



Case Study - Enhancing Supply Chain Intelligence with Synthetic Data

1. Executive Summary

Customer: Engineering Partner-BIMCON for a Tier-1 North American Automotive OEM

Industry: Automotive Manufacturing

Challenge: The OEM's vehicle order-bank data lacked the scale, diversity, and rule compliance needed for advanced ML, scenario modeling, and buildability validation.

Solution: Rockfish generated high-fidelity, rule-compliant synthetic vehicle orders that preserve real-world statistical structure while enabling scalable analysis and model development.

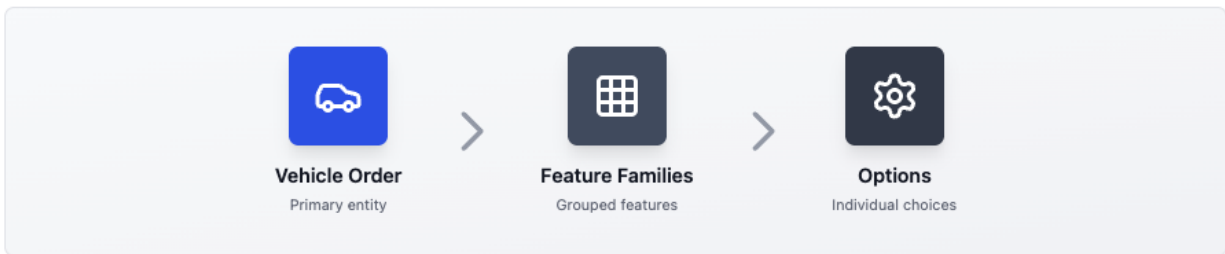
Results:

- Synthetic dataset expanded **5×** while maintaining key feature distributions
- **Large buildable order set** identified and reproduced synthetically
- Full engineering, regulatory, and marketing rule enforcement
- Unlocks ML development, forecasting, and secure multi-party data sharing

2. Customer Background

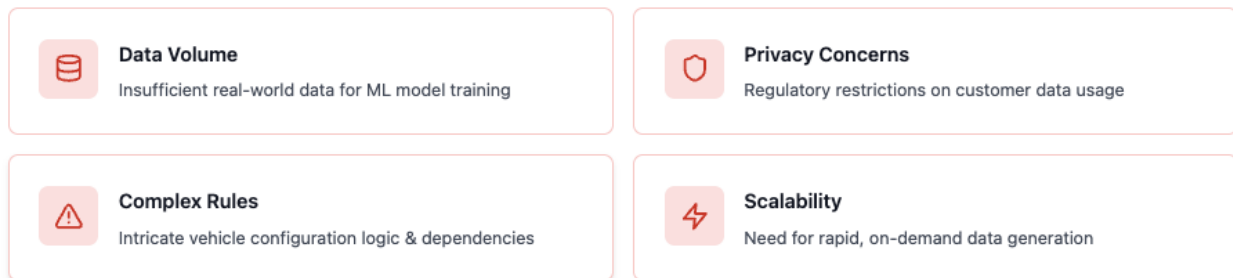
The customer manages a highly configurable vehicle lineup where each order consists of a unique identifier and a combination of features (interior, exterior, seating, wheels, colors, technology, etc.) that define the product. Features belong to Feature families and must obey strict engineering and regulatory constraints, including certain inclusion/exclusion rules

and package-level configurations.



BIMCON engaged Rockfish to provide scalable, privacy-preserving synthetic order-bank data that can support analytics, ML experimentation, buildability checks, and cross-team collaboration without exposing sensitive production data.

3. The Challenge



Business Challenges

- Limited quantity and variability in available order data, restricting ML model development and forecasting accuracy
- Slow, costly, and operationally time-consuming real-world data collection
- Privacy constraints preventing vendor or supplier collaboration
- validation of buildable configurations aligned to marketing projections

Data & Technical Challenges

- Complex feature families requiring one feature-per-family enforcement
- Vast number of rules across regulatory, engineering, and marketing domains
- A “black-box” environment used to generate plausible configurations that honor all constraints – lack of a clear and complete rule set
- No scalable mechanism to simulate future scenarios or package variations

Quantified Pain Points

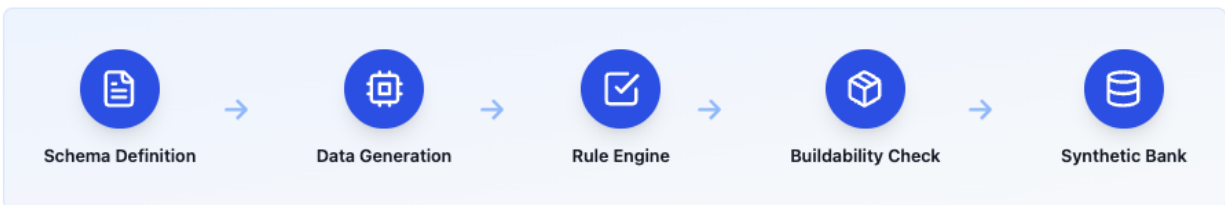
- Engineering teams spent substantial manual effort validating constraints
- Rare combinations could not be reliably modeled or forecasted from real data

4. The Solution

Rockfish provided an end-to-end synthetic data solution to generate scalable, rule-compliant vehicle configurations with comprehensive buildability analysis.

Approach Overview

Using the OEM's feature schema, Rockfish generated synthetic orders that maintained original take rates and correlations while enforcing all applicable constraints. The system produced a buildable-only synthetic order bank suitable for ML training, planning, and experimentation.



Key Capabilities Delivered

- **Schema-based synthetic generation** for thousands of feature families
- **Cluster-based modeling** to enhance accuracy and diversity
- **Automated constraint enforcement**, including inclusion/exclusion and regulatory rules
- **Package-level alignment** for multiple trim or configuration groups
- **Buildability Analyzer** to classify hundreds of thousands of orders at scale
- **Synthetic buildable order bank** that matches original feature take rates

Implementation Highlights

- Generated synthetic orders preserving original distributions
- Applied engineering and regulatory rules to ensure valid configurations
- Aligned synthetic orders to defined configuration packages
- Evaluated full order bank for buildability and produced a synthetic version

5. Results & Impact

Quantitative Outcomes

Outcome	Value
Orders evaluated	~290K
Buildable configurations	~157K
Non-buildable configurations	~132K
Synthetic buildable dataset	~157K valid orders
Scale achieved	5× larger dataset than original
Fidelity	Feature-family take rates closely matched

Business & Technical Impact

- Eliminated dependence on expensive real-world data collection
- Enabled data at scale to support scenario modeling, demand simulation, and constraint validation
- Provided privacy-preserving data for engineering partner collaboration
- Simplified analysis of rare features, hypothetical features, and end-of-life transitions

6. Key Success Factors

- Clear rule templates enabling automated constraint enforcement
- Collaborative iteration between the OEM's engineering partner and Rockfish
- High-fidelity modeling using cluster-based generation
- Scalable buildability analysis applied to a large configuration space

7. Customer Quote

“Rockfish allowed us to effectively validate configurations, explore new scenarios, and generate high-quality synthetic order data—all while respecting strict engineering and

regulatory constraints and advance the artificial intelligence capabilities for a global automotive OEM."

Krishna Murthy

President & CEO, BIMCON