# CAD/CAM, augmented
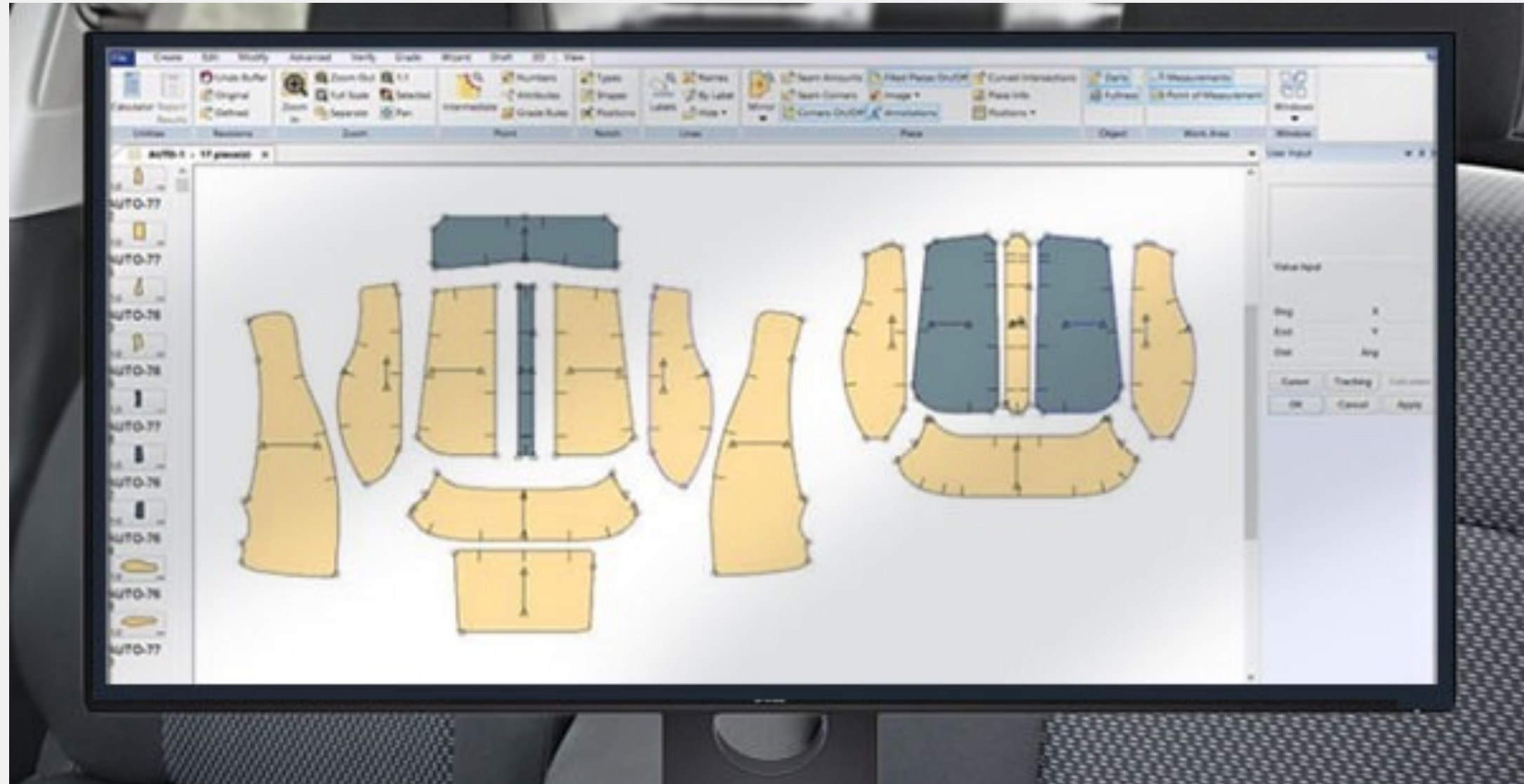
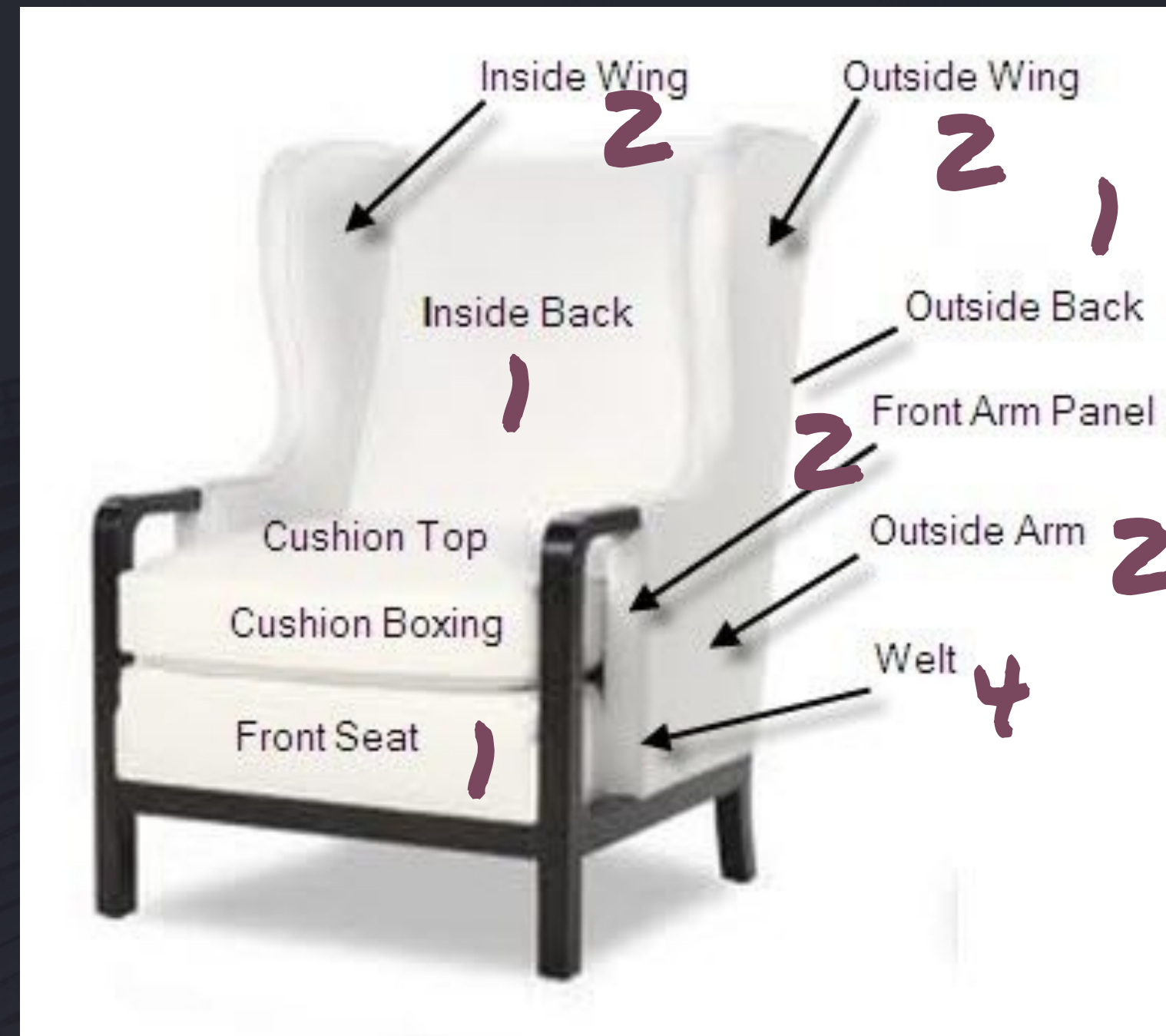Machine Learning for Furniture Product Development

# Custom design requires flexible and adaptable software.

# Bio

Taylor Hale Robert

- Data Scientist
- 6 years experience developing products requiring CAD/CAM cutting
- interested in applications of AI in product development for reliability, speed and freedom



```
SAMPLE_FORMULA = { 'OUTSIDE_WING' : 2 ,
                   'INSIDE_WING' : 2 ,
                   'WELT' : 4 ,....... }
```

# OVERVIEW

### DATA SOURCING

Current State
About the ETL process
Feature Engineering

### ANALYSIS + MODELING

Observations + Insights
Level I Modeling
Level II Modeling
Data flow + Algorithm Design

### BENEFITS

For Customer Segments
For LECTRA

# Current State

LECTRA automatic order processing is an end-to-end solution now, and adding an AI algorithm to the cloud can bolster support for more complex or custom designs and support a wider range of customers.
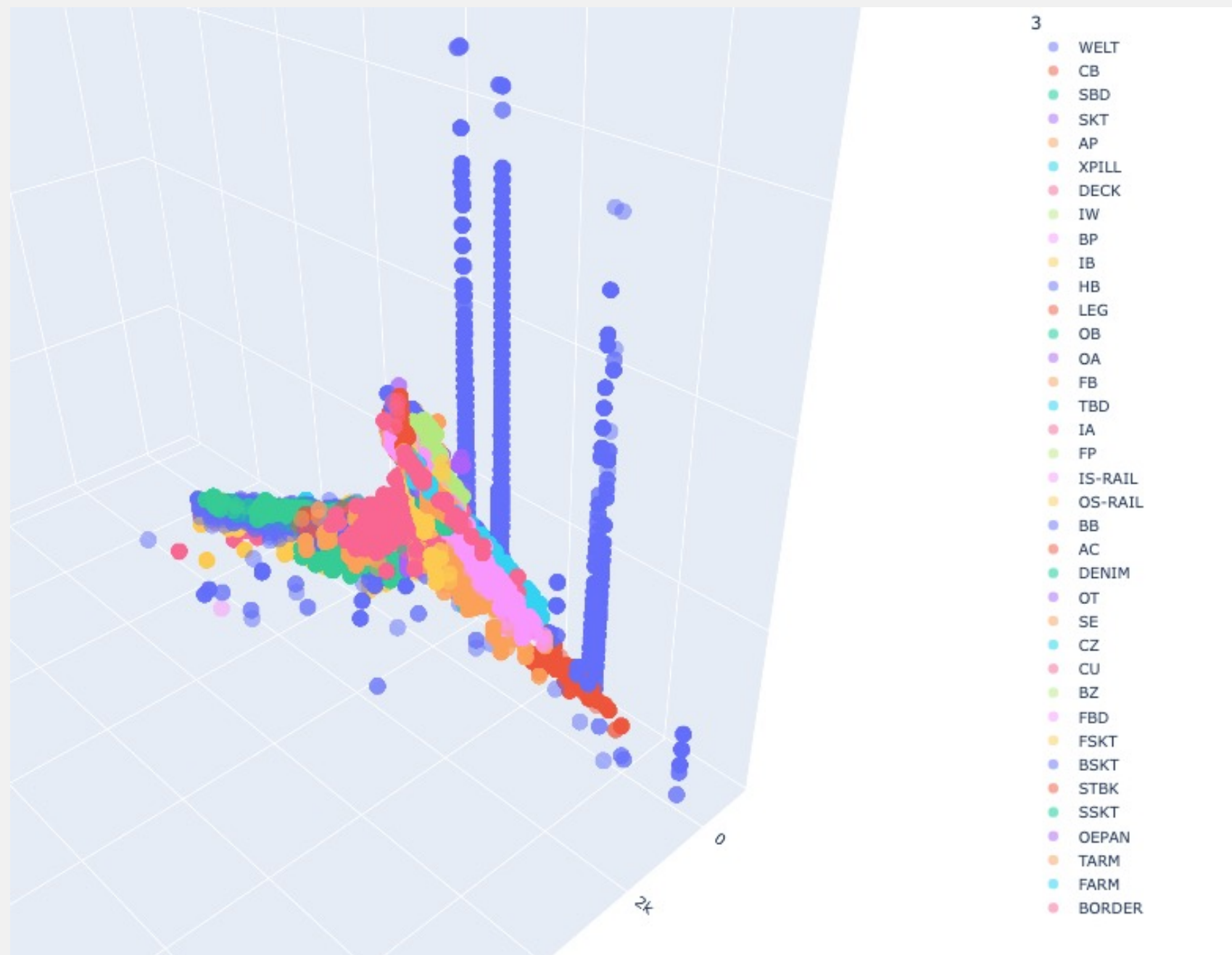
# Data

- 2 furniture manufacturers
- GERBER Accumark Suite
- Collation of standard reports for all storage areas, extracted using a Python script in the command line
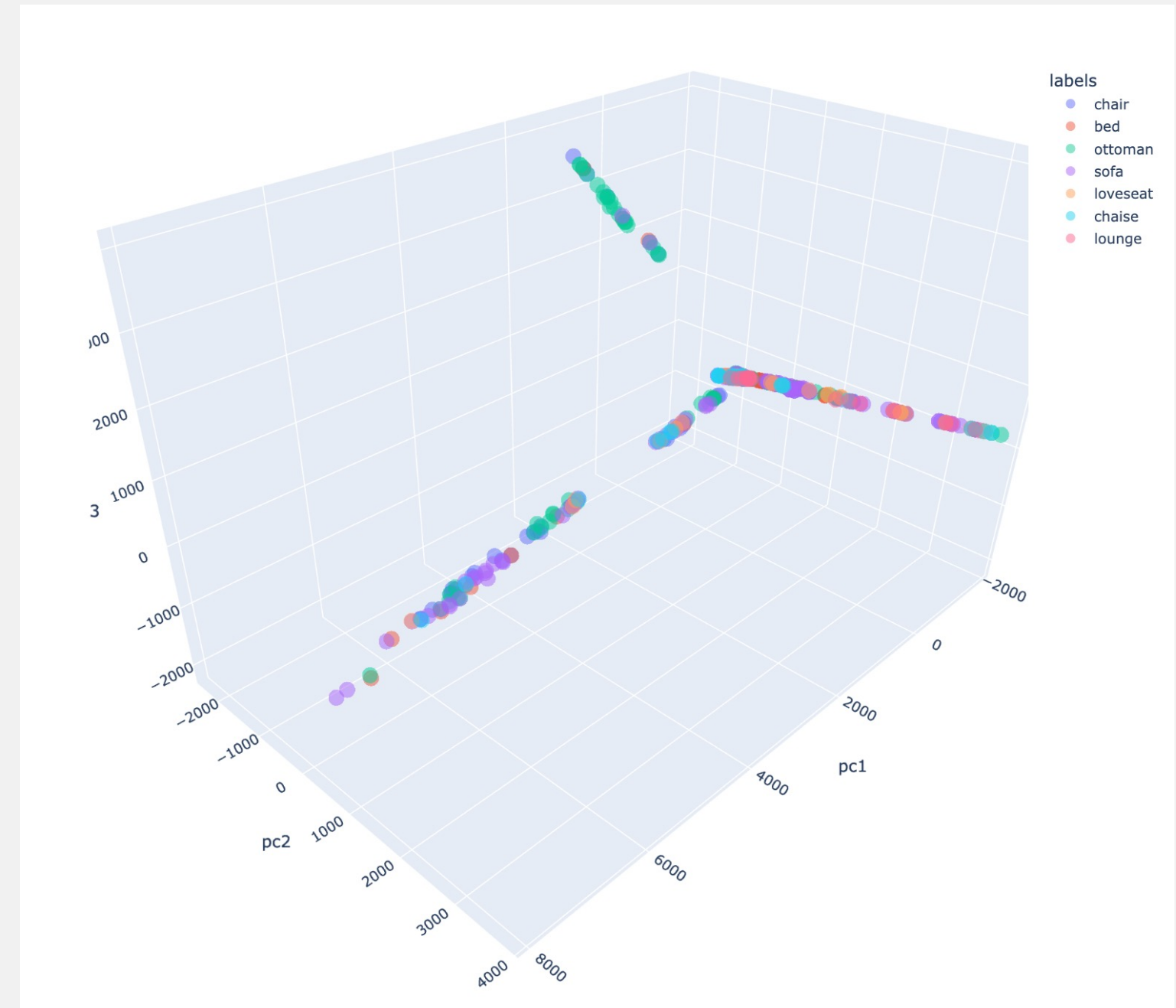- Feature Engineering
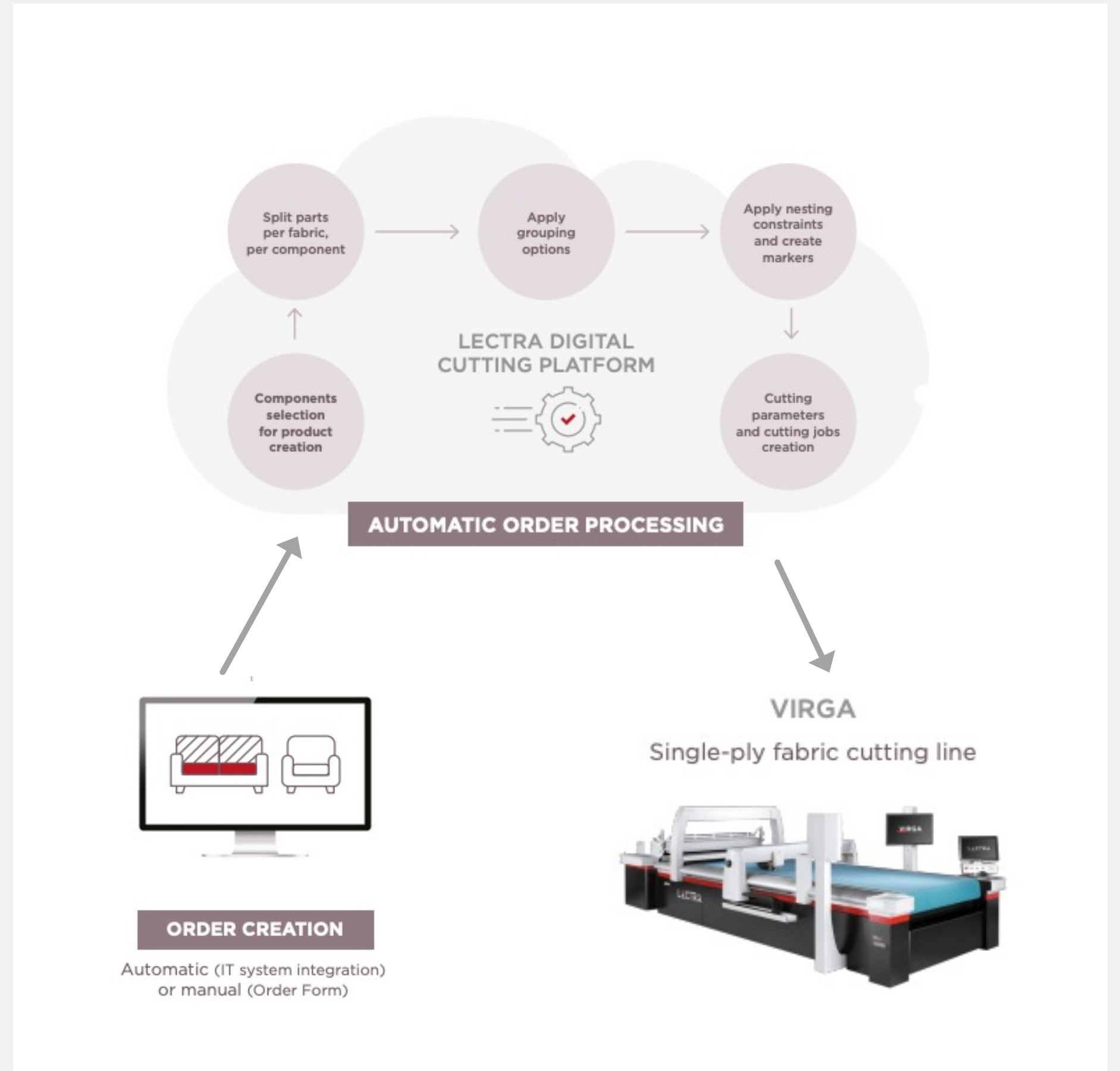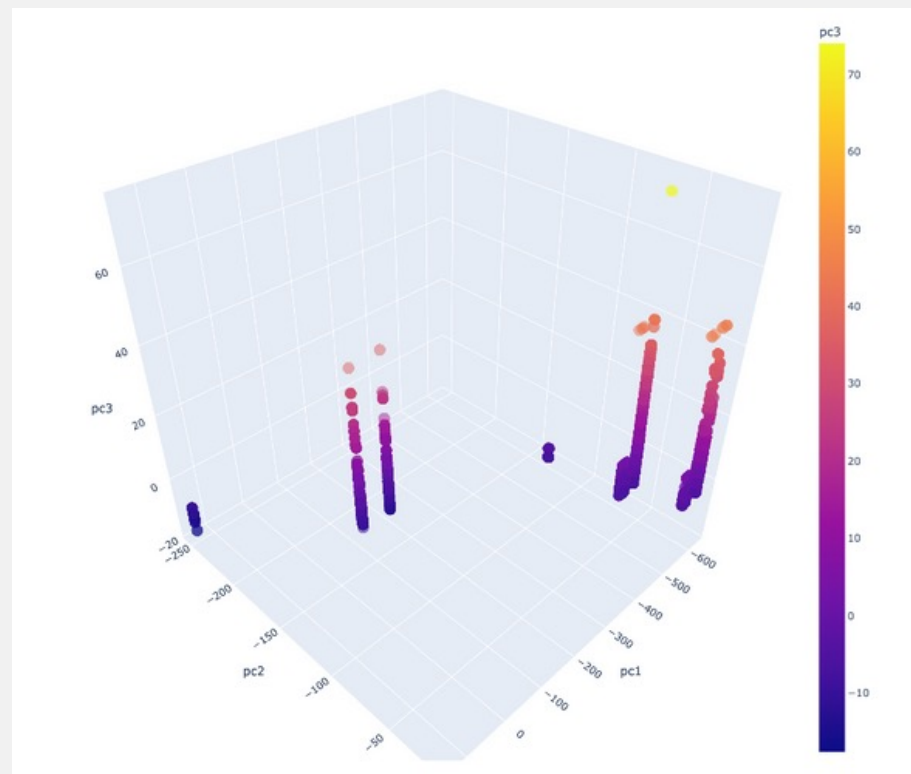
# ANALYSIS & ALGORITHMS

*Observations and Insights*



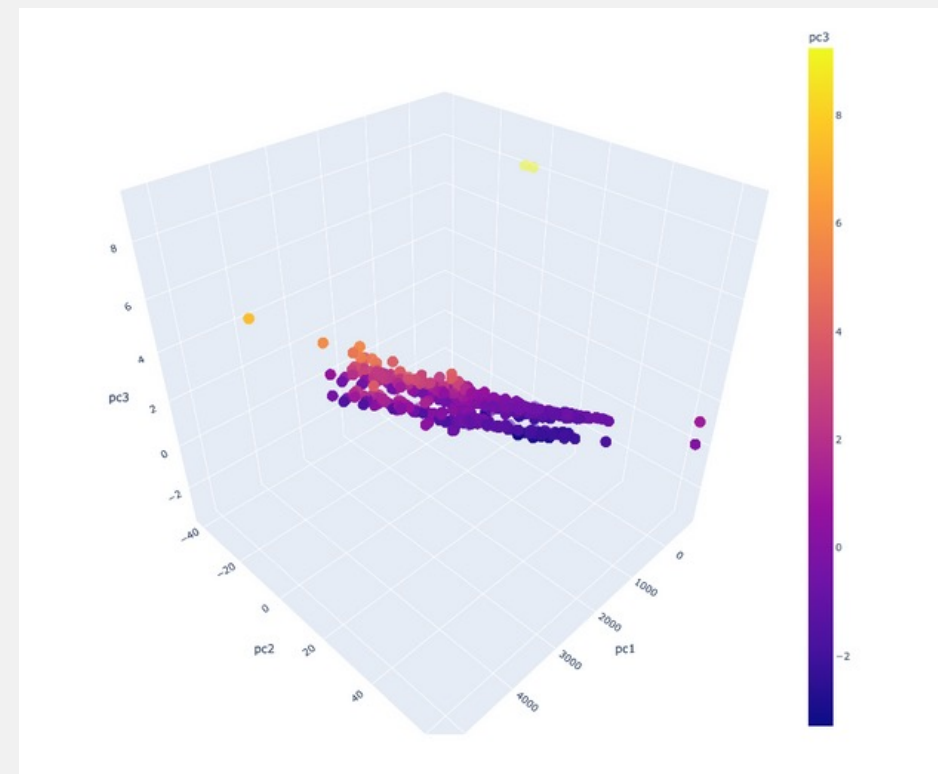PATTERN PIECE CLUSTERS

FURNITURE OBJECT TYPES

# ANALYSIS & ALGORITHMS

*Multi-Level Modeling*



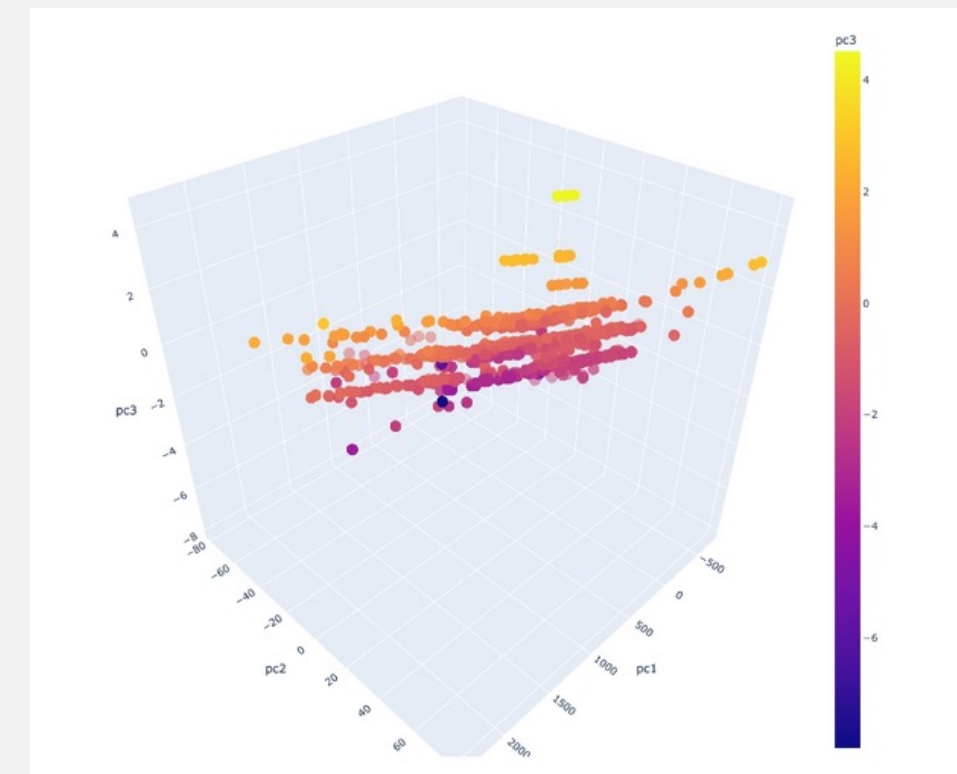## LEVEL I MODELING

*Accuracy of 99.3% on test data.*

KNearestNeighbors and Gradient
Boosting models performed incredibly
well across all cross-validation folds.

## LEVEL II MODELING

*Accuracy of 77.5% on test data.*

Gradient Boosting models performed
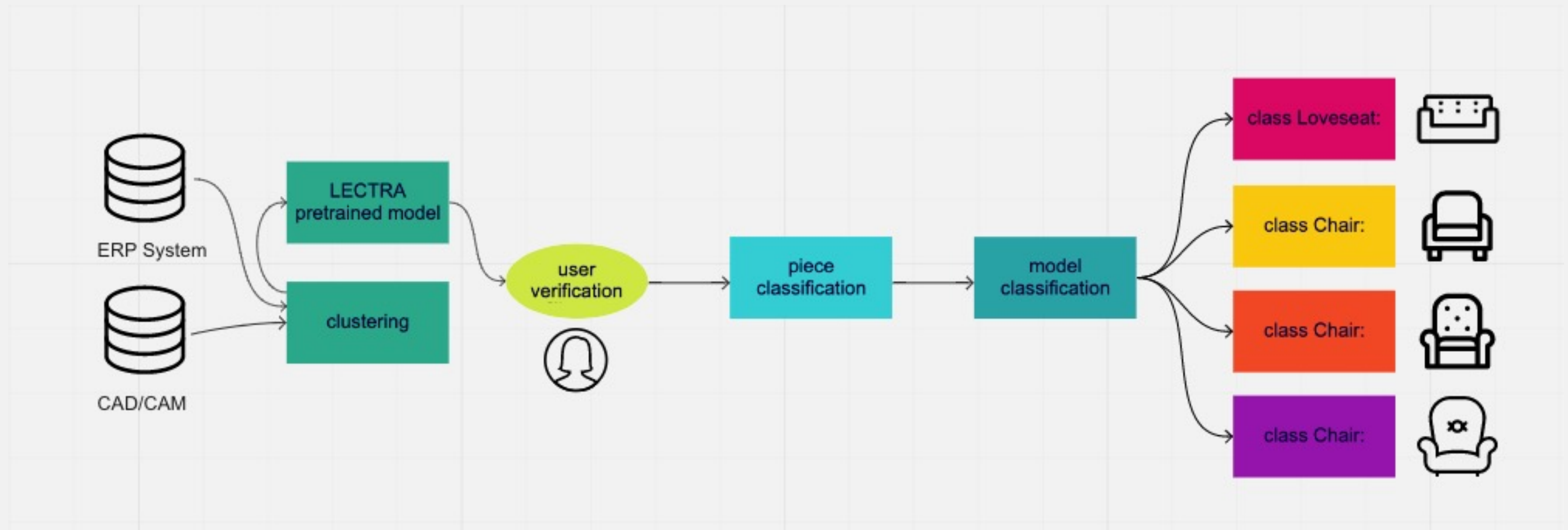this classification most successfully.

## NOTE

*Adding image or vector processing
could assist Level II model
performance.*

# ANALYSIS & ALGORITHMS

*Data Flow and Algorithm Design*
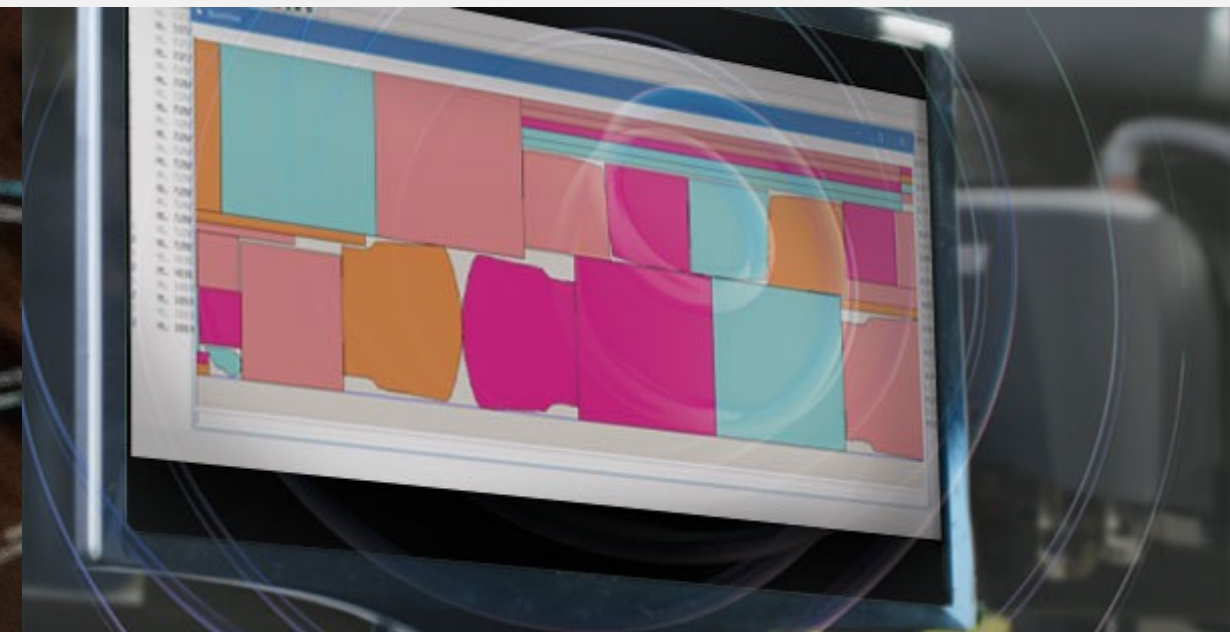
# BENEFITS



## OVERHEAD REDUCTION

*Invest elsewhere.*

A reduction in time to develop physical
and digital patterns manually manifests
as a decrease in overhead.

## INCREASED SPEED

*Limit time to production.*

Automating manual processes makes
them faster and more reliable.

## LONGEVITY

*Built to learn.*

Training computers to perform as much
of the development work as possible.

# Next Steps

## EXPLORE OTHER INDUSTRIES

The presentation today focused on furniture manufacturers, I suggest doing a similar analysis on healthcare, transportation and packaging customers to find avenues for growth.

## TRANSITION FROM LEARNING TO AI

Presentations are communication tools that can be used as demonstrations, lectures, speeches, and more.

## EXTEND MODELING TO INCLUDE IMAGES

Presentations are communication tools that can be used as demonstrations, lectures, speeches, and more.

# Summary

## LECTRA IS ICONIC

LECTRA is a pioneer in providing intelligent and connected solutions in automated cutting operations.
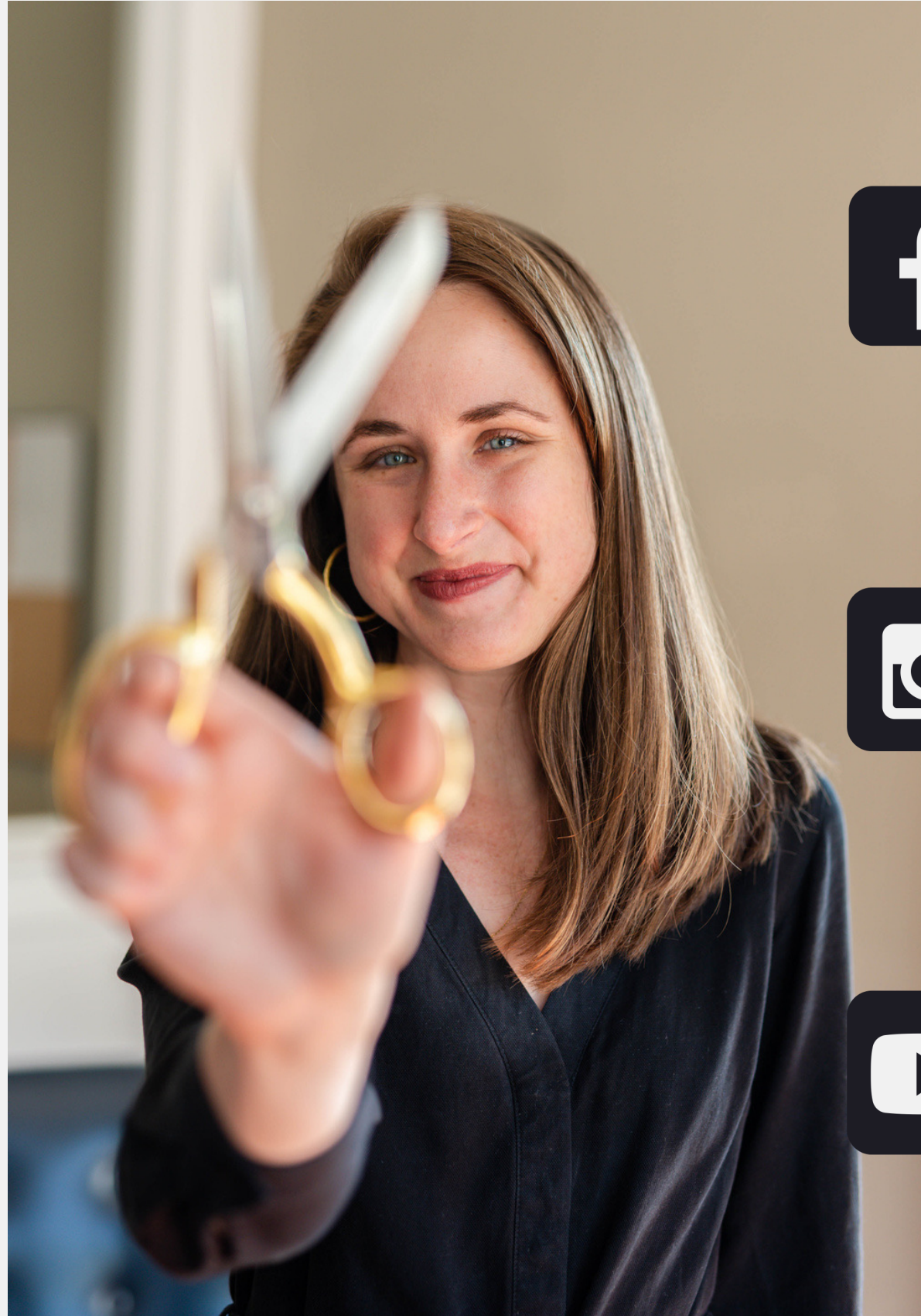
## PRODUCTS FOLLOW PATTERNS

Using tree and clustering algorithms, we can identify and represent patterns evident in CAD/CAM data.

## LEARNING AND PRODUCTIONISING PATTERNS WILL SIGNIFICANTLY BENEFIT LECTRA AND CUSTOMERS

Learned patterns in CAD/CAM data can be translated and deployed as custom production formulas, increasing efficiency and flexibility in development processes.
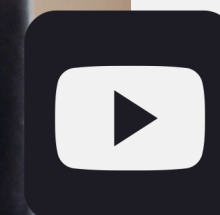
# LEARN MORE

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MACHINE LEARNING FOR
PRODUCT DEVELOPMENT