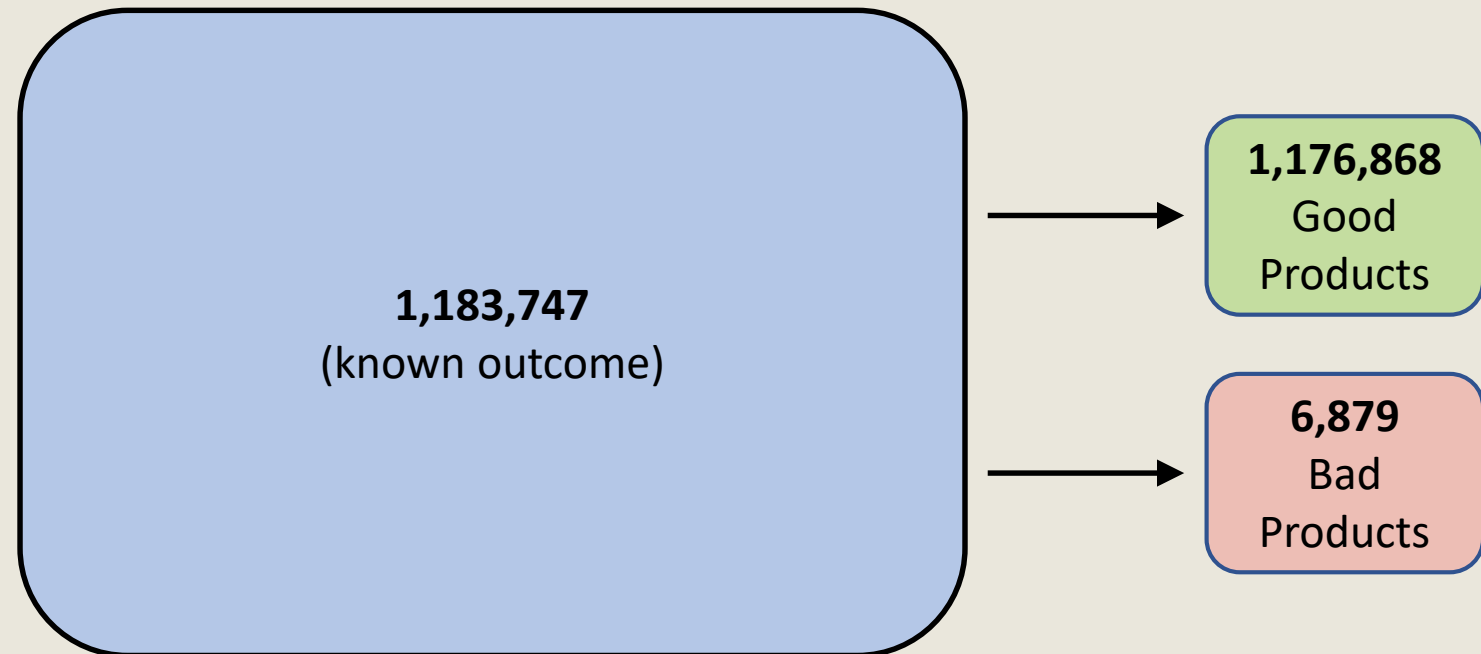
# Parts with outcome

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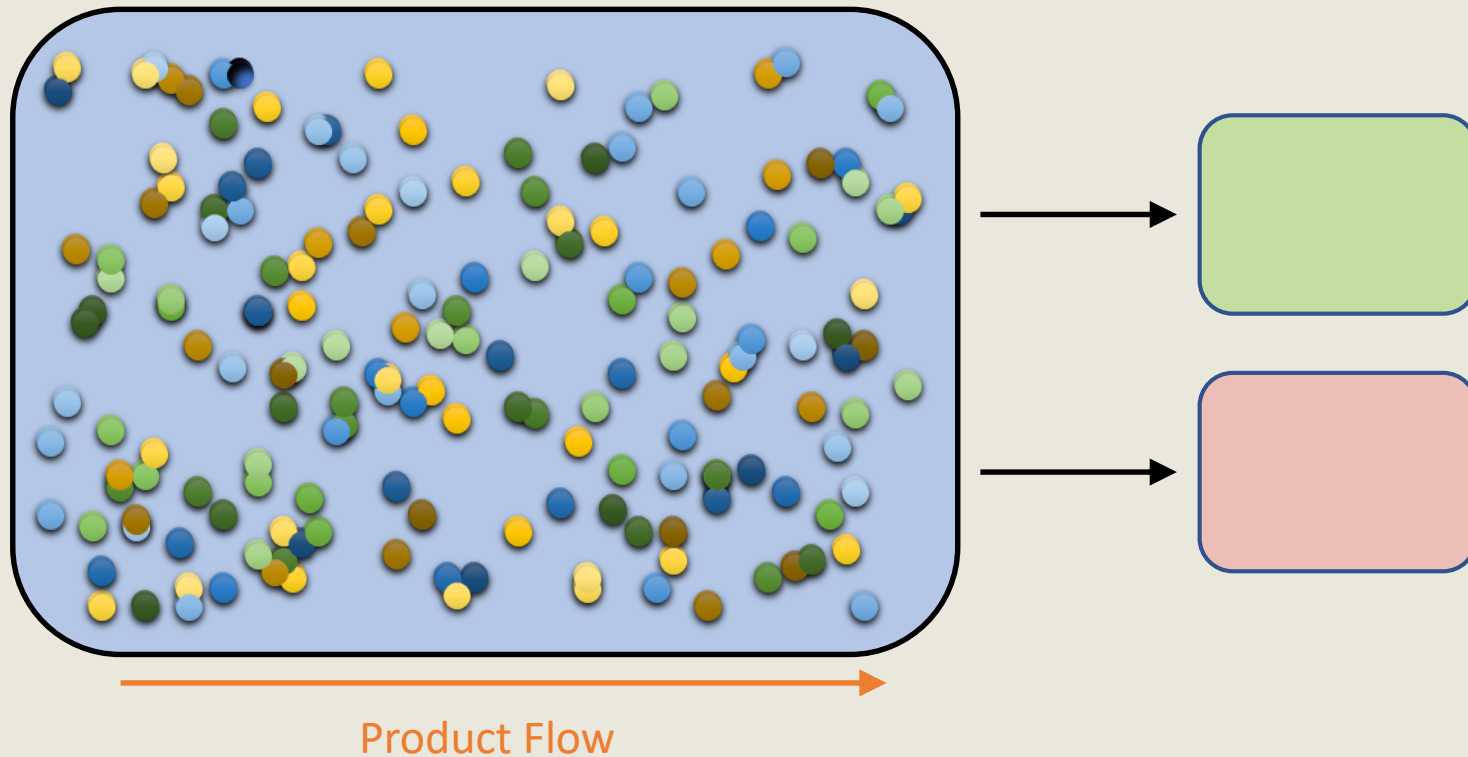
# Parts with outcome

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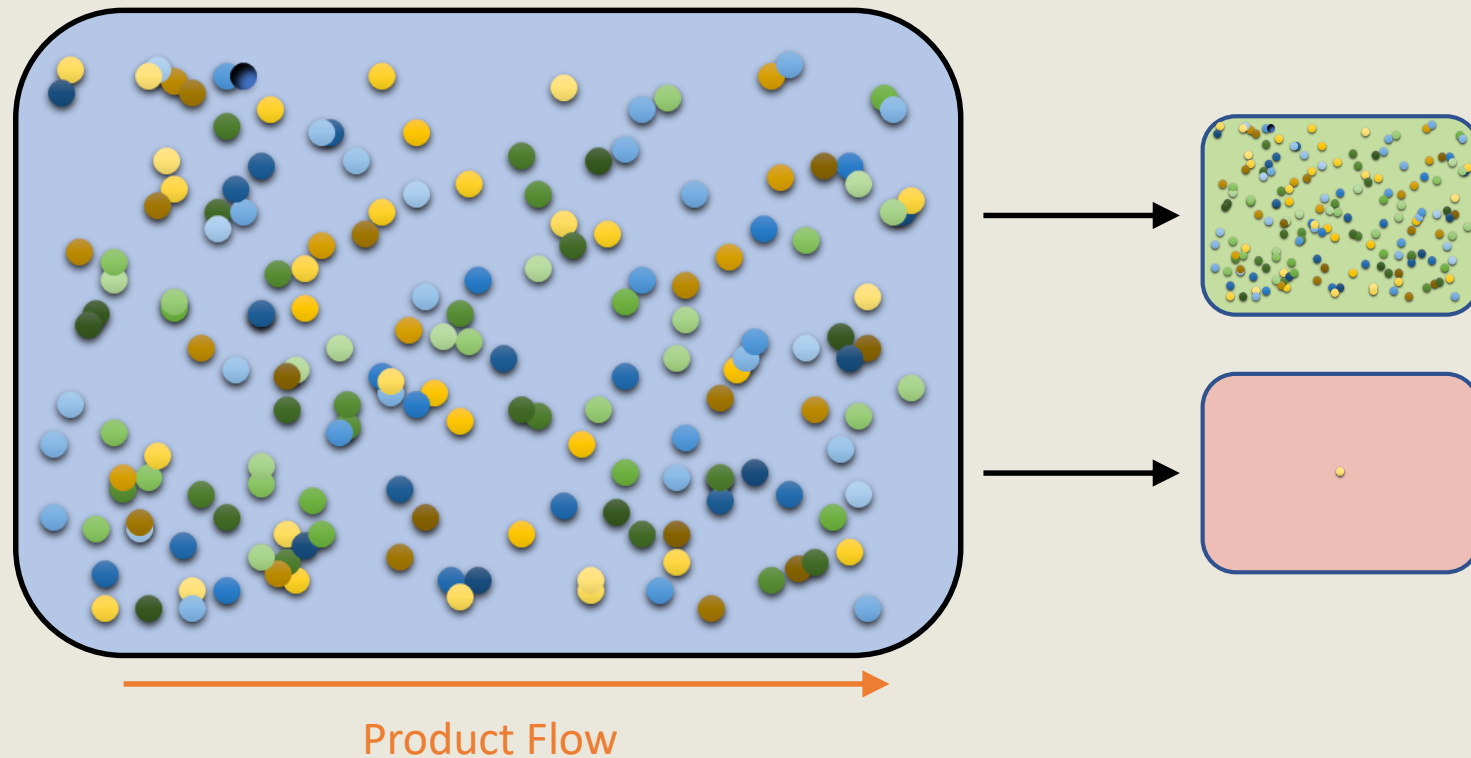
# Product Failure Rate (1/172)

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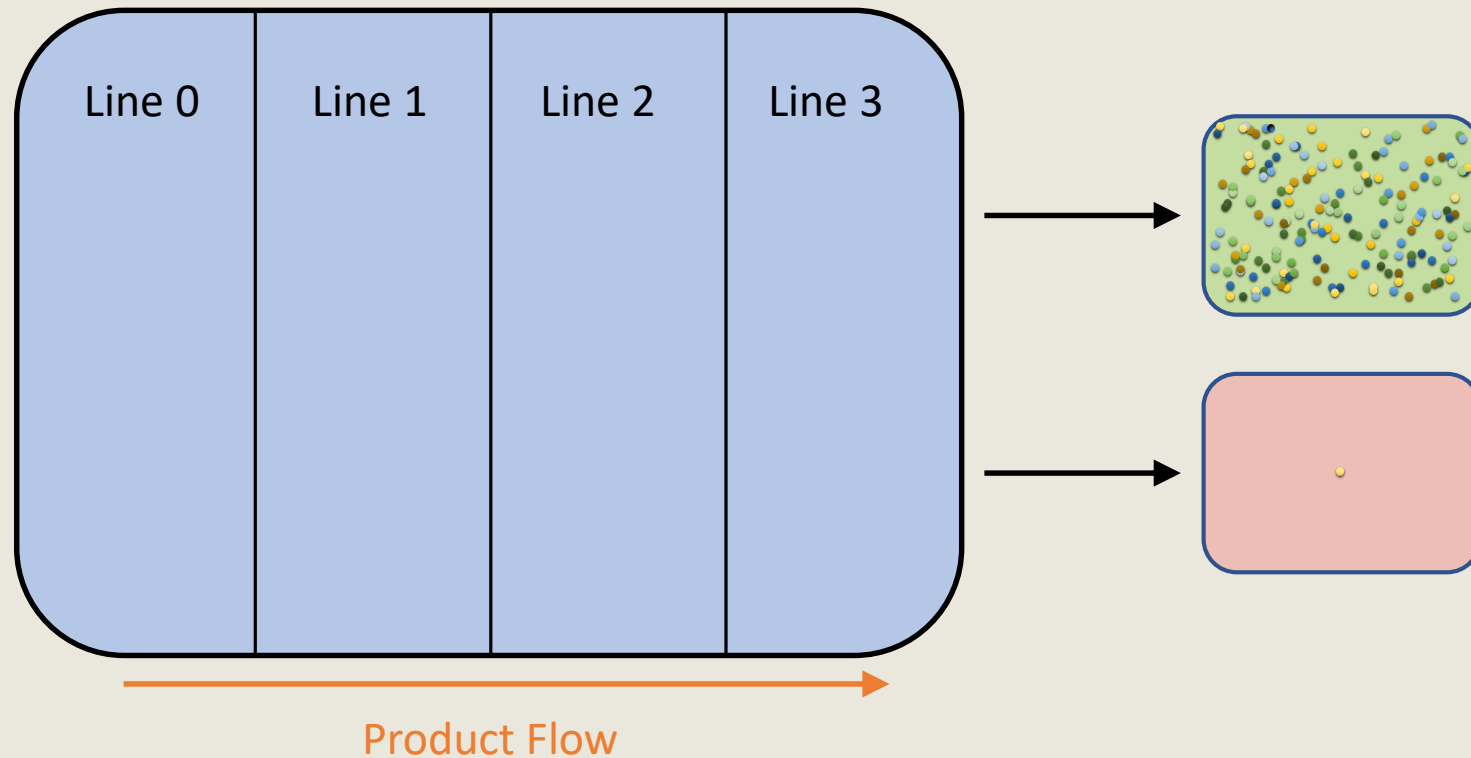
# Product Failure Rate (1/172)

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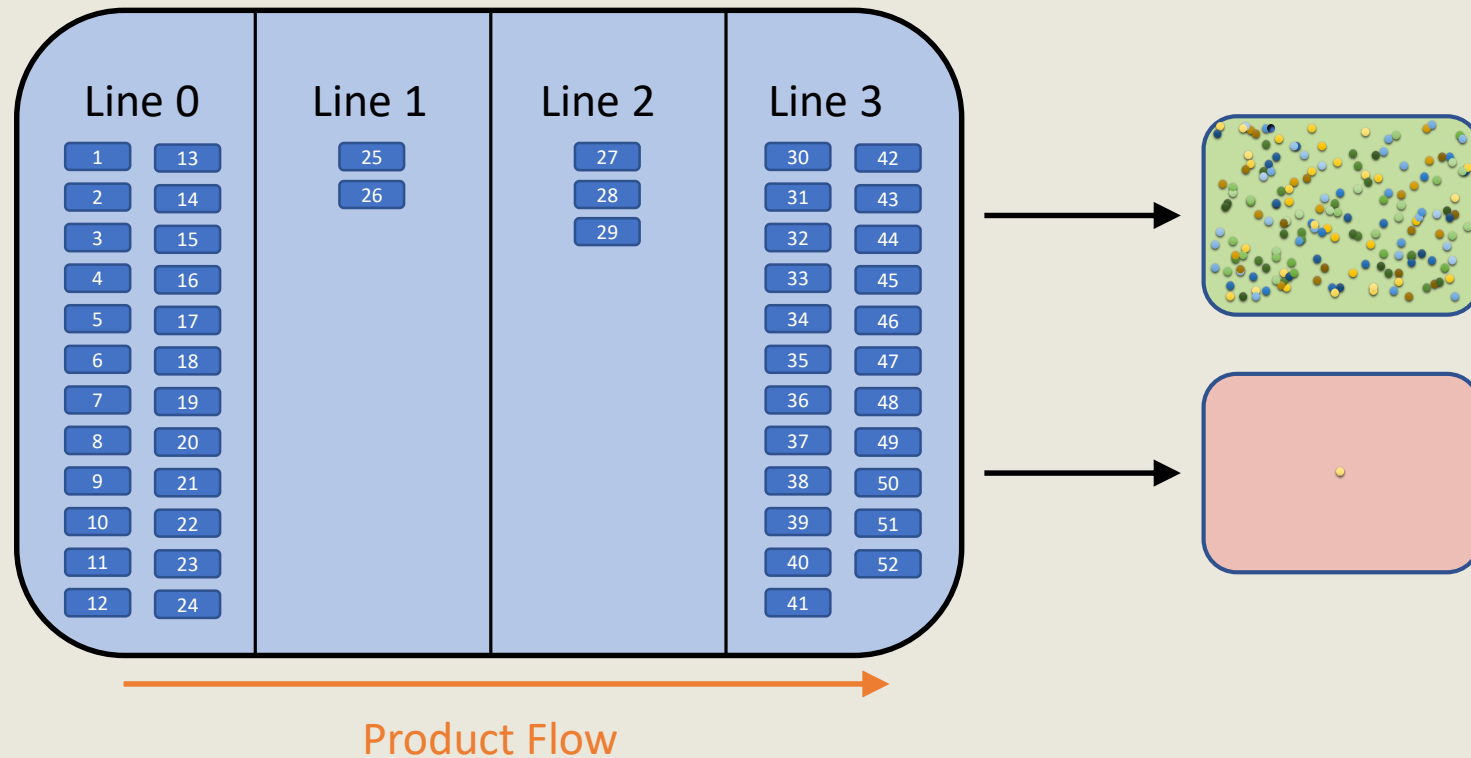
# Production lines

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# Production stations

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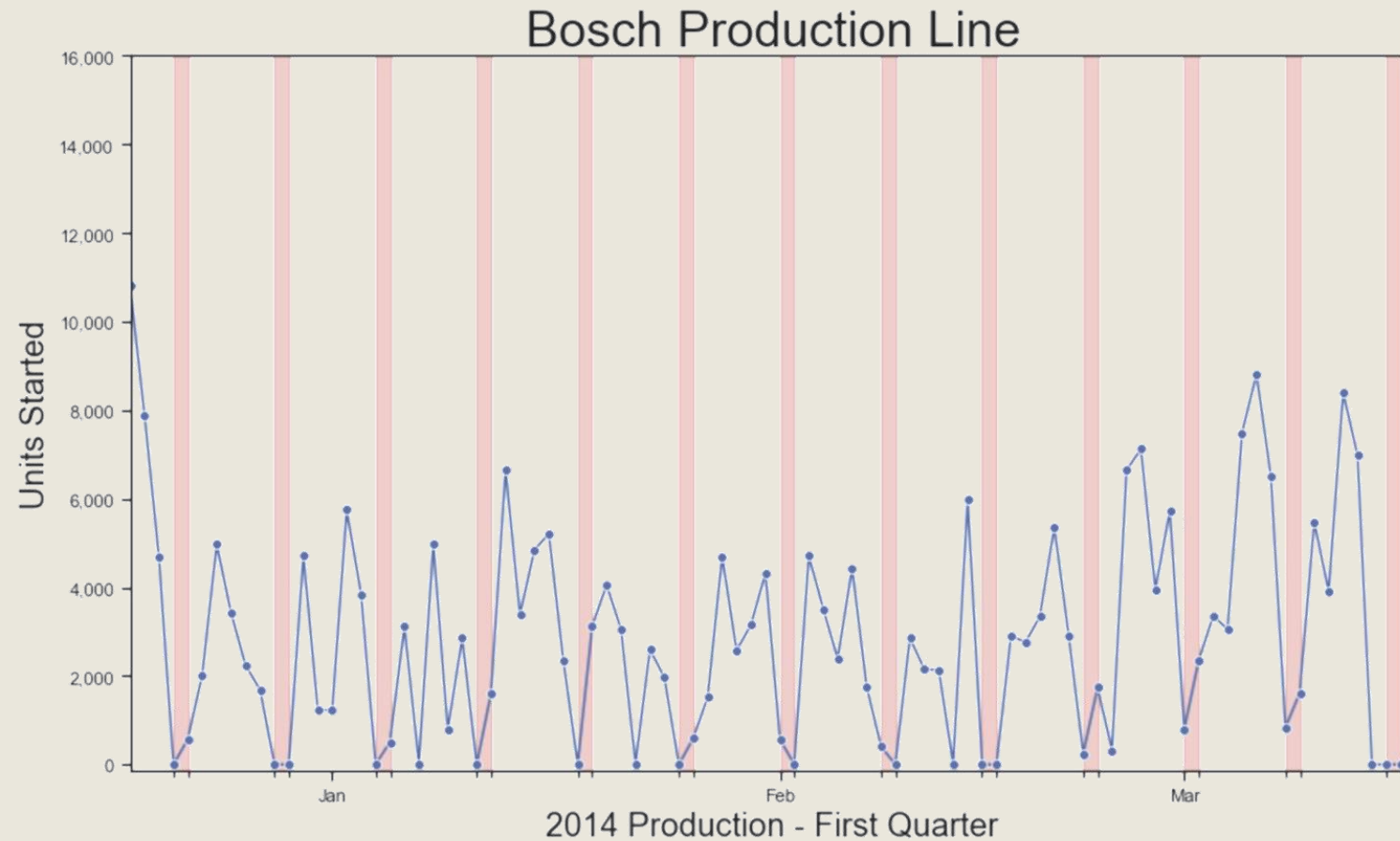


# The Data - What we learned

- 2+ million parts
- Low failure rate
- Plethora of measurements
- Sparse data
- Good date and time info
- Route calculation possible

# Time and Date (3 months)

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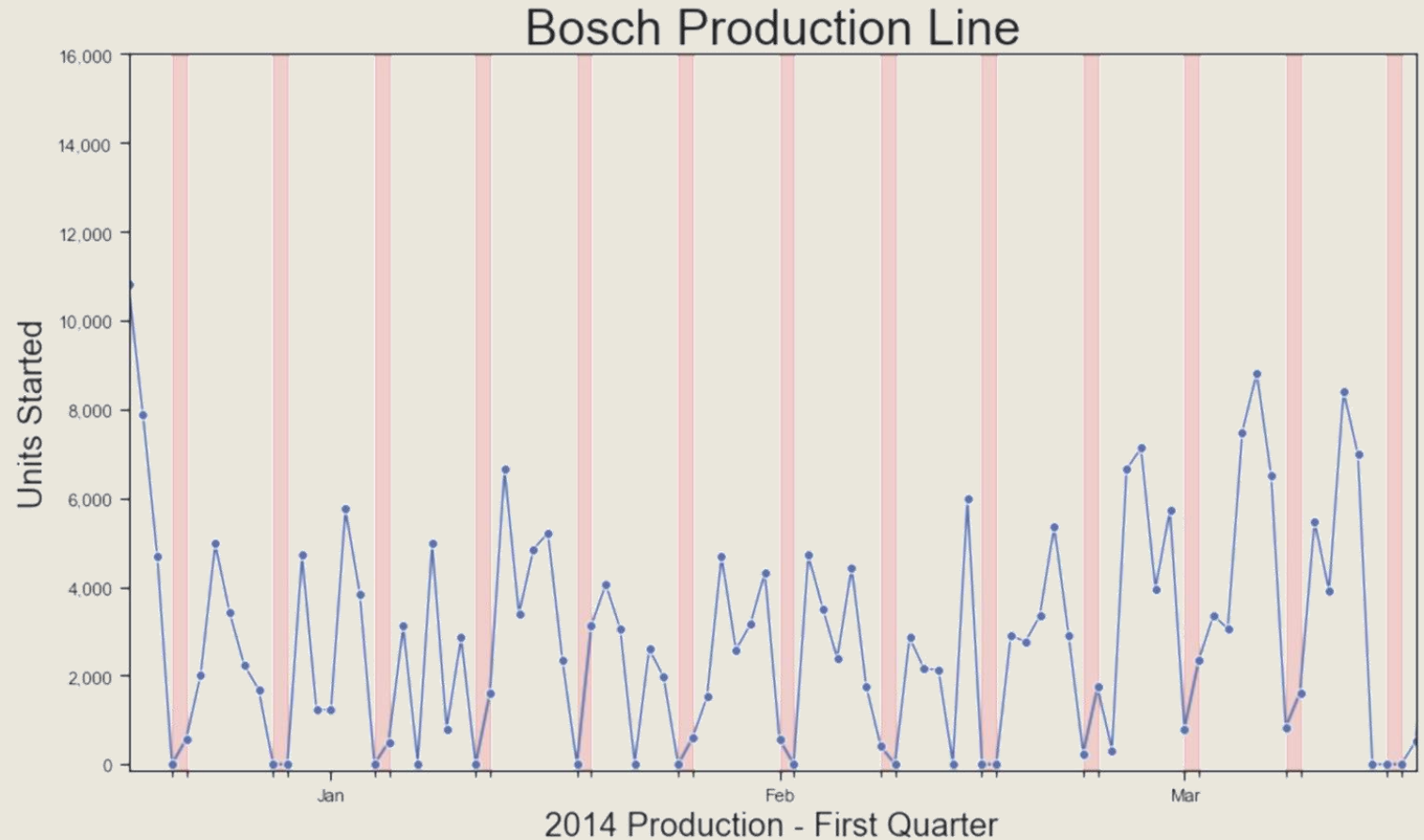




# Time and Date (3 months)

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- Measured in 6 min intervals
- Start date of 01/01/2014
- 2 years of production data
- Pink bars show weekends
- Blue dots are daily production

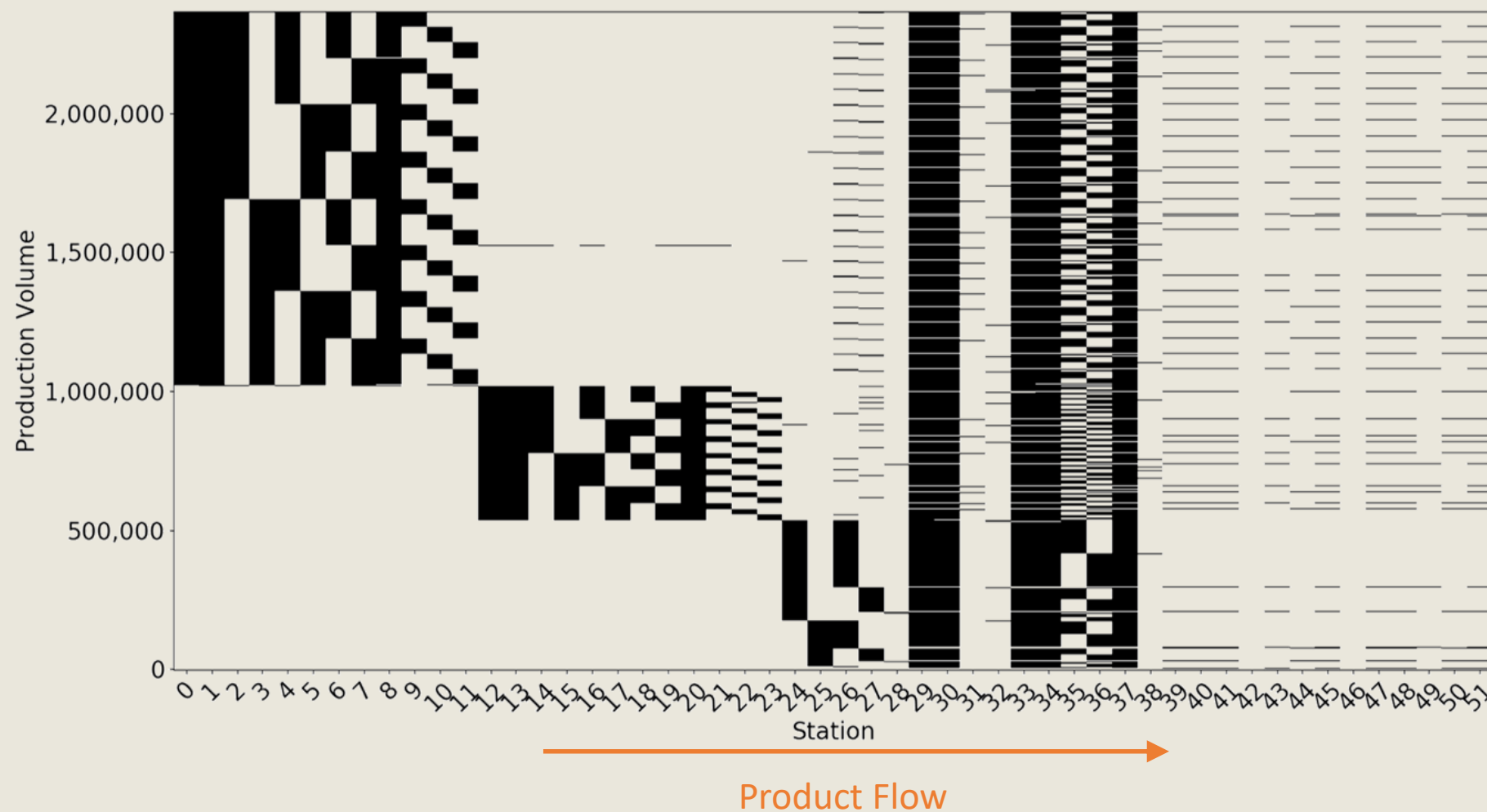


# Production by Line

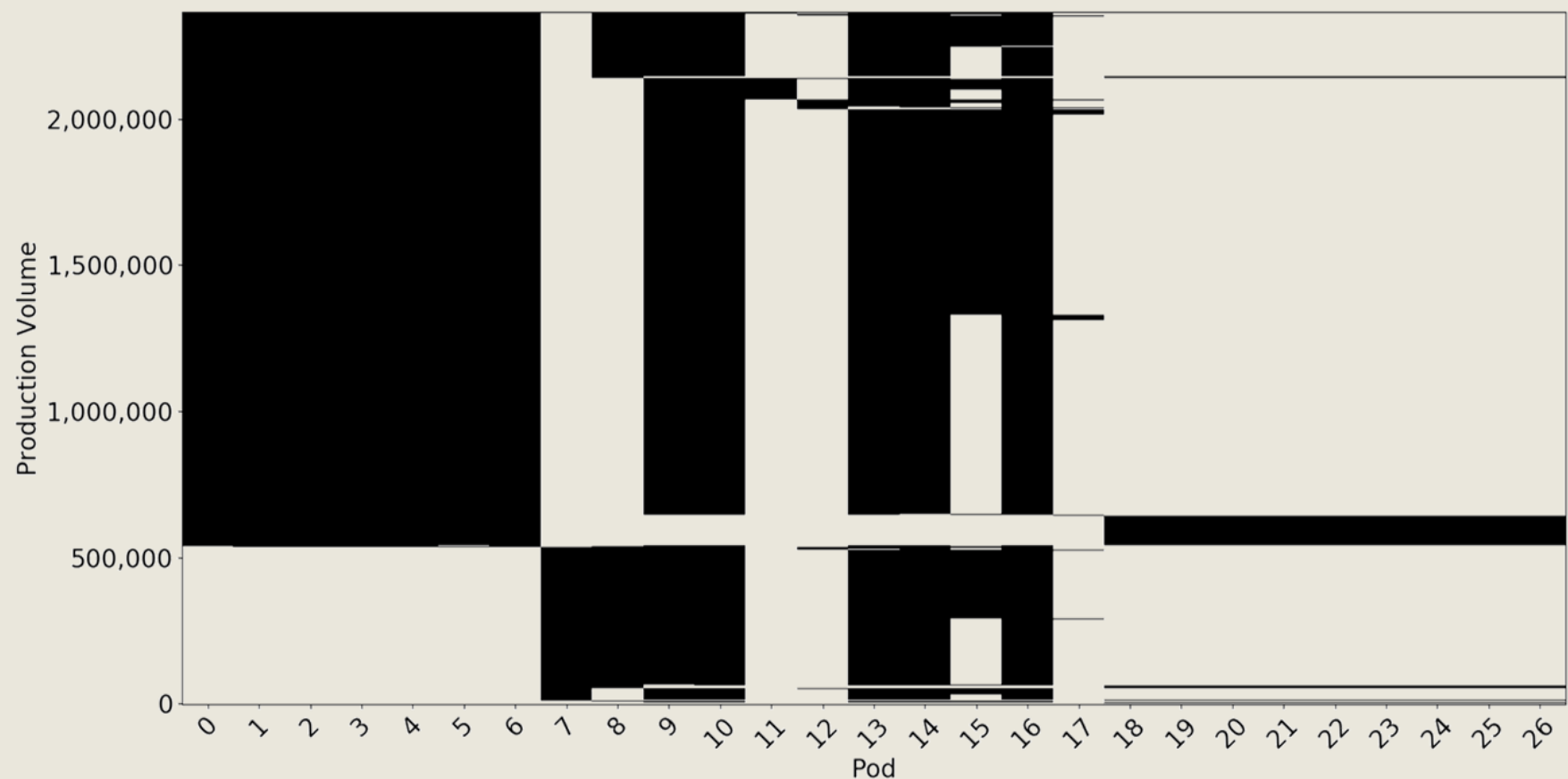
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# Production by Station



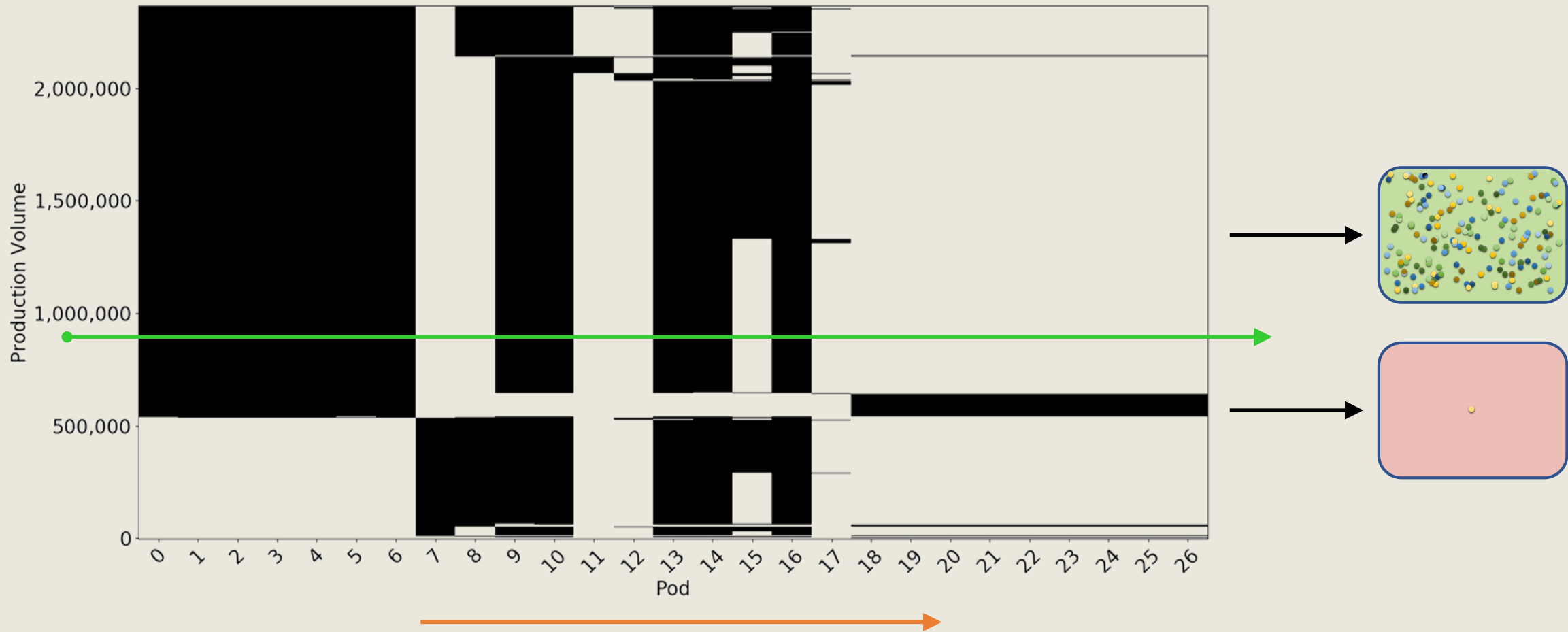
# Production by Pod



Product Flow

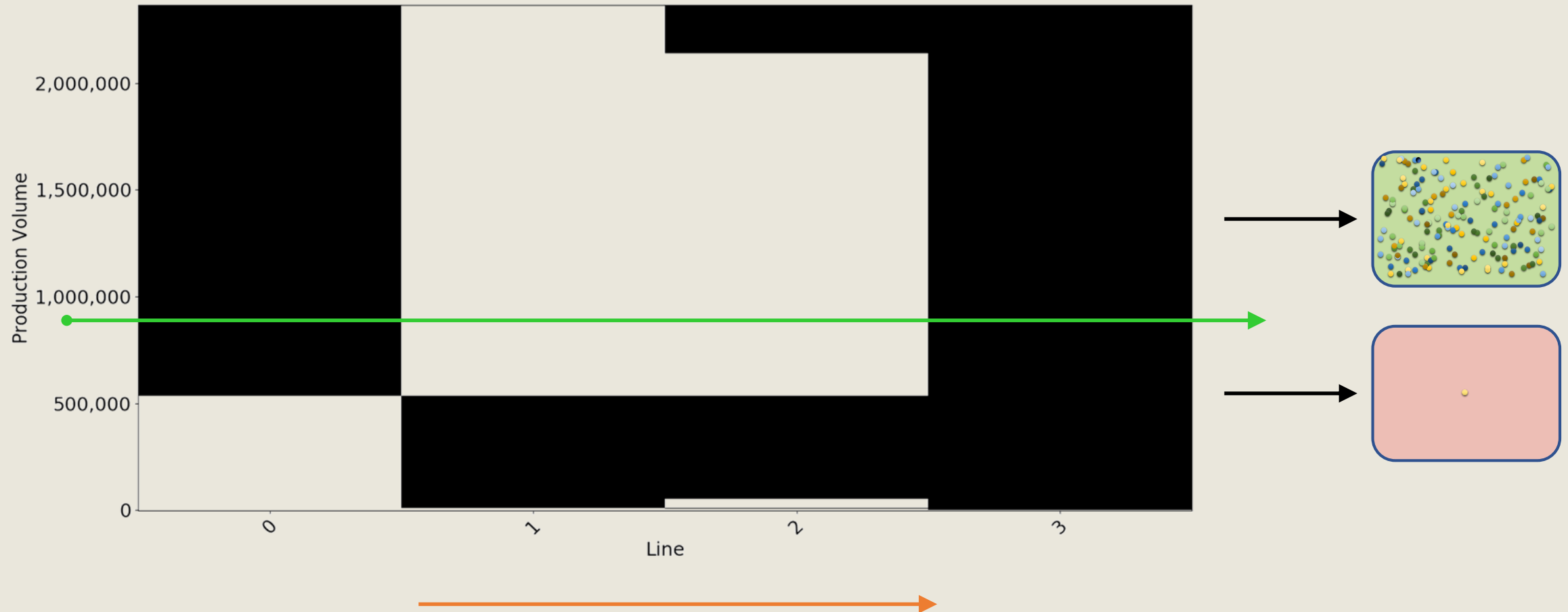
# Routes through Pods

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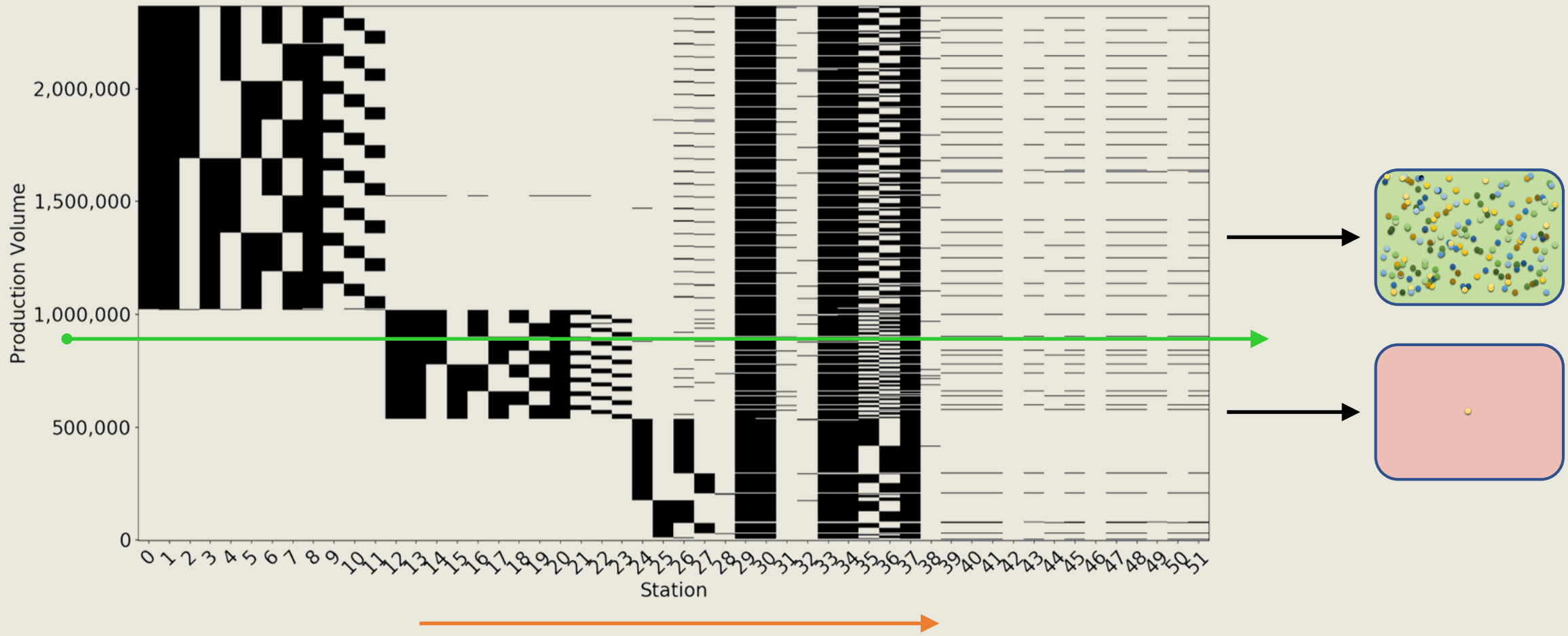
# Routes through Line

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# Routes through Station

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# Enhancement summary

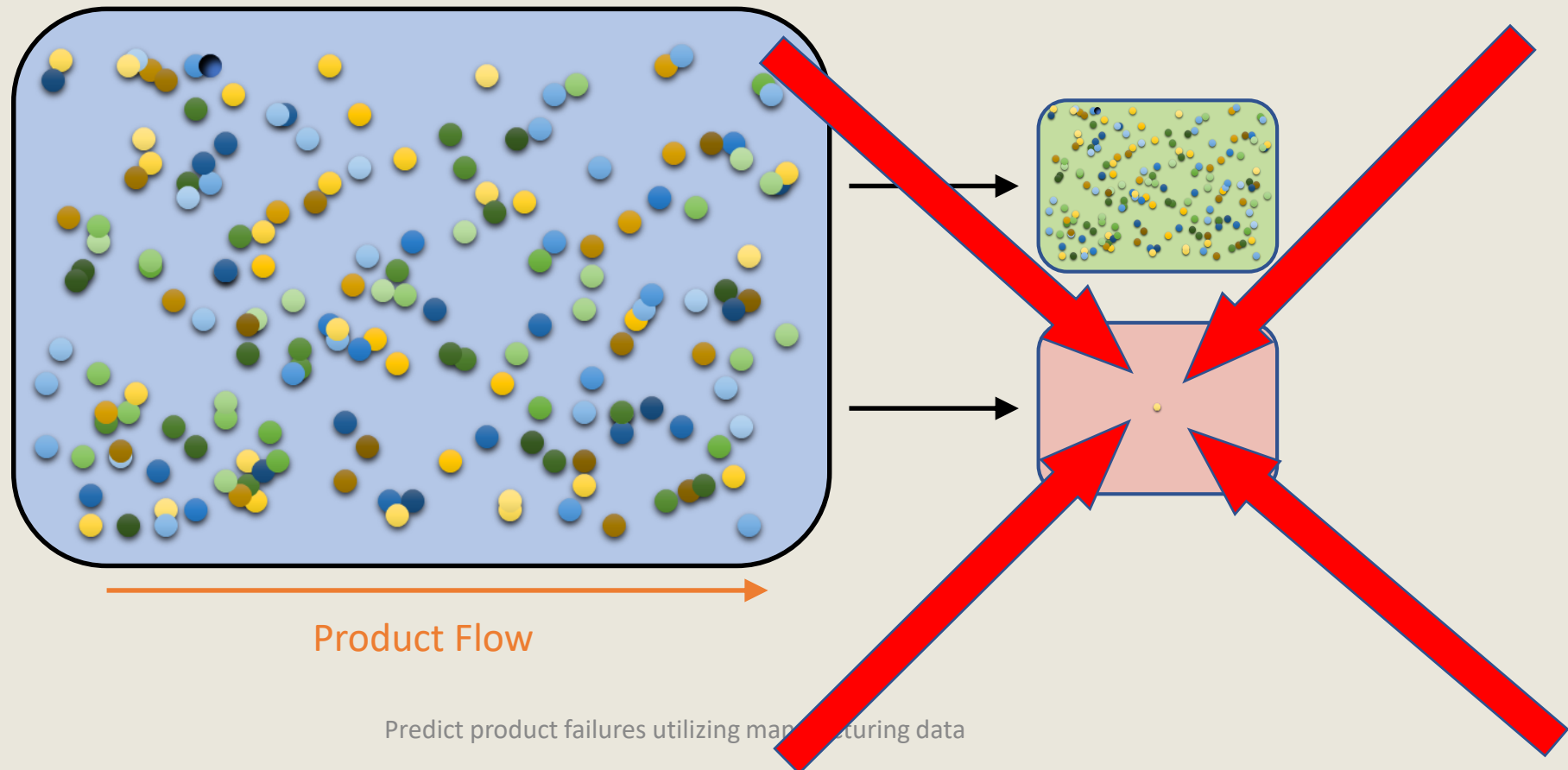
- Date features (day of week, time of day...)
- Pods (a more logical station)
- Wait time, production time, next station, last station, que, wip
- Production sequence and batches
- Routes
- Summarized numeric data (min, max, median, std)



# Predict product failures utilizing manufacturing data

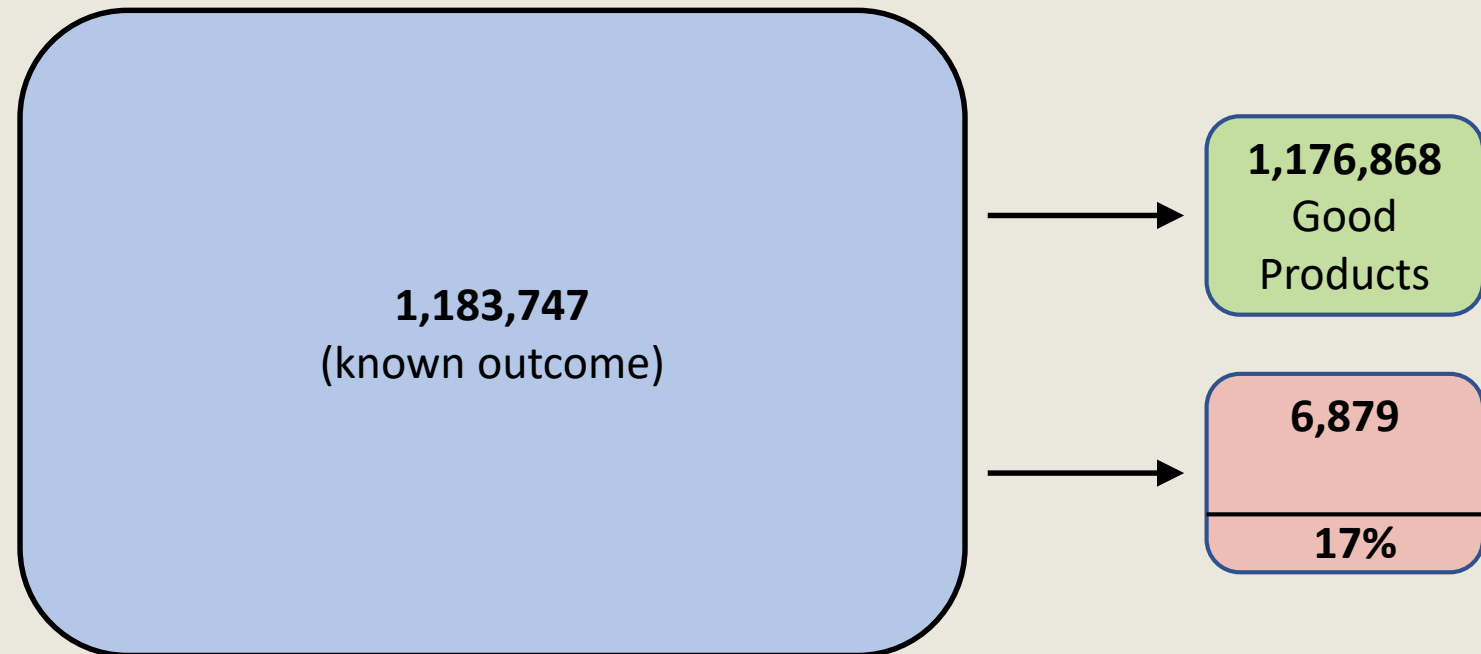
# The Target...

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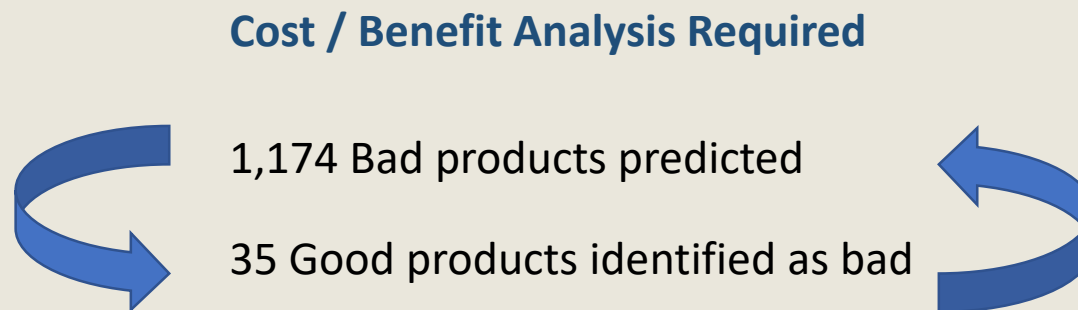
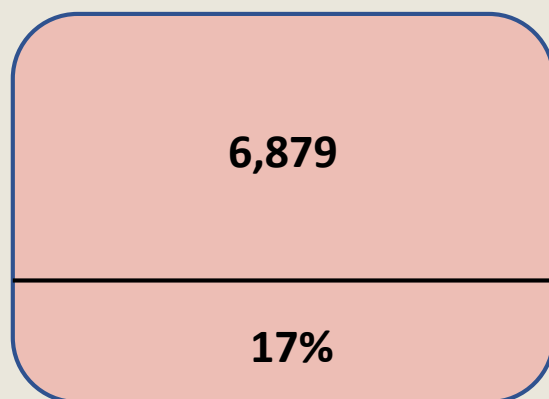
# Predicted failures

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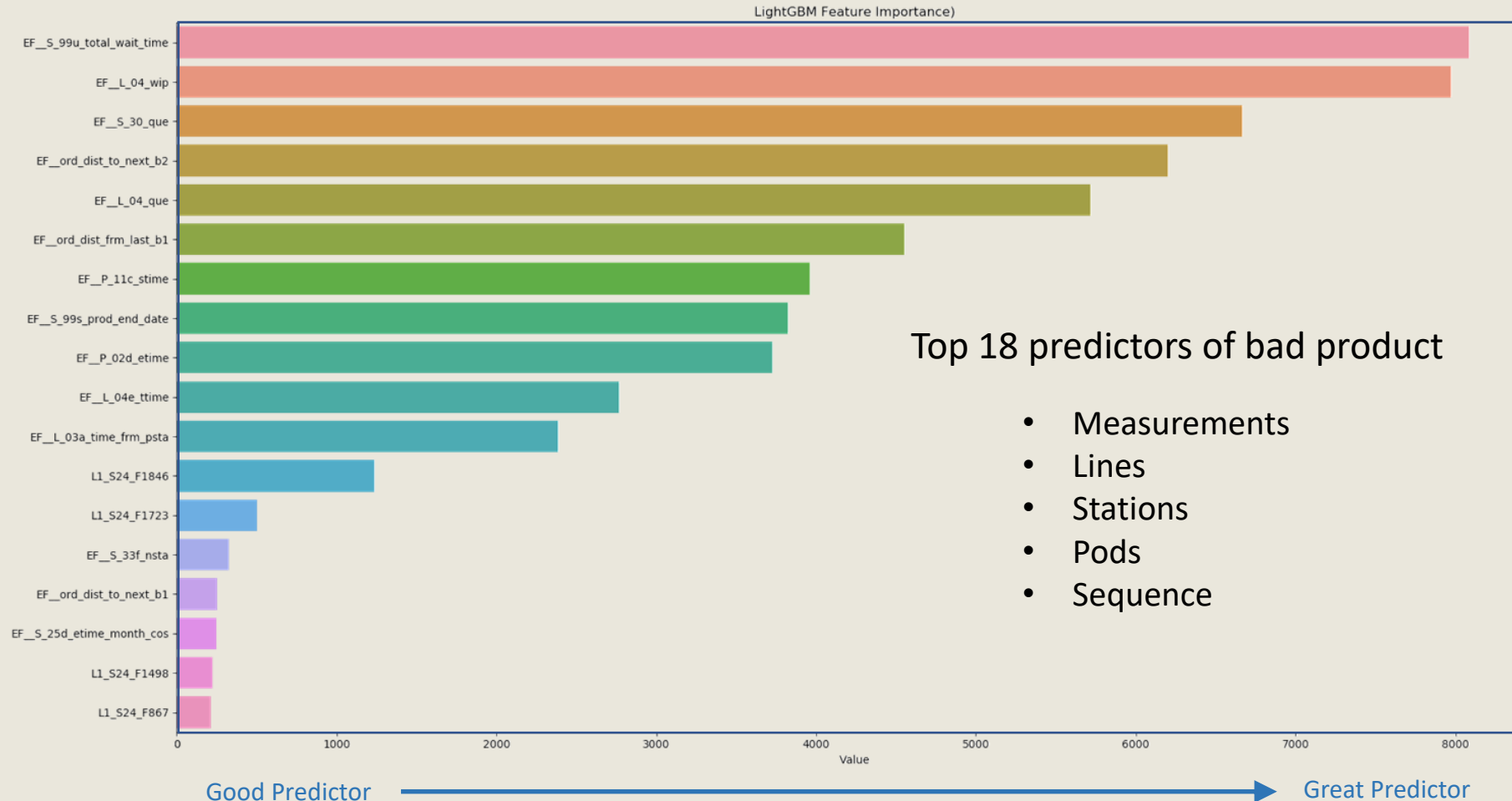


# Adjustments for cost/benefit

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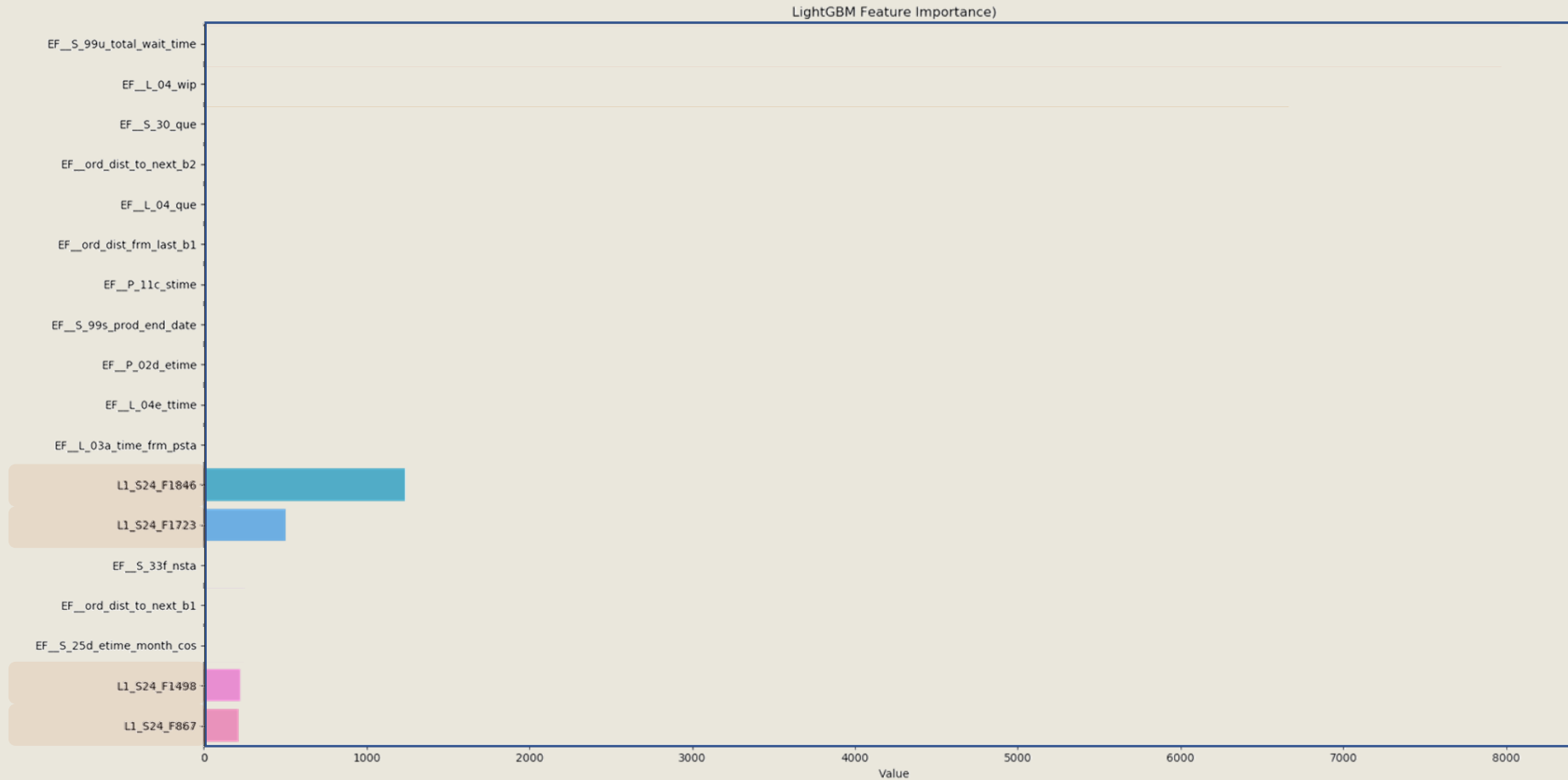


# How it works and why you care



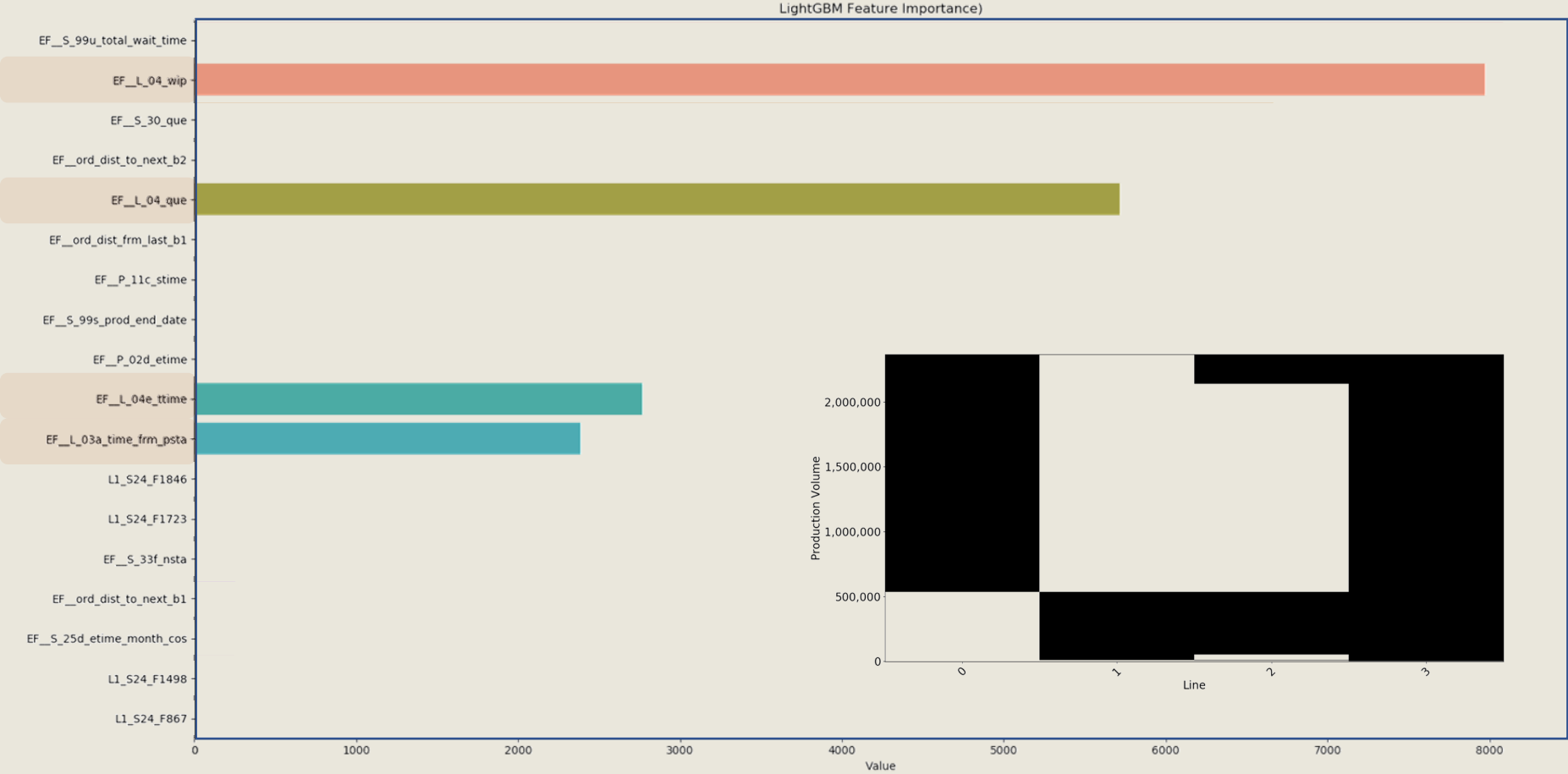
# Original Measurements

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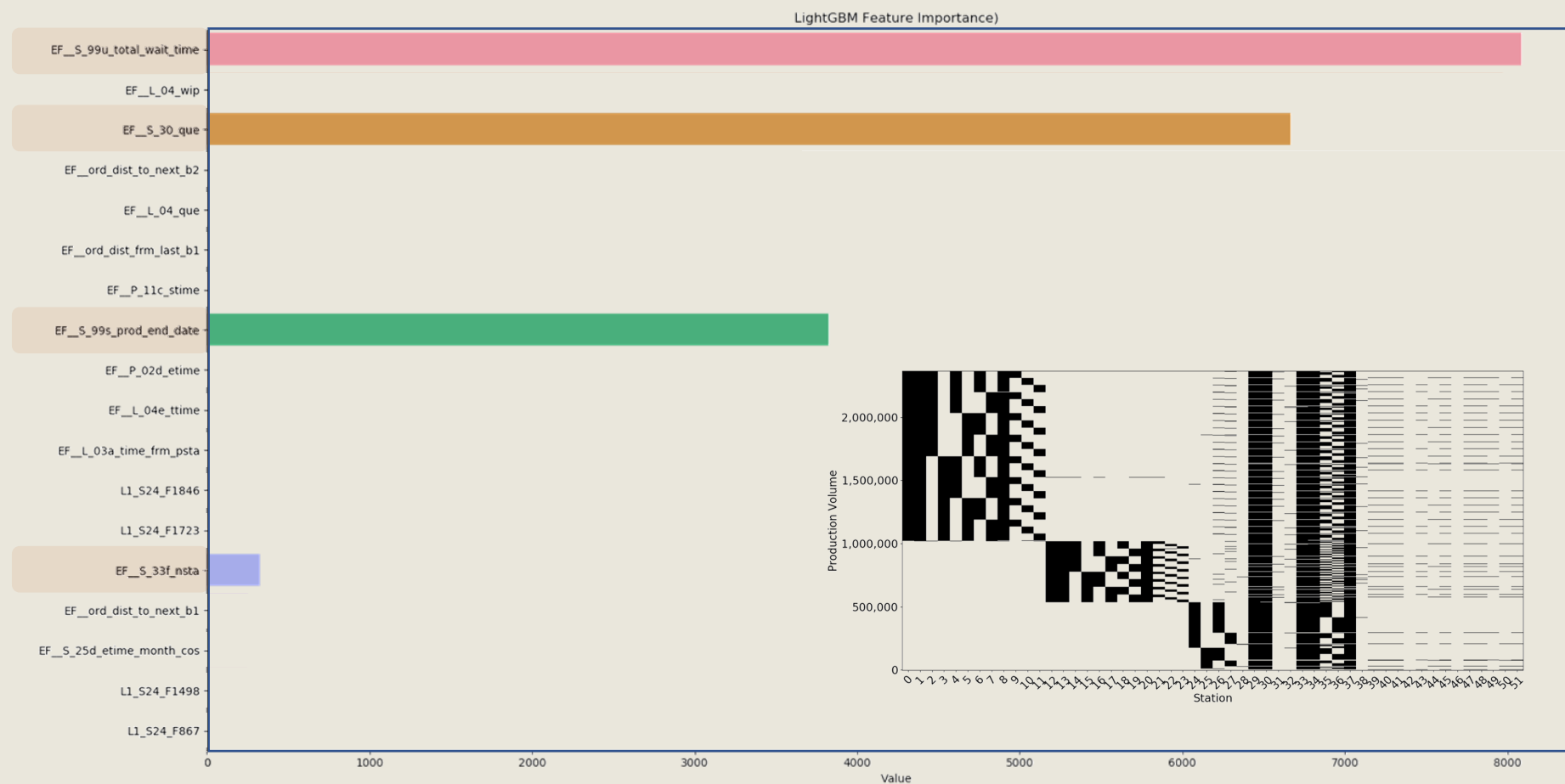
# Lines

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# Stations

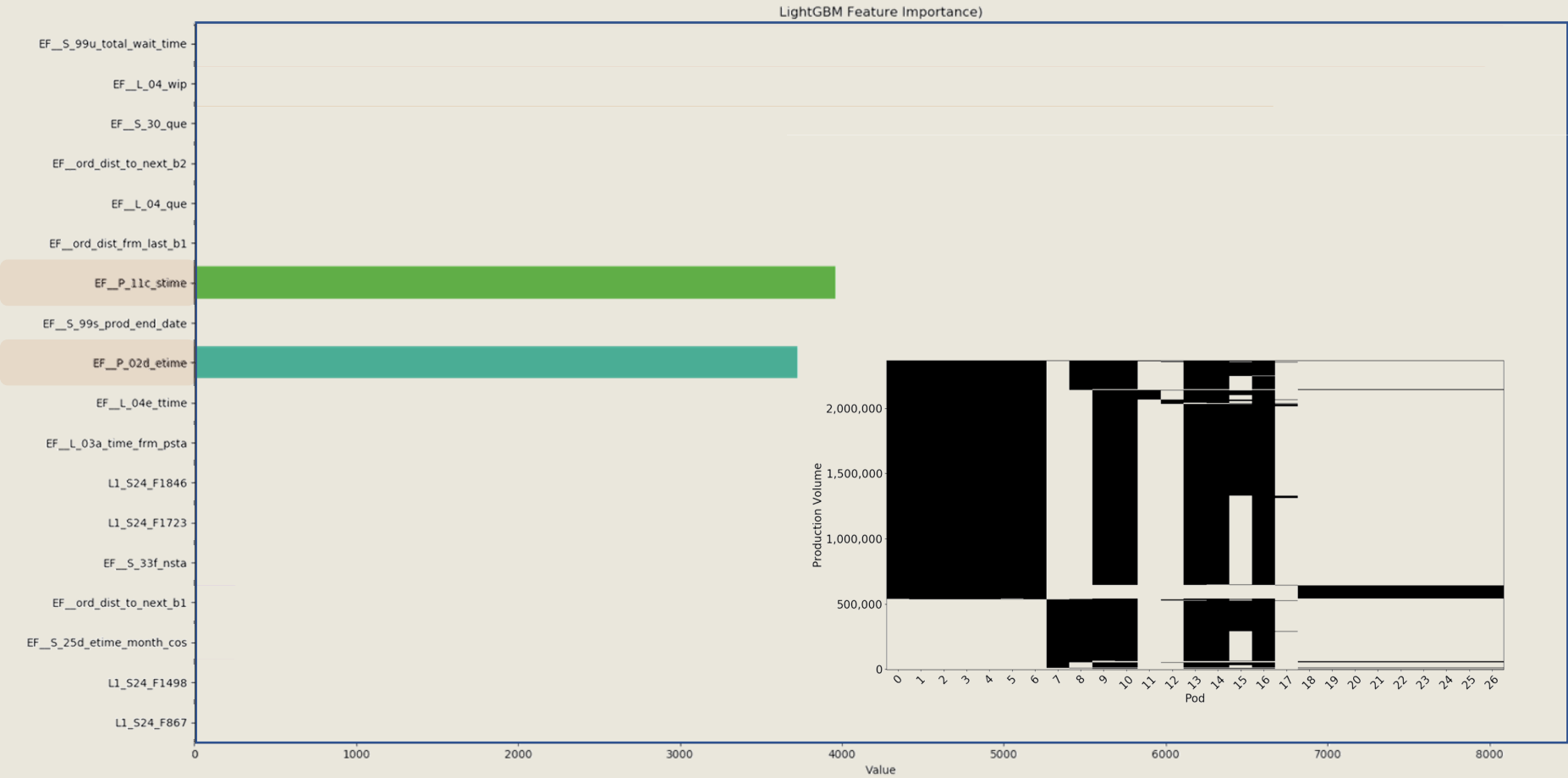
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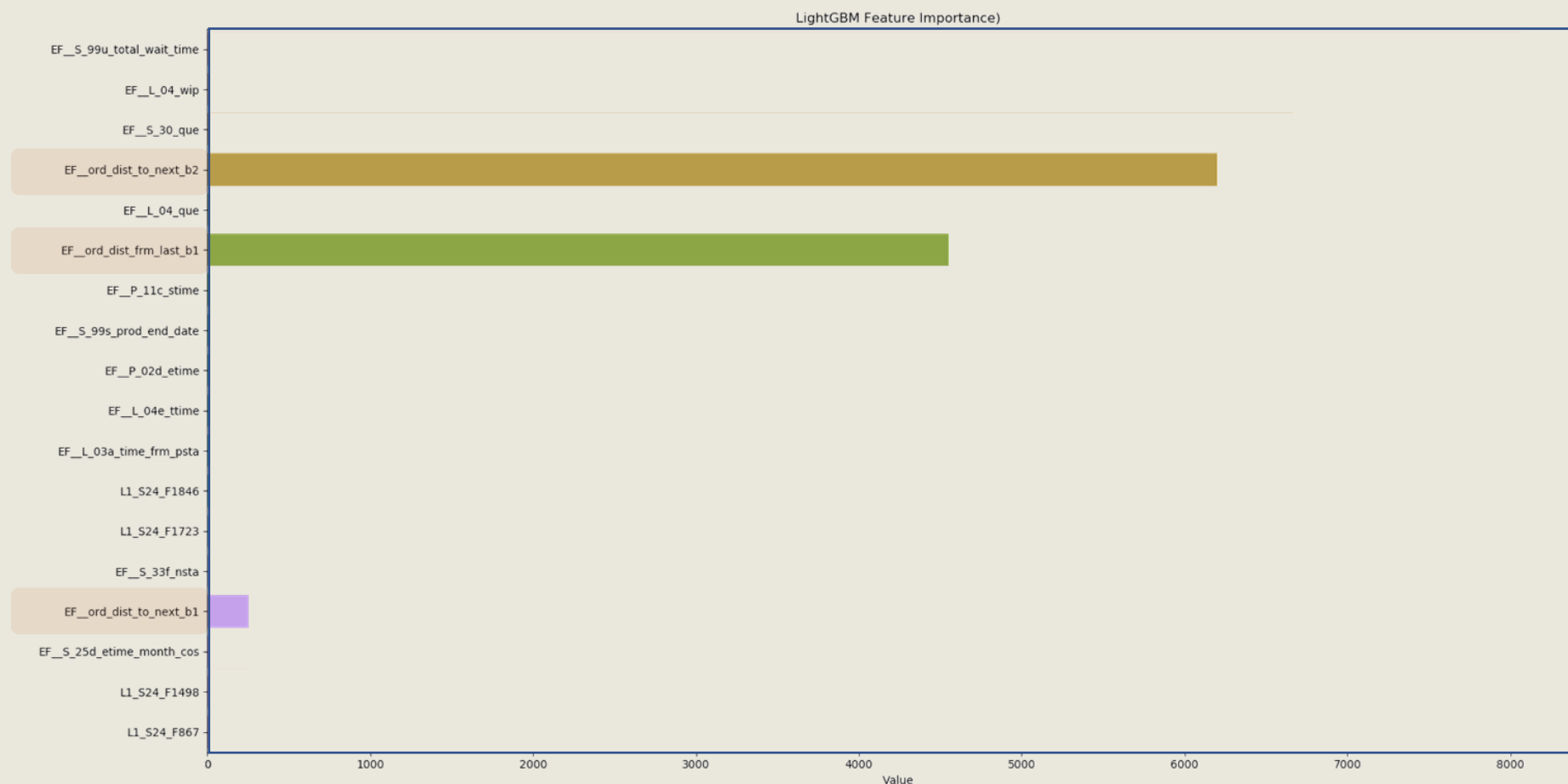


# Pods

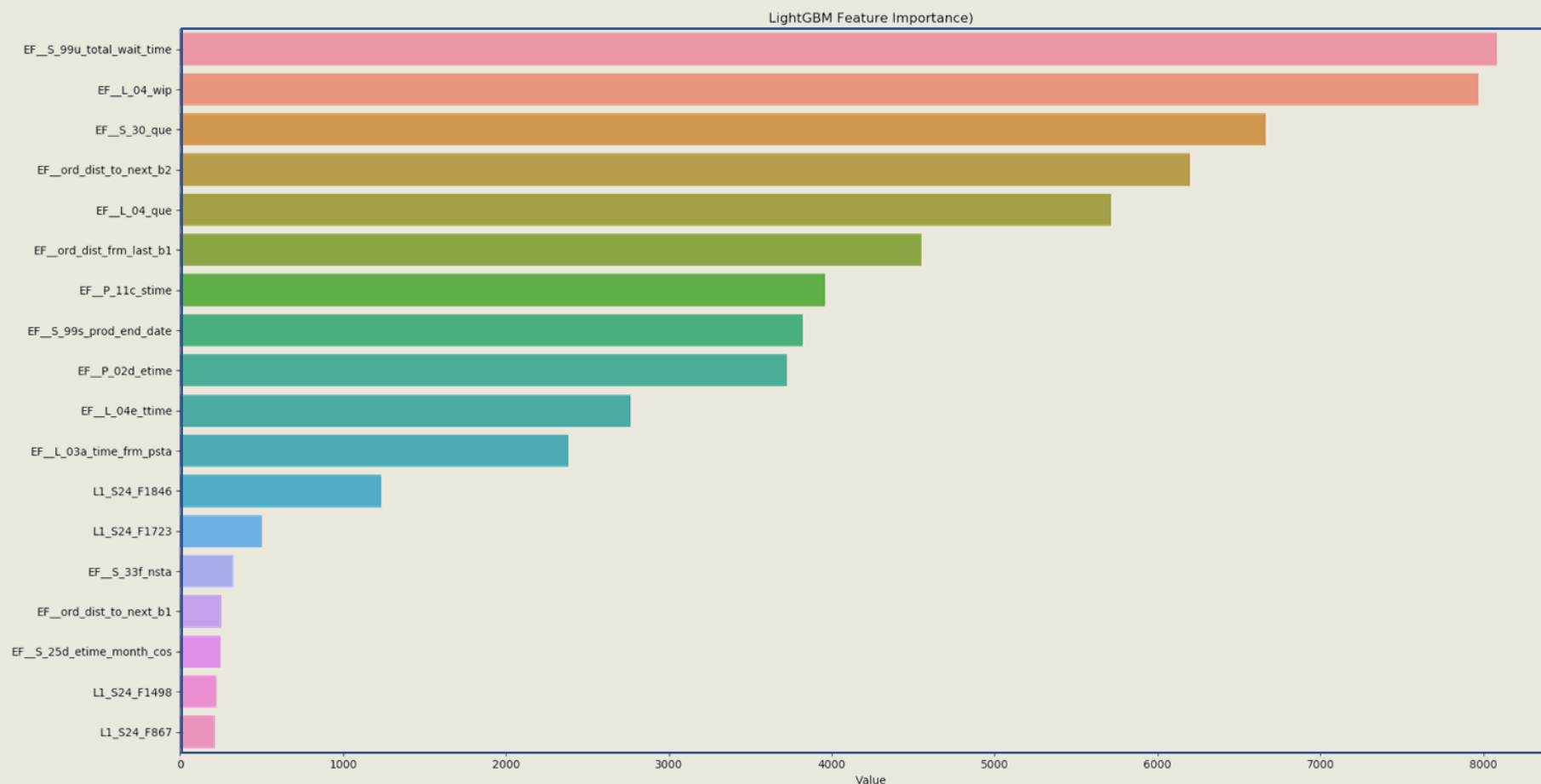
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# Production sequence

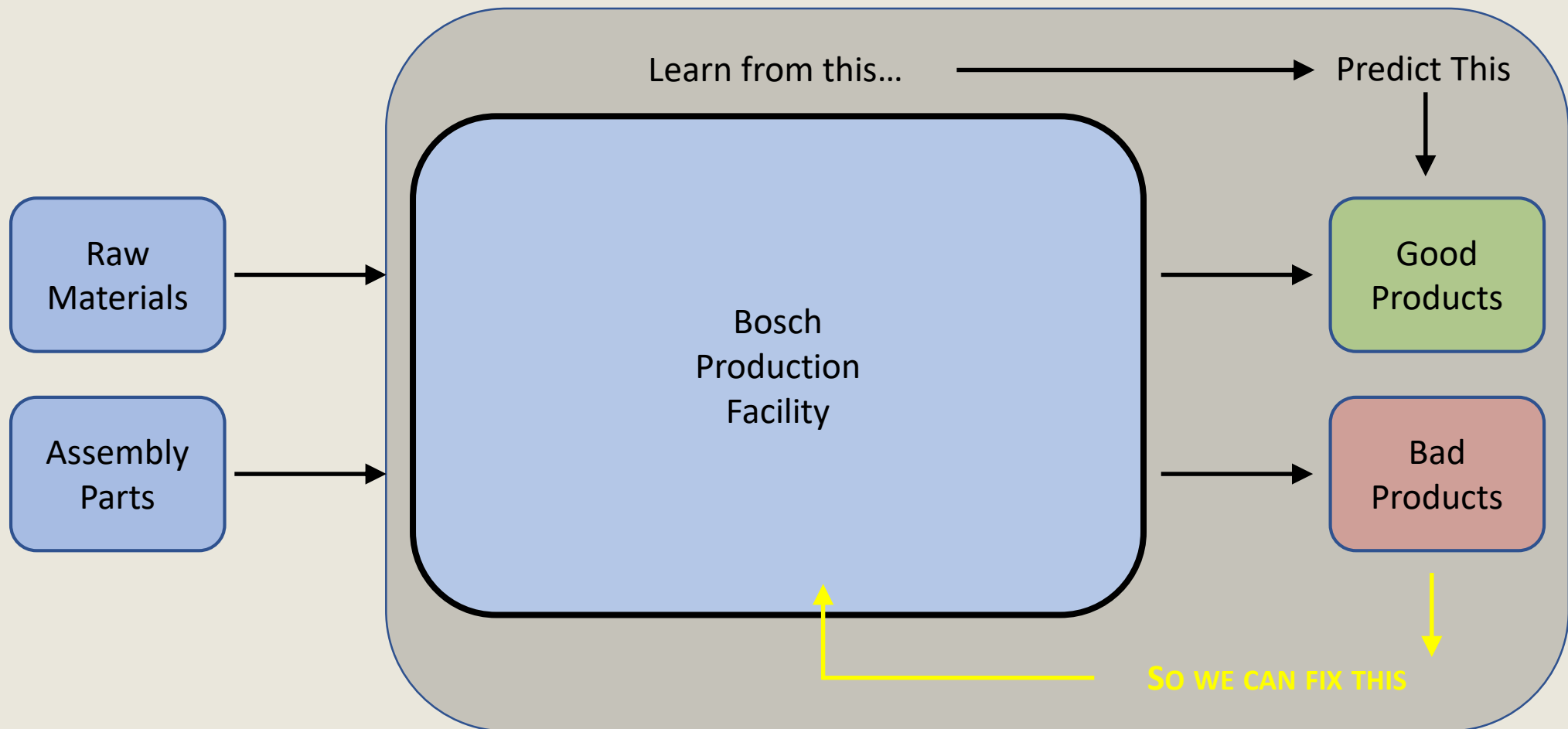


# How it works and why you care



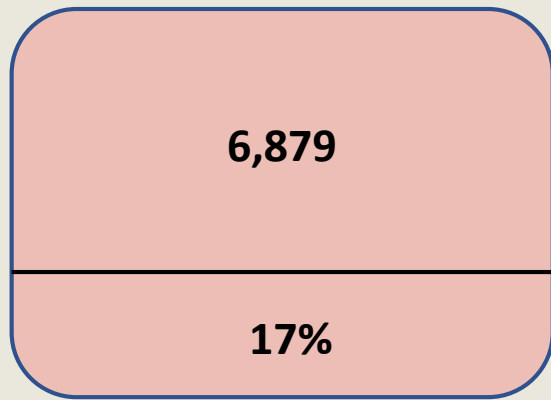
# Eliminate Failures

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# What now...

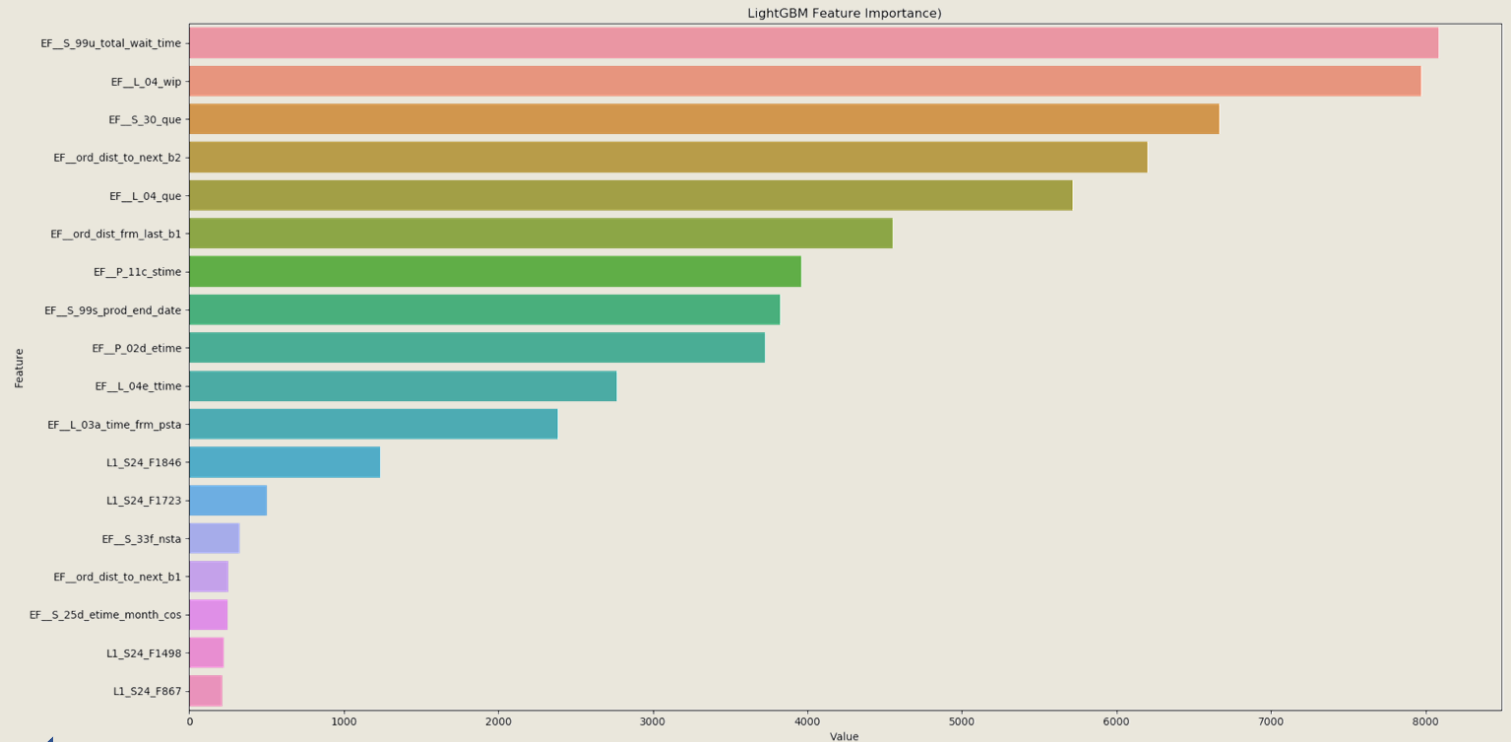
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## Cost / Benefit Analysis Required

1,174 Bad products predicted

35 Good products identified as bad



# Eliminate Failures

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## Questions and Answers