How Vnomics built a “digital twin” for commercial trucking that led to $160M (and counting) in fuel savings

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Today’s Topics

Targeting Business Value
  avoiding false opportunity

Bringing in the Technology
  but only after the data proves itself

Making it Real
  just in time feedback & control
Targeting Business Value

(IIOT ROI)

Capture value by employing the means to optimize significant operational expenses
Fuel Expense In Commercial Trucking

Fun facts to appreciate the scale...

~ $50K in diesel per year

~ $160B in diesel per year

One of these per 100 People

In the USA

This is a massive optimization opportunity!
~ $130K in Annual Expense per Asset

A quick story about a false start...

LET'S ATTACK THIS BEAST...

ATRI $1.60 CPM @ ~80K mi per year
Introducing the Digital Twin

What is a Digital Twin

A **Digital Twin** - is a *model* that tracks the *chosen characteristics* (e.g. fuel use) of a physical asset that you would like to have more *visibility* into and *control* over to *optimize* its *performance*.

**Key Insights provided by the Twin**

- Am I being operated efficiently?
- Is my performance trend increasing or decreasing?
- Am I performing consistent with my class?
Bring in the Technology
but only after the data proves itself...

Spend time digging into the data to be sure you have the visibility and sufficient means to control and optimize your target e.g. Fuel Use

Domain expertise and good data clarity trumps sophisticated algorithms or at least plays the role of prerequisites.

Demonstrate understanding before you implement and scale. Implementation is hard work. Prove it will be worth it.
Data sources that determine fuel economy

- Load (tonnage)
- Environment
- Tractor Configuration (engine & drivetrain)
- Driving Behavior
  - Idling
  - Speeding
  - Shifting
  - Acceleration
- Routing
Isolating the Truck’s Potential Fuel Economy

Model “digital twin”

What could be happening?

Digital Twin Insight & Feedback
- Learn each tractor’s fuel map
- Tractor type dictates the fuel map shape
- Driver, environment and load dictate where on the map the tractor operates at any given moment.
- Tracking potential fuel economy - given where you are operating on the fuel map, how close did you come to using the least amount of fuel given the context and what needs to be done to get that benefit? - ans. Provided by Digital Twin

Actual Fuel Use (measured)

5.98 MPG

4.5% of $50K ($2250/year)

Potential Fuel Use (modeled)

6.25 MPG

> $1M per year with 500 Trucks!
A look inside the fuel map

2012 Volvo (4V4NC9EH3CN561661)
- Class 8
- D13 engine
- 6x4 drivetrain
- 425 HP
7.77 MPG (actual)

Wasting Fuel - 6.86% Loss

2012 Volvo (4V4NC9EH3CN561661)
- Class 8
- D13 engine
- 6x4 drivetrain
- 425 HP
9.58 MPG (actual)

Efficient - 0.15% Loss

Wheel Speed (X) vs. RPM (Y) vs. Accelerator Position (Z)
Size of points represents fuel rate
White is efficient & Blue is inefficient (engine control and Acceleration)
Making it Real
(just in time feedback and control)

Put the information in the hands of the people that can affect a positive outcome exactly when they need it and do it in an unobtrusive manner
The System Context

- Optimize operations working with the Model (machines & people)
- Factor in the context (features)
- Provide feedback in real time (timely)
- Analyze specific machine performance and across classes.
- Improve based on learning from historical performance.
In practice - the True Fuel dashboard

Tracking the ROI with the system

Focus on specific Machines & People (outliers)

Quantify the current opportunity and how to claim it.
Today’s Points

Gain the control necessary to optimize the big expenses
Targeting Business Value

Make sure your data is sufficient to control and optimize your target. High signal to noise ratio.
Bringing in the Technology

Providing unobtrusive feedback to people and machines where and when it is needed to affect positive change
Making it Real
Thanks for listening!

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