Your Roadmap to AI-Driven Supply Chain: We Have the Technology

Nathan Eskue
A.I. Architect

Northrop Grumman Innovation Systems

Objectives of this presentation

Learn what AI is and what it means to your company

Discover the two real goals of using AI

Explore possibilities of AI through several interoperable-driven use cases

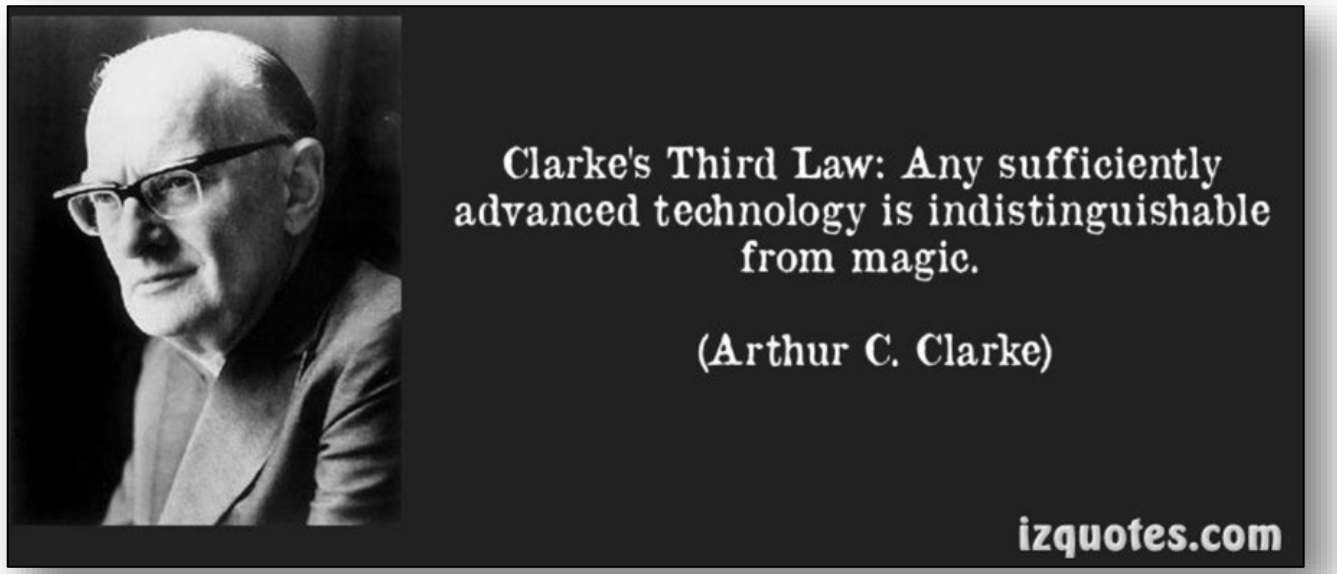
Build your own AI strategy by using this one weird trick (no, this isn't click bait)

Learn how lateral thinking can translate your unique problems into boring (and therefore solvable) AI applications

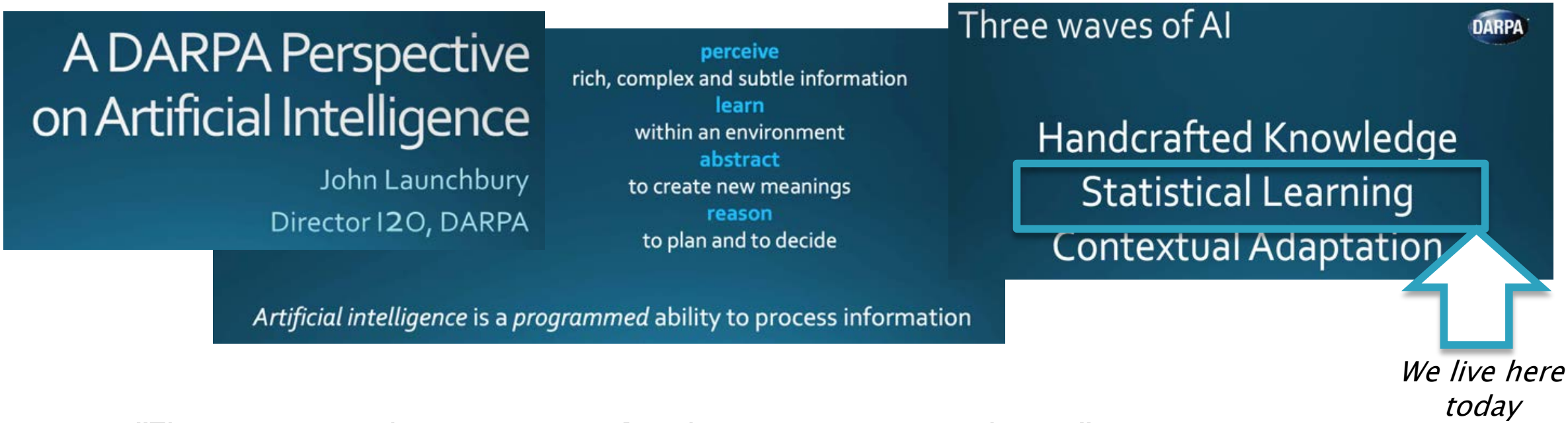
Problem to Solve

Businesses thrive when they can do TWO key things better than their competitors

1. Have omniscient power over the current status
2. Have oracle power when seeing what might happen next



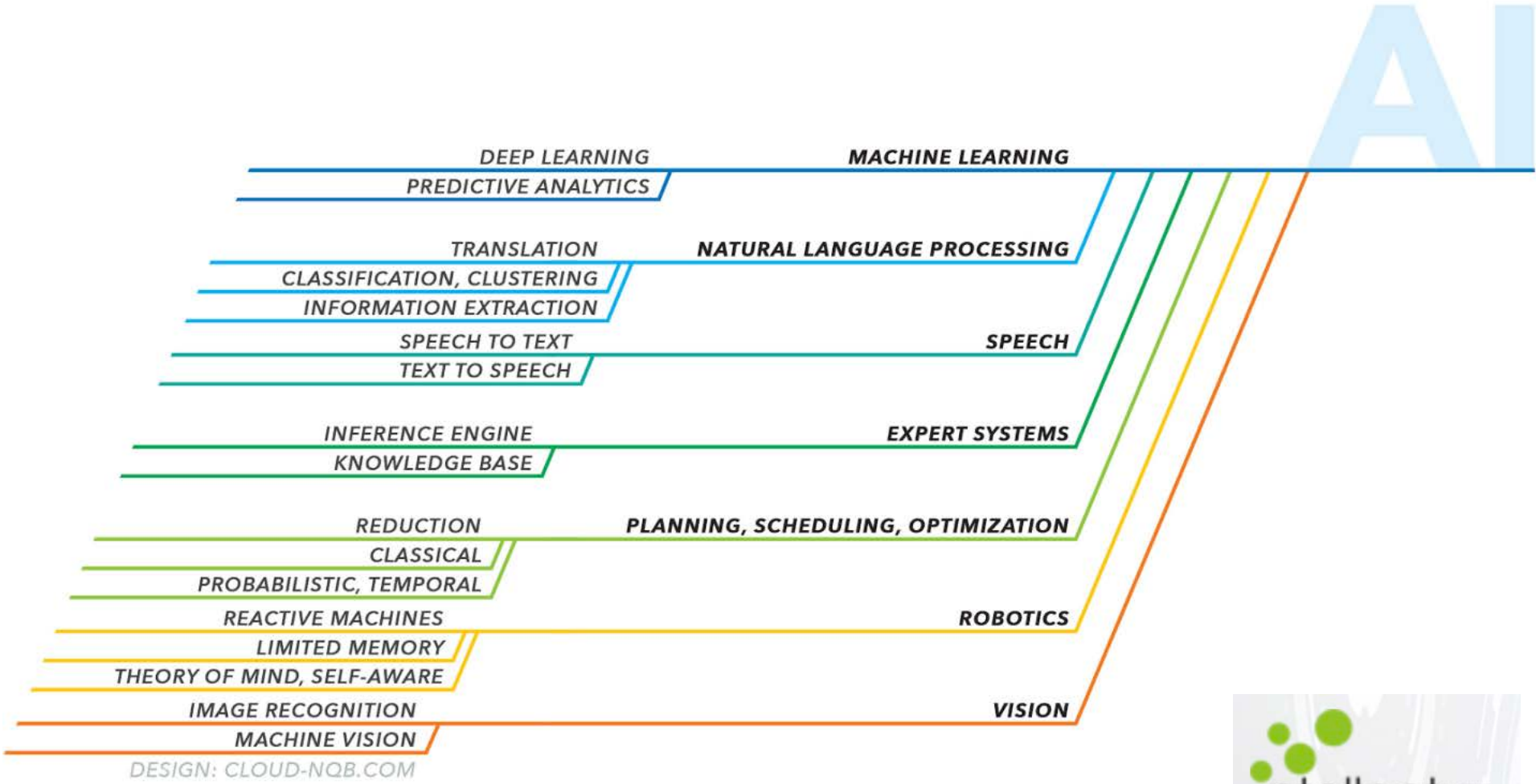
Let's dive into A.I., but first…
What exactly IS A.I.?



"The science and engineering of making intelligent machines."

"The ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings."

Types of Artificial Intelligence



So the A.I. model needs:

- Data (more data allows more advanced AI)
- Ability to process data into information
- Ability to make sense of as many variables as possible, including their relationships
- Ability to improve decision making over time
- Ability to reason why it made a decision, how good that decision was, why it might be wrong, and the consequences if it is wrong

AI can seem god-like if it has enough information and the ability to process it. Is that new?

No A.I., same result:

Two examples from the Caribbean – 500 years apart

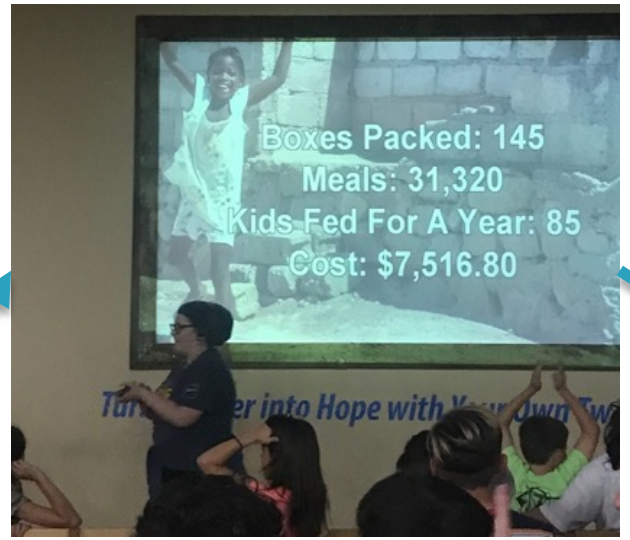
Oracle-like foresight

Omniscience

This is what A.I. does…

Old School Example: I know more than you

And so is this



FEED MY STARVING CHILDREN

Low Tech Example: Process Mastery

Typical Start to the A.I. Journey: The Biggest Challenges

DATA

- Dirty
- Missing
- Not enough

PEOPLE

- You will be accused of witchcraft
- Old habits die hard
- ”That’s too much information! I just want to see a simple summary showing me the status; of which parts? All 20,000 of them of course!”

We learned to—START WITH THIS EXERCISE…

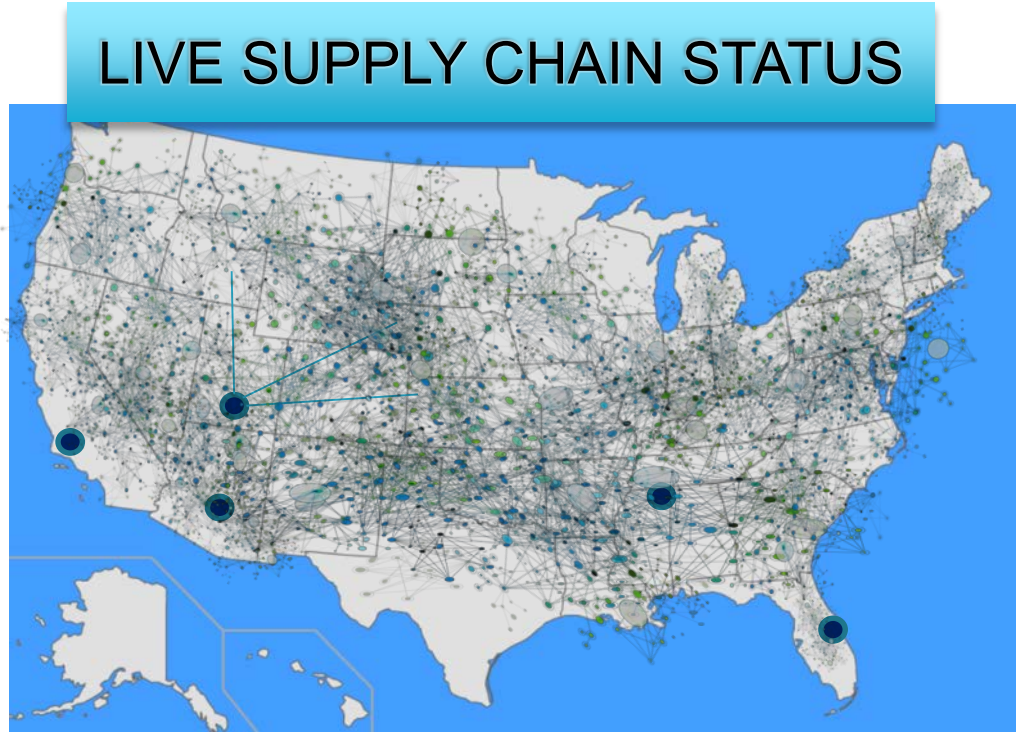
Typical Start to the A.I. Journey: Resetting expectations, finding the path

- Started with high hopes of using ANN's
- "We have the technology… but not the data"
- Thought about what it would take to get a lot of clean data, but also about what problem we were trying to solve
- Realized that a continuous ROI model to A.I. DOES exist if we focus on becoming **Omniscient and Oracle-like**

We learned to—START WITH THIS EXERCISE…

Dream big, then back up to today

Visualize: If you were an **Omniscient Oracle**, how would you run your business?



Use-Cases for AI Strategy

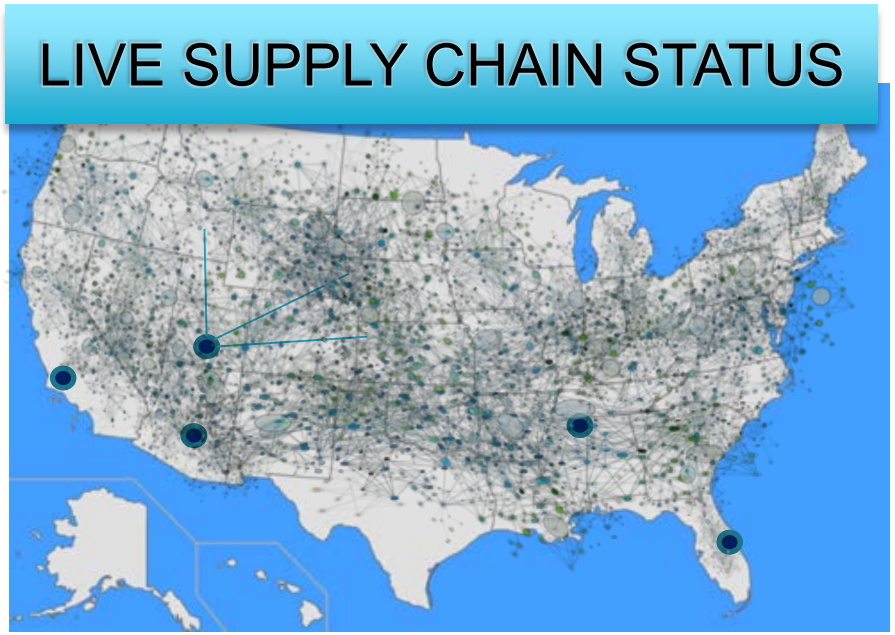
Application: Interactive Analysis

- ”Show me all vendors on the critical path”
- ”Sort group by supplier scorecard, descending”
- ”Search newsfeeds for negative sentiment”
- “Highlight vendors not on critical path but showing schedule risk”
- “Show vendor X. What is most likely causing their schedule slip?”

Natural Language Processing

Information Extraction, Clustering/Classification

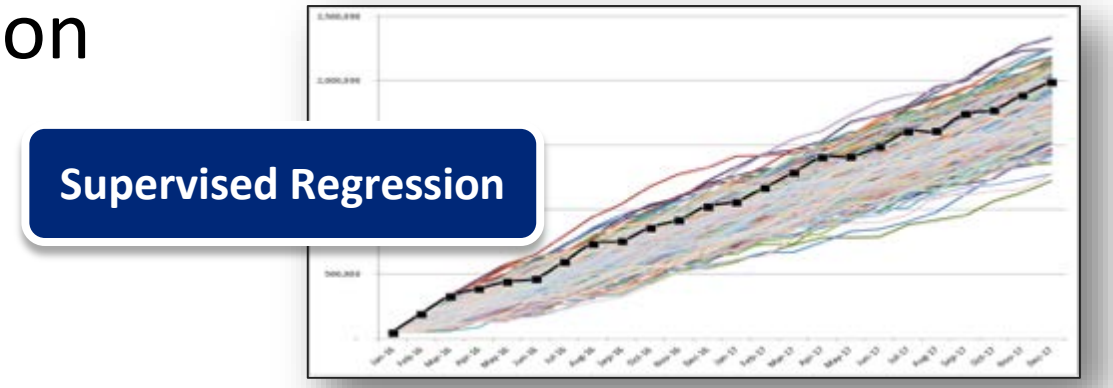
Supervised Regression

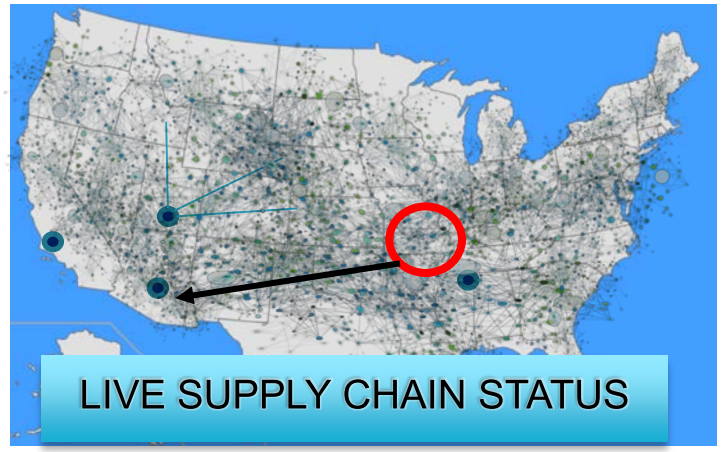


Use-Cases for AI Strategy

Application: Shortest Time to Best Action

1. Forecasted schedule at risk

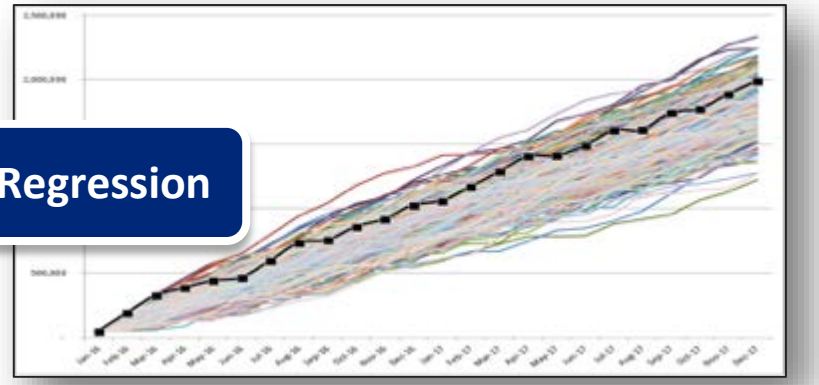




Use-Cases for AI Strategy

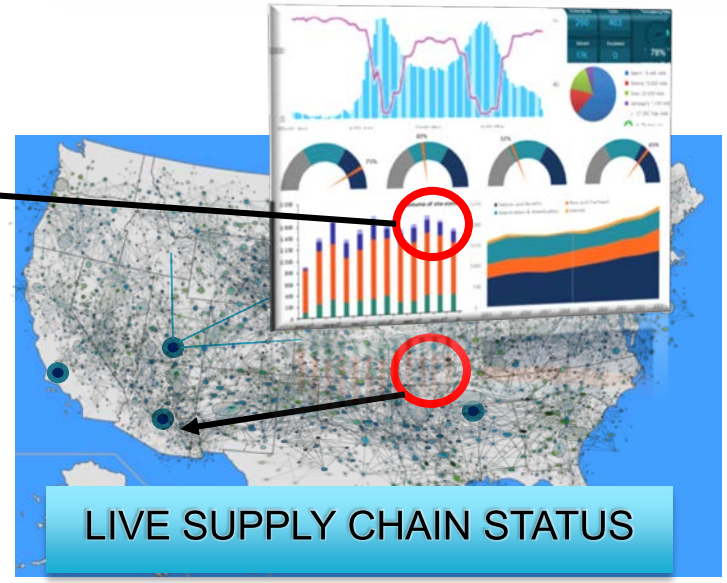
Application: Shortest Time to Best Action

1. Forecasted schedule at risk
2. Highlight concern with data



Supervised Regression

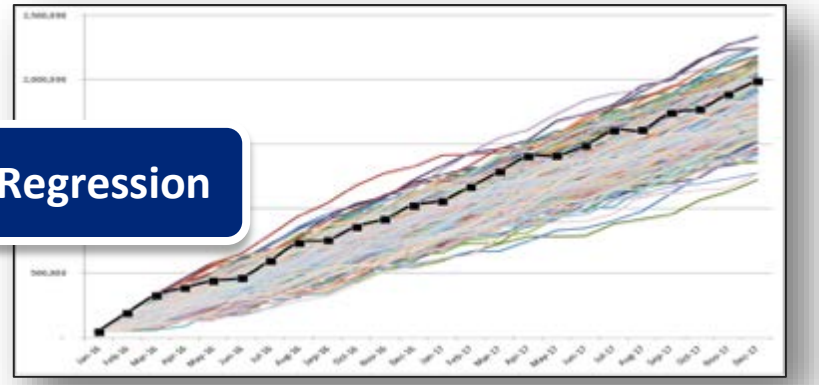
Expert System

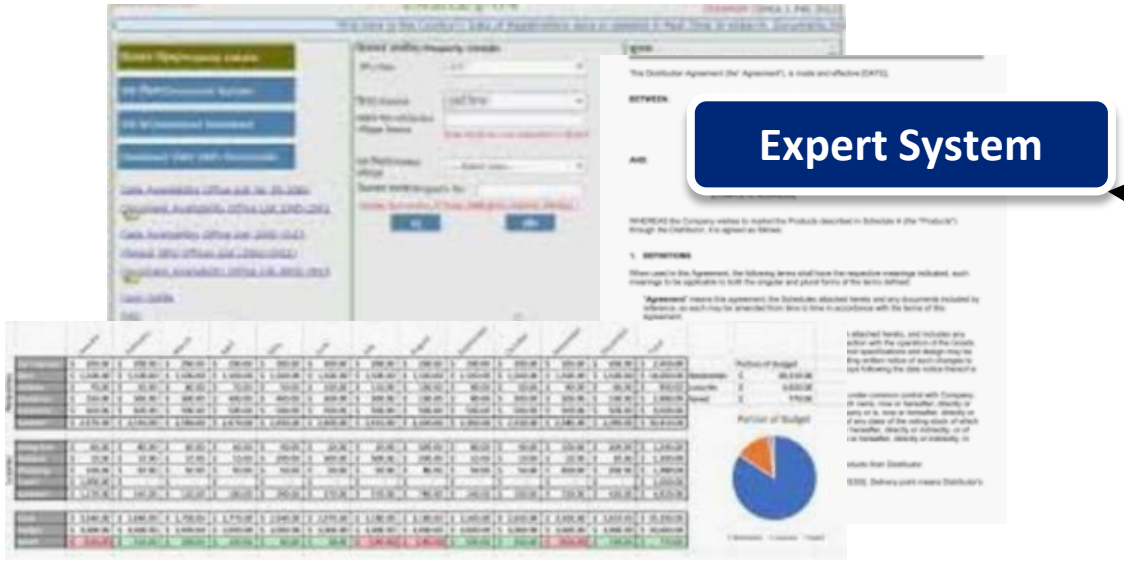


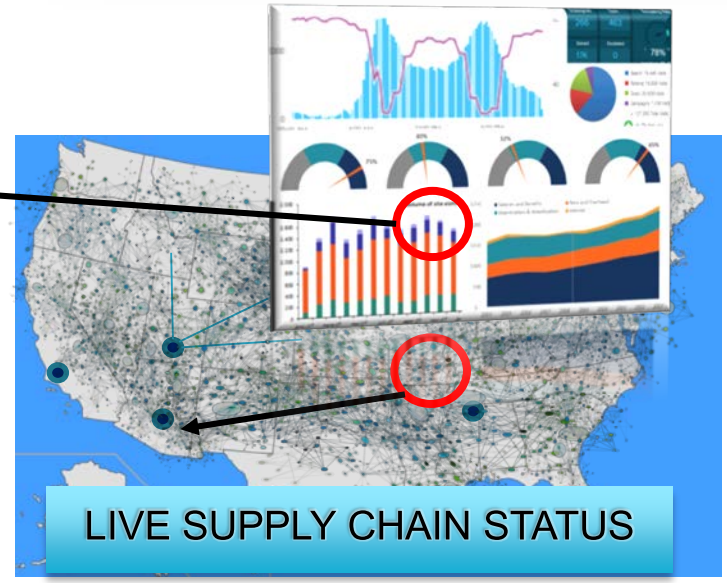
Use-Cases for AI Strategy

Application: Shortest Time to Best Action

1. Forecasted schedule at risk
2. Highlight concern with data
3. Pull context data based on prediction





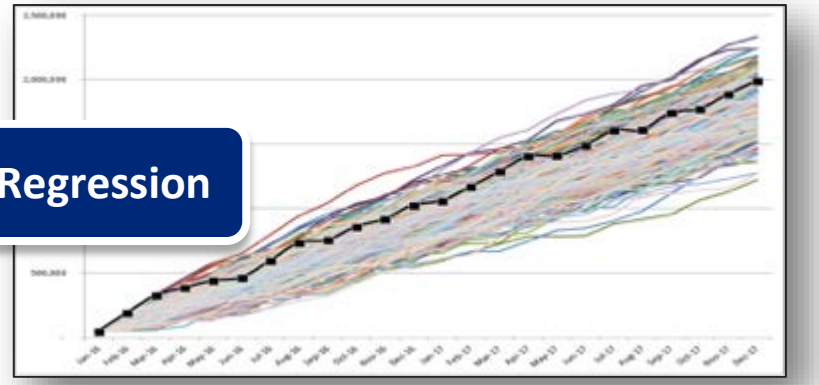


Use-Cases for AI Strategy

Application: Shortest Time to Best Action

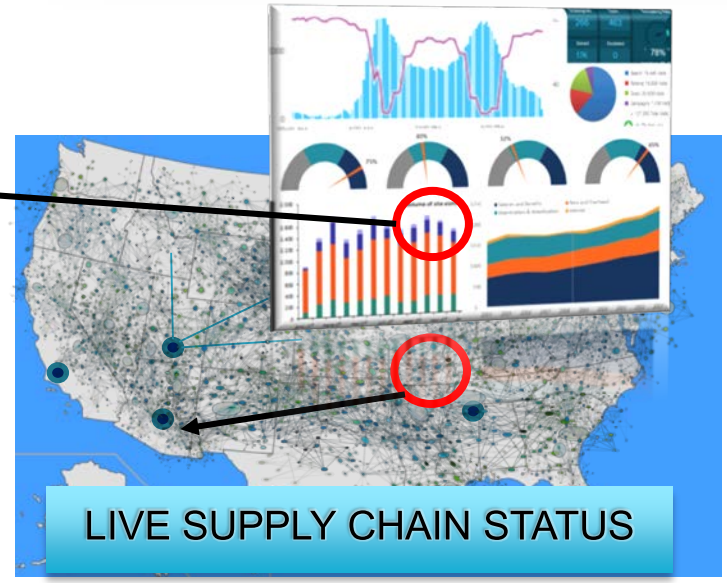
1. Forecasted schedule at risk
2. Highlight concern with data
3. Pull context data based on prediction
4. View live feed, contact process owner

Supervised Regression



Unsupervised Classification

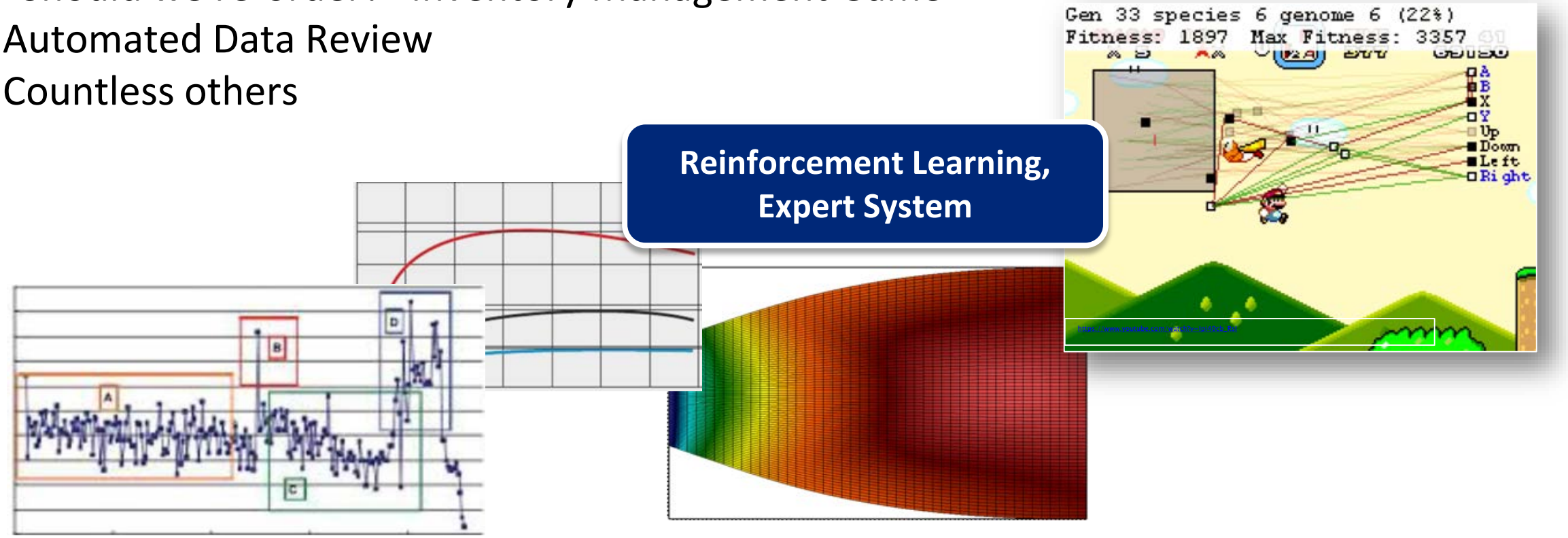
Expert System



Use-Cases for AI Strategy

Application: Optimization through Learning

1. “Should we re-order?” Inventory Management Game
2. Automated Data Review
3. Countless others



Building Your AI Strategy

AFTER DREAMING BIG, ASK YOURSELF:

WHAT DOES MY DATA NEED TO LOOK LIKE FOR THAT TO BE POSSIBLE?

SPECIFICALLY, THERE ARE 3 READINESS TESTS…

AI Strategy: Readiness Test

1: Do you have the data to *manually* do this now?

- If not, invest in creating clean input data that is archived, live, available—and secure.

AI Strategy: Readiness Test

2: Have you captured the *context and flow* of your decision-making processes?

- For each process, if you haven't documented 80-90% of the scenarios that will require action—do so.
- If you don't have them, they are stored in your "non-networked bio servers" (I.E., tribal knowledge in human heads)
- Start interviewing, documenting decision trees, then test in parallel with the process owners

AI Strategy: Readiness Test

3: Do you have a way to get the right people in a room quickly?

- Before A.I. can make decisions, you need to understand/optimize your approval processes
- Which are really needed? Which can be reduced/removed?
- If needed, are they fast enough to match A.I.?

Summary

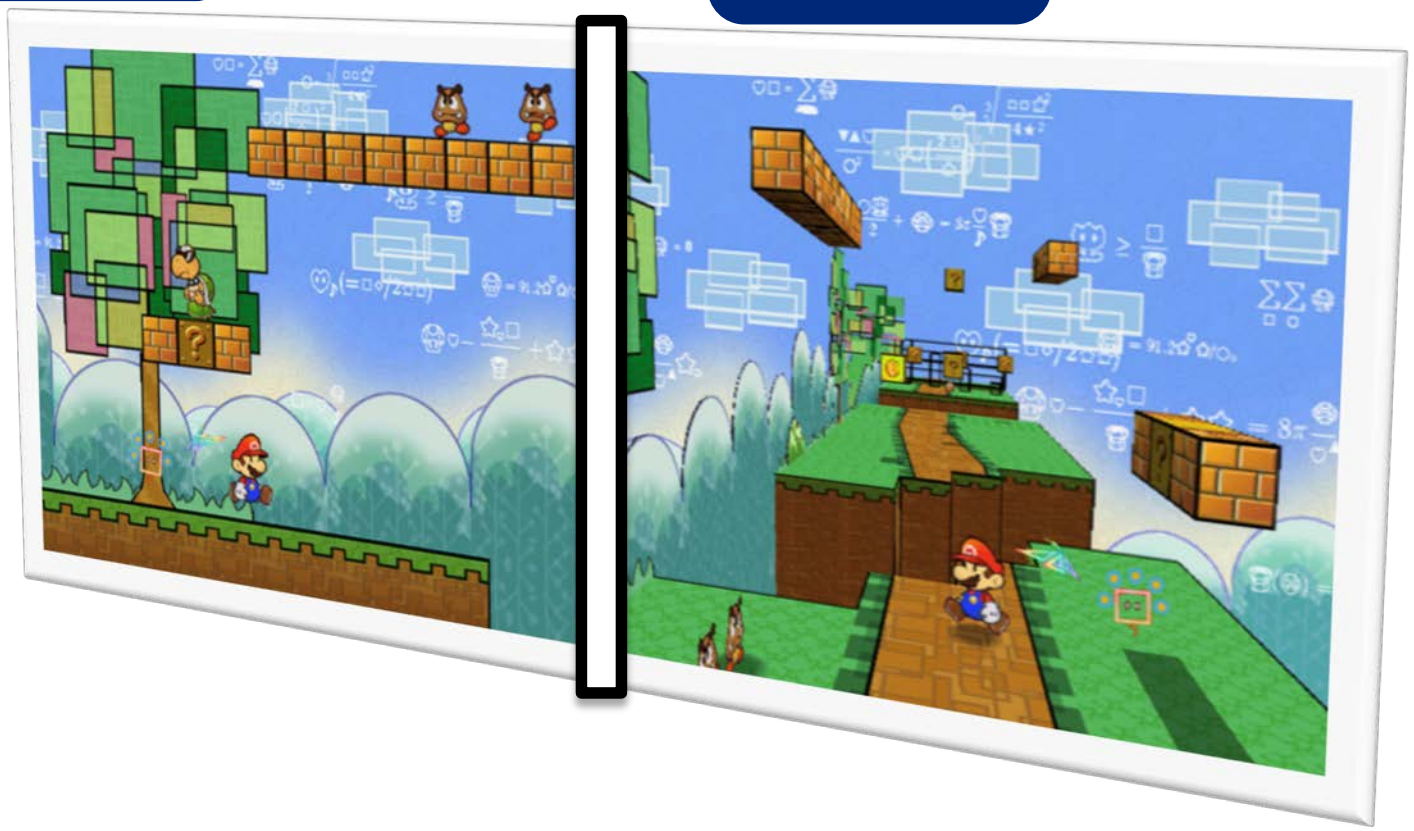
- Artificial Intelligence is transforming the industry
- Don’t be afraid to start dreaming big today
- Understand what it will take to actually use the technology and start preparing before you invest; doing this will enable **Continuous ROI**

- But wait—there’s more! (if we have time)

AI Lateral Thinking Approach: Shifting perspective to solve your problems

Special Bonus!

IDENTIFY PROBLEM → ROTATE PROBLEM LATERALLY → USE WELL DOCUMENTED, PRE-STRUCTURED A.I. (Neural Net) MODEL TO SOLVE

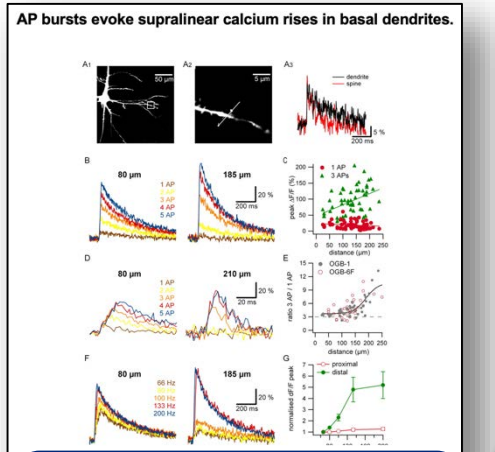


AI Lateral Shift Project: Quality Control using Signal Processing

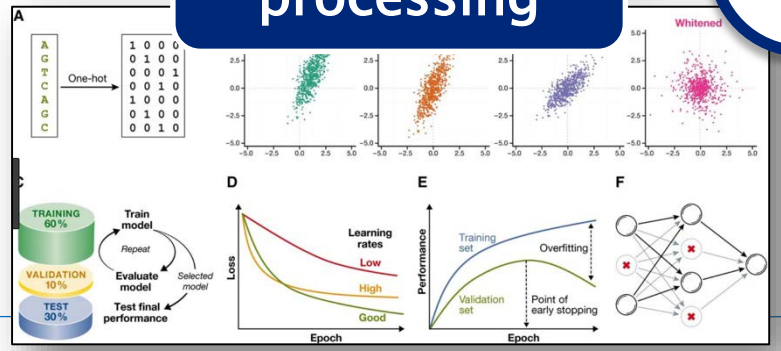
Special Bonus!

ROTATED PROBLEM → **SIMILAR APPLICATIONS** → **PROJECTED BENEFIT**

Quality Control requires analysis of performance data; this data can be plotted as a signal



CNN for signal processing



- Improved Accuracy
- 200-300 hours savings per vehicle
- 2-4 weeks schedule savings per vehicle
- Very scalable

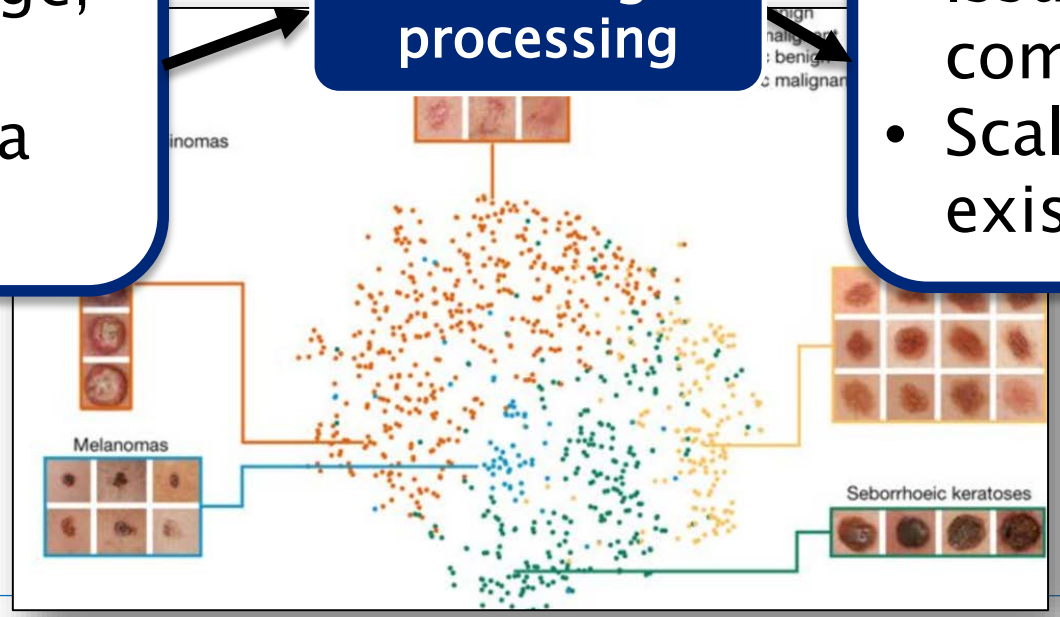
AI Lateral Shift Project: Quality Control using Cancer Screening

Special Bonus!

ROTATED PROBLEM → **SIMILAR APPLICATIONS** → **PROJECTED BENEFIT**

X-rays used to check for imperfection/damage; treat possible imperfections as a cancer screen

CNN for signal processing



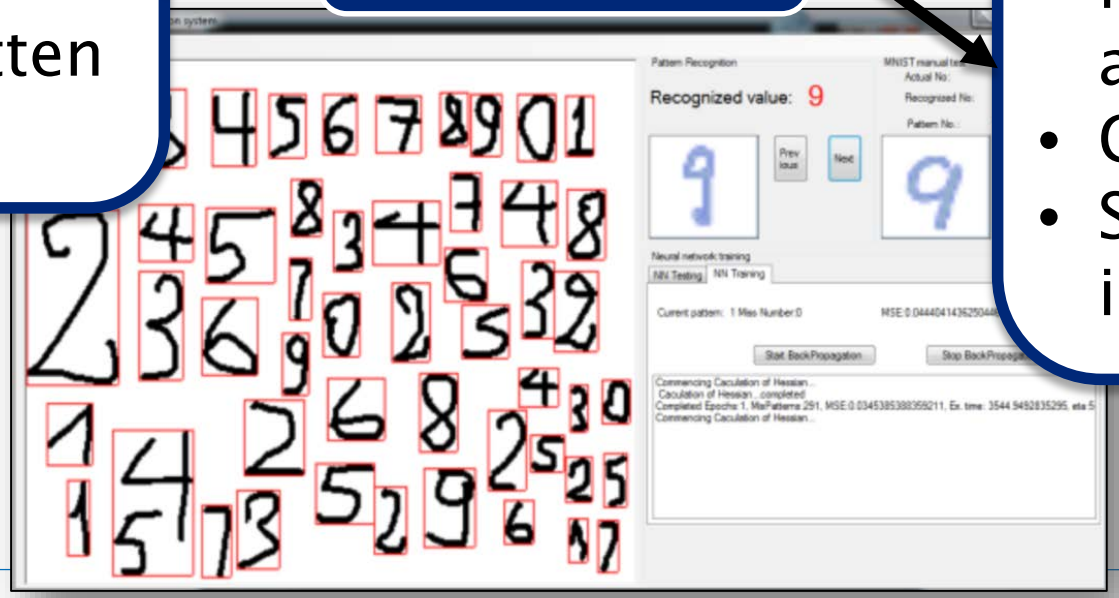
- Vastly improved accuracy
- Issues caught at component level
- Scalable if prior data exists

AI Lateral Shift Project: Process Flow Translator

ROTATED PROBLEM → **SIMILAR APPLICATIONS** → **PROJECTED BENEFIT**

Engineering process doc varies through sites and supply chain; treat shapes as handwritten characters

→ **Pattern-recognition ANN** →



- Processes can flow together and be reviewed/edited across supply chain
- Creates efficiency
- Strategic design implications

THANK YOU!

Nathan Eskue
A.I. Architect

Northrop Grumman Innovation Systems