

Applications of AI in Supply Chain Management: Hype versus Reality



Ganes Kesari



December 7, 2020



Mark Chockalingam

INTRODUCTION



Mark Chockalingam
President & CEO
Valtitude / Demand Planning LLC

Demand Planning, S&OP and
SCM Optimization



Ganes Kesari
Co-founder & Chief Decision Scientist
Gramener

Help start, apply and adopt Data Science

100+ Clients, 250+ team



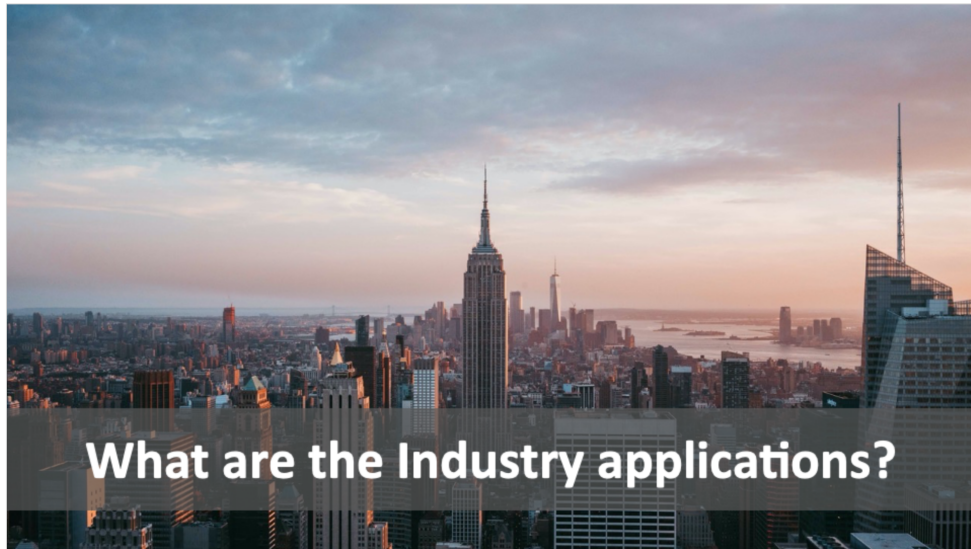
THE WORLD BANK



Why all this Hype over AI/ML?



What's Driving the Craze?



What are the Industry applications?



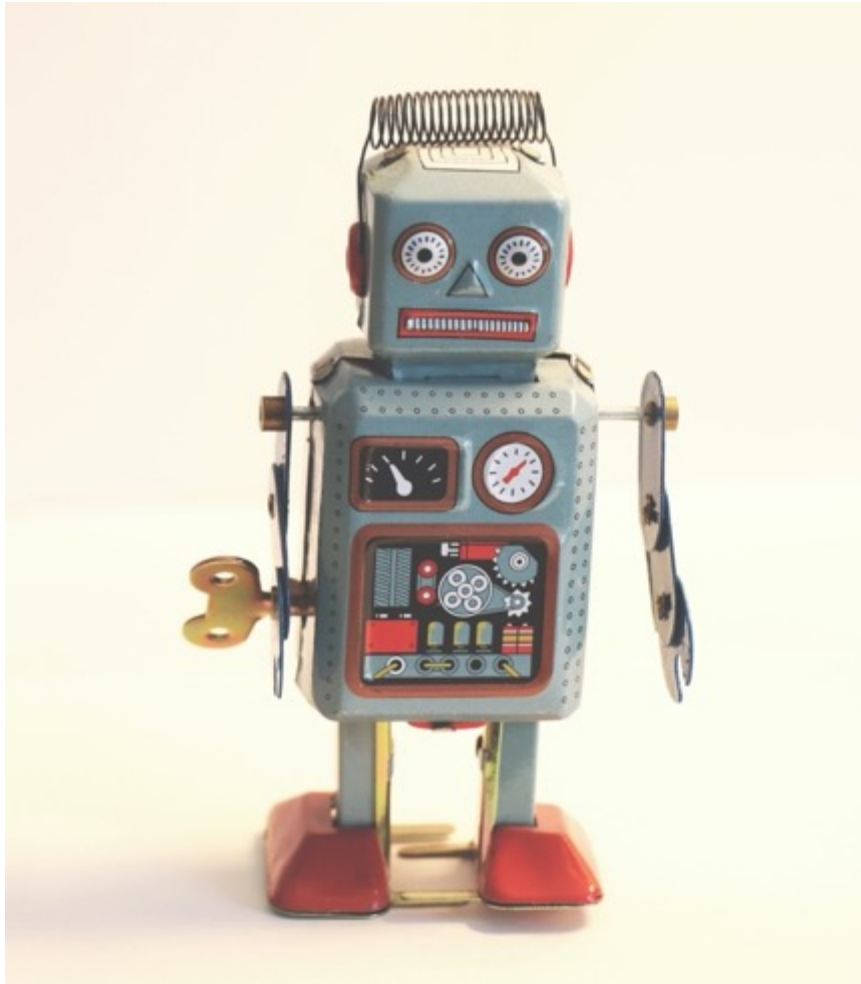
How Can You Upskill in AI/ML?



Why all this Hype over AI/ML?

AI IS NOT A COOL NEW TOY!

It might as well share its Diamond Jubilee..



..with the Queen!



WHAT COMES TO MIND WHEN YOU THINK OF ARTIFICIAL INTELLIGENCE?

The end of jobs.. and humanity?



DOES MACHINE DISPLACE
MEN IN THE LONG RUN?

NYT, 1940

Unemployment will end
honeymoon with robots

The Age, 1982

DETROIT — Technological innovation is widely billed as a miracle cure for the United States' economic doldrums. Its aftereffects, however, may be far from benign. The introduction of revolutionary new technologies such as robots — versatile computer-controlled mechanical arms — raise two painful possibilities: sizeable losses of jobs and a deteriorated quality of working life.

A Robot
Is After
Your Job

NYT, 1980

AUTOMATION LOOMING LARGE IN LABOR PICTURE

Automation* Might End Most
Unskilled Jobs In 10 Years

**Automation Linked
To Jobless Count**

1960s

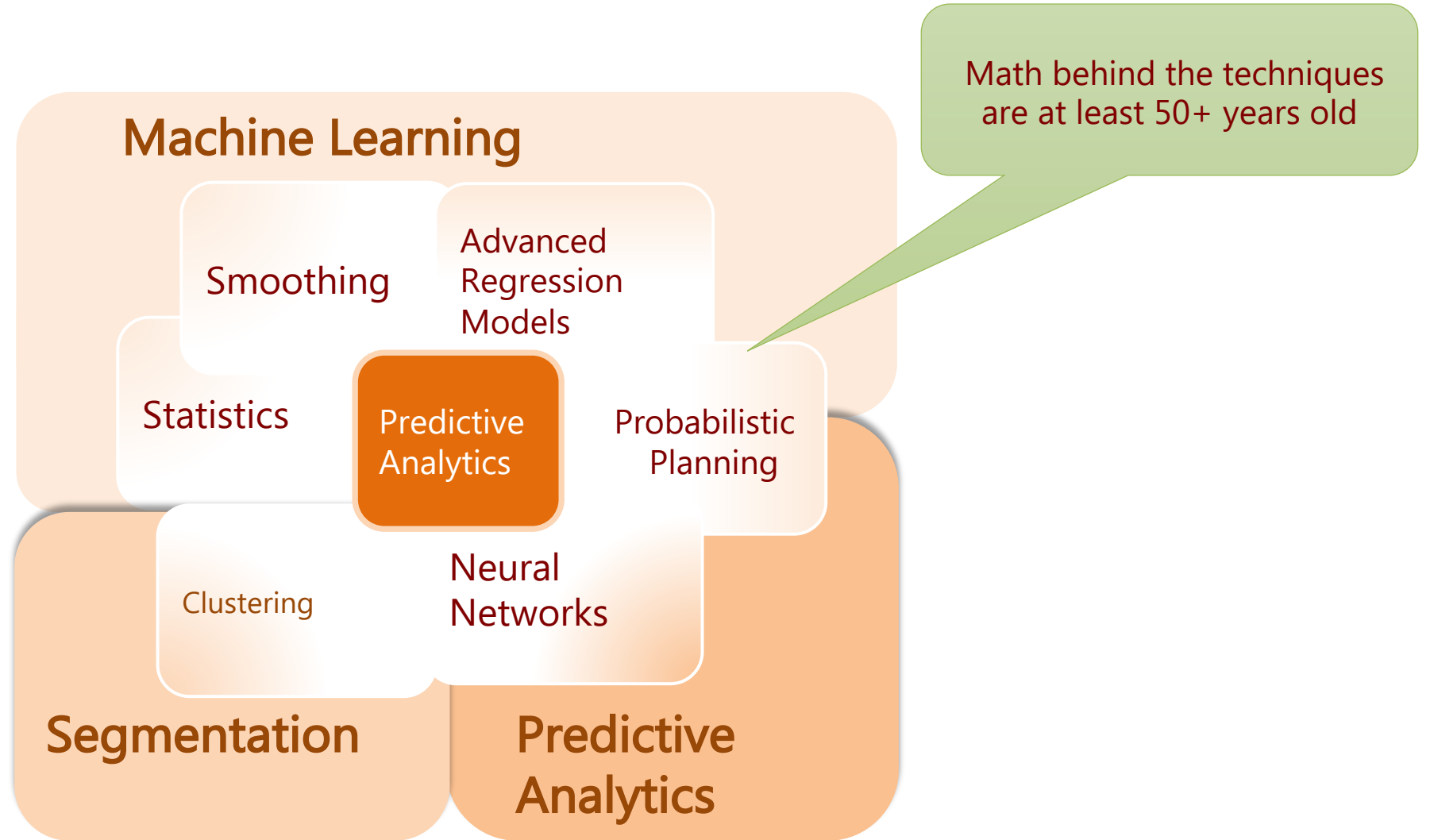
AI HAS BEEN AROUND FOR A WHILE

- Remember Deep Blue beat World Chess Champion Garry Kasparov in 1997

Deep Blue was an expensive machine with highly-paid Team of IBM Scientists working on this experiment to beat the sharpest mind in Chess.

Today most ordinary personal computers can beat Deep Blue handily!

THE GENIE IN THE BOTTLE



SO WHAT HAS CHANGED?

Big Data

Economics of Storage

Democratization of the Cloud

Computational Power

WHAT IS THE HYPE?

AI can program itself to do more than what it is taught

AI will take your job – eventually replace Humans!

Businesses should try to adopt AI and Machine Learning regardless of Cost

AI is easy to implement

AI is sexy!



What's Driving the Craze?

Poll #1

What's your level of familiarity with AI?
(choose one)

- *New to AI*
- *Have some conceptual understanding*
- *Have a technical understanding*
- *Have worked in AI*

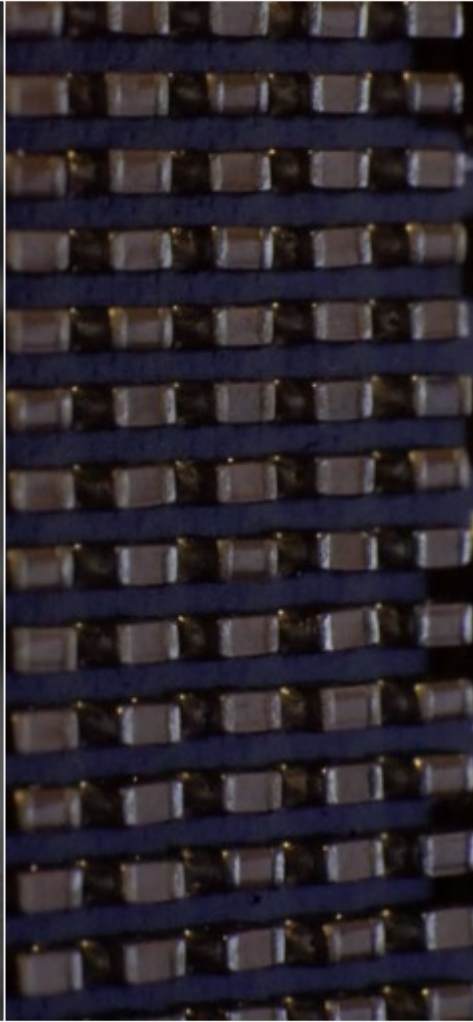
WHAT'S CHANGED TODAY: TOP TRENDS DRIVING THE AI REVOLUTION



Data



Storage



Processor



Software



Internet

THE JOURNEY FROM DATA TO DECISIONS



Phases

Data Engineering

Data Science

Decision Intelligence

Maturity

Data Collection

Data Storage

Data Transformation

Reporting

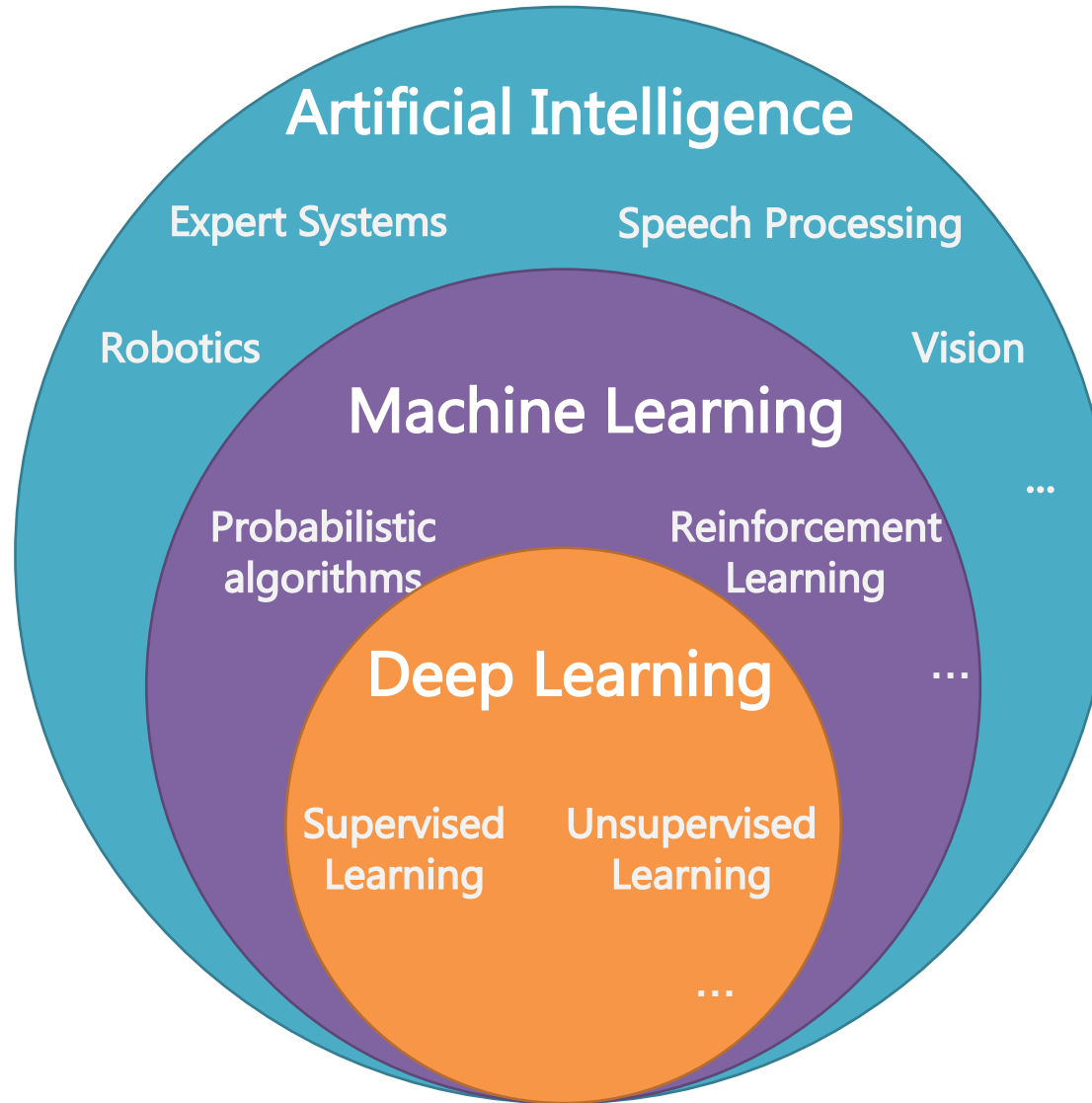
Insights

Consumption

Decisions



WHAT REALLY IS AI: MAKING SENSE OF THE TERMINOLOGIES

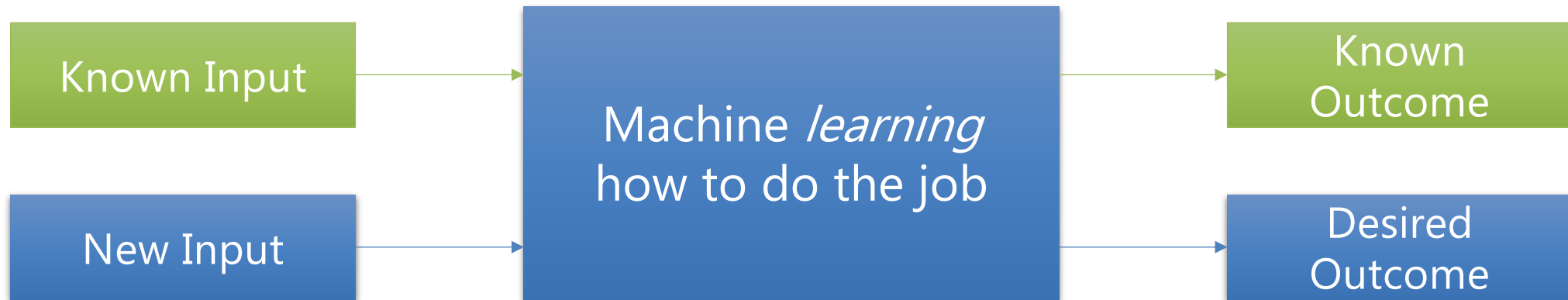


HOW DOES MACHINE LEARNING WORK? A QUICK 101

“Programs that solve
the problem”

vs

“Programs that **learn**
to solve the problem”



AAPL

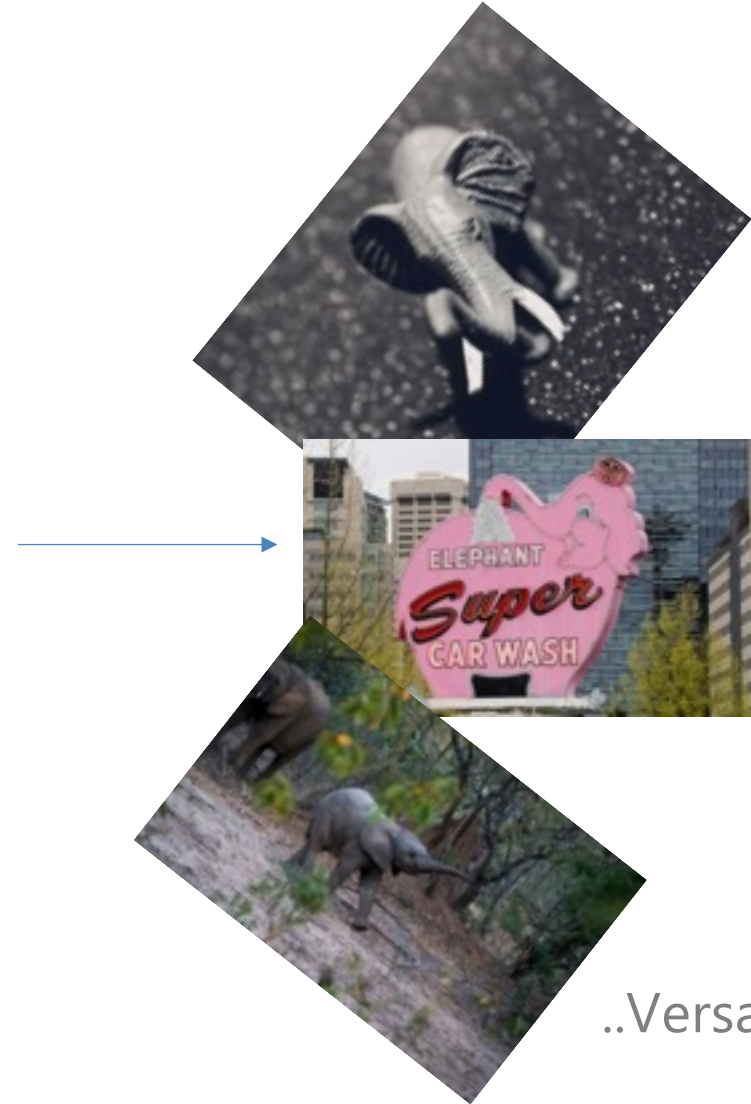
... \$119.3, 115.1, 119.0, 123.9,

...131.5

DEEP LEARNING ALGORITHMS ARE INSPIRED BY HOW WE LEARN



Training



..Versatile Detection!

A panoramic view of the New York City skyline at sunset. The sky is filled with soft, orange and pink clouds. The city is densely packed with skyscrapers, with the Empire State Building prominently in the center. The Hudson River and the New York Harbor are visible in the background, with the Freedom Tower standing out on the right side. The overall atmosphere is serene and majestic.

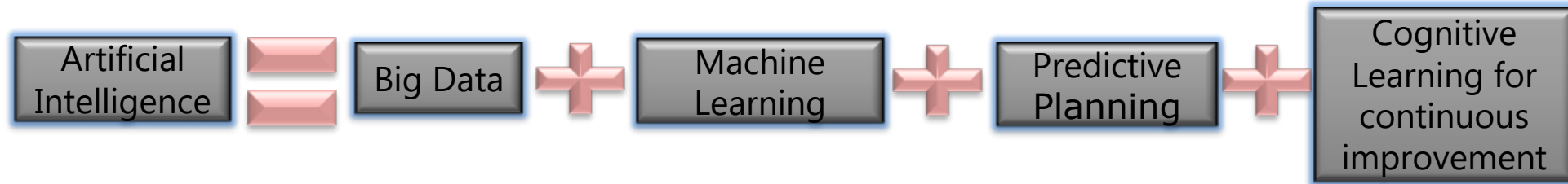
What are the Industry applications?

Poll #2

Has your organization adopted AI/ML?
(choose one)

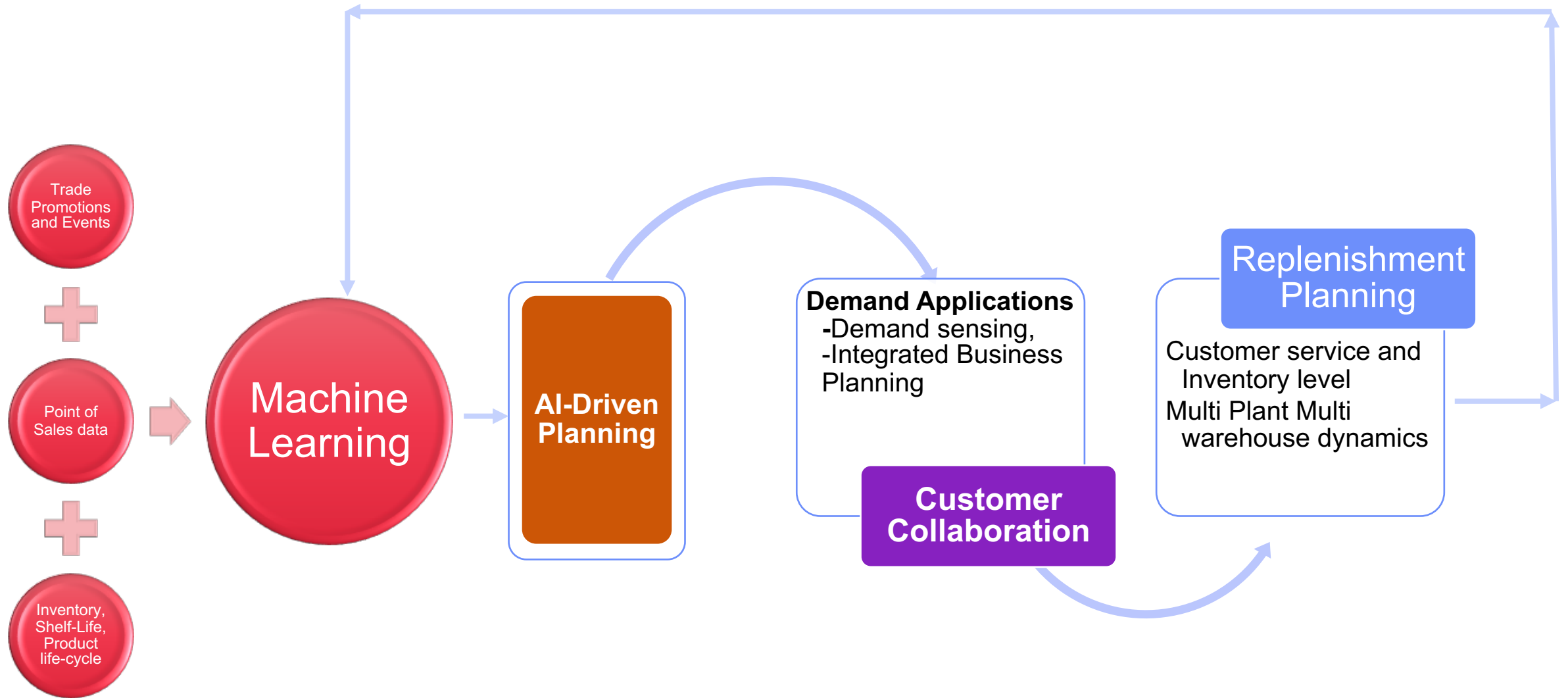
- *Not considering it yet*
- *Actively evaluating AI/ML*
- *Running some pilots*
- *Using a few AI/ML solutions in production*
- *Mature in AI/ML with many solutions in use*

APPLICATION OF AI IN THE SUPPLY CHAIN

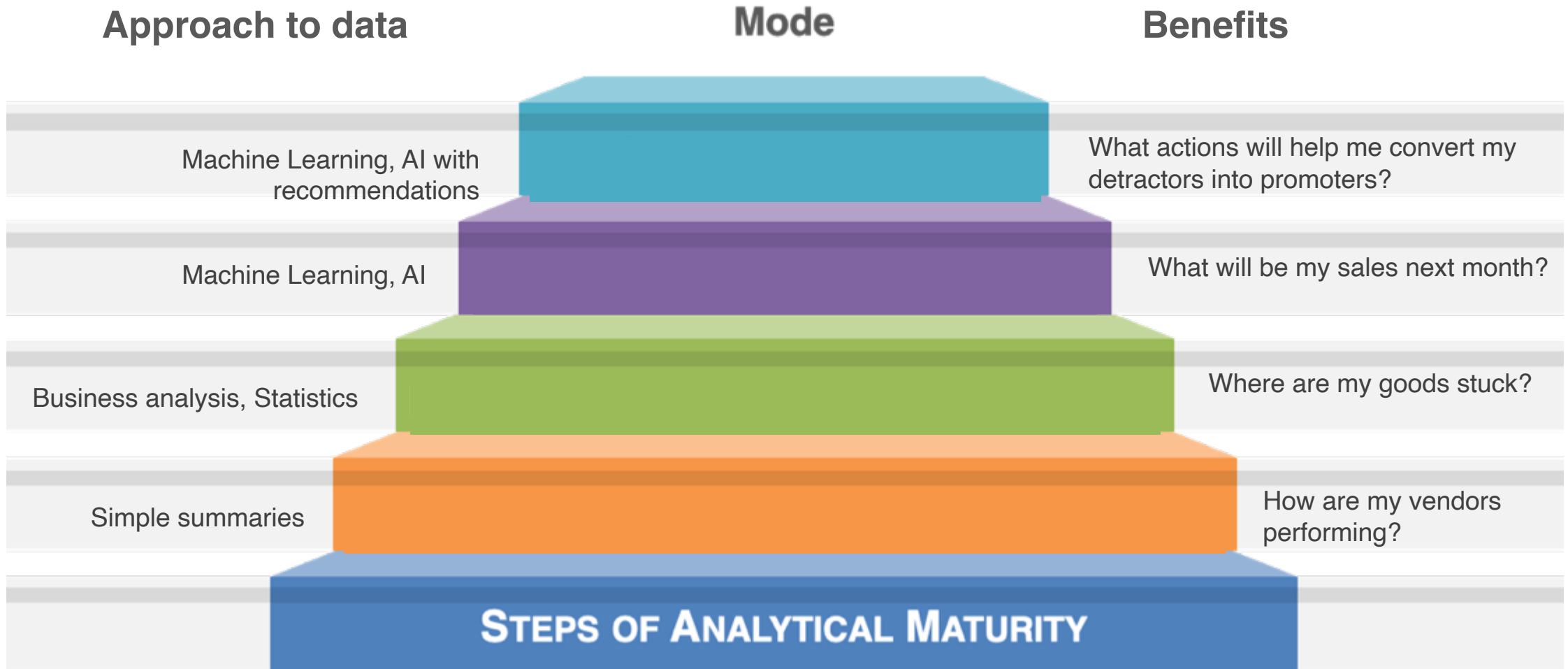


- Big Data, IOT, Predictive Planning and cloud computing have evolved substantially in the last few years with the potential for sophisticated solutions for the supply chain
 - Predicting potential Out-of-stock at the store level
 - Demand Sensing
 - Predictive analytics for Trade Promotions
 - Supply Risk Modeling
 - Real-time early warning systems

AI driven SCM Planning



What kind of insights does your application need?



AI/ML can Consolidate Your Purchases & Detect Fraud



PROBLEM

A large consulting and audit firm evaluated procurement practices for a European brewery. They wanted to automate their analysis, and an effective strategy to convince plant managers to **consolidate vendors and orders**.



APPROACH

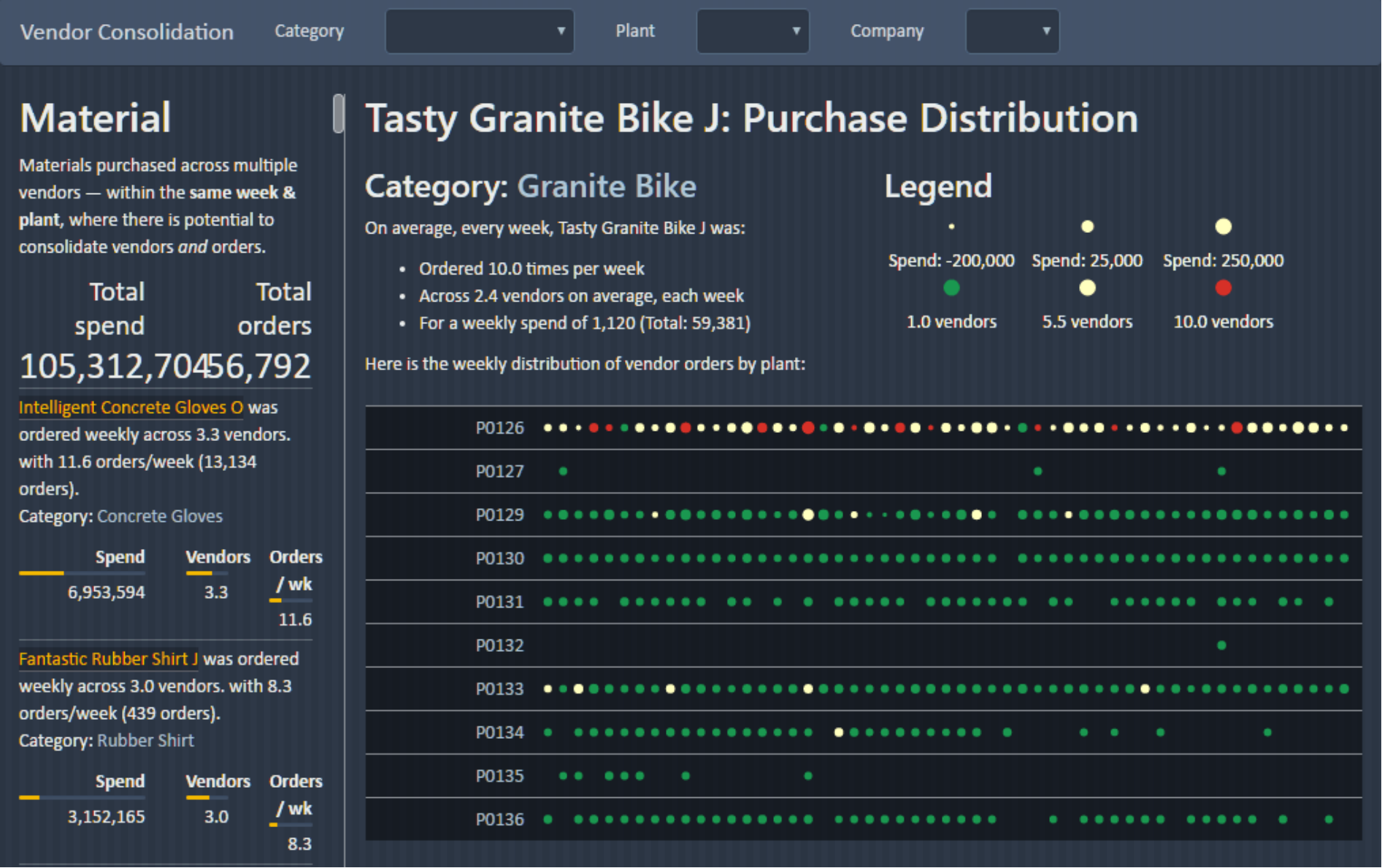
The visual analytics platform evaluated the consolidation potential.
It showed products with the highest potential for consolidation across all the plants along with the # of vendors it's sourced from.



OUTCOME

The client was empowered to quickly identify areas that needed attention and **communicate them effectively** to the plant managers. It also helped them identify fraudulent activities in the purchase process.
This helped identify a **saving potential of € 15 million** for the client.

VENDOR PURCHASE CONSOLIDATION & FRAUD DETECTION



AI/ML can help Optimize your Supply Chain



PROBLEM

A leading retailer wanted to identify **operational bottlenecks in transportation** of products from manufacturers / suppliers (vendor partners) to DCs / warehouses all the way to the stores covering the entire supply chain network.



APPROACH

Several parameters like Transit Value (COGS), Product Type, Transit Time were analyzed to identify potential paths leading to high costs in the **supply chain network**

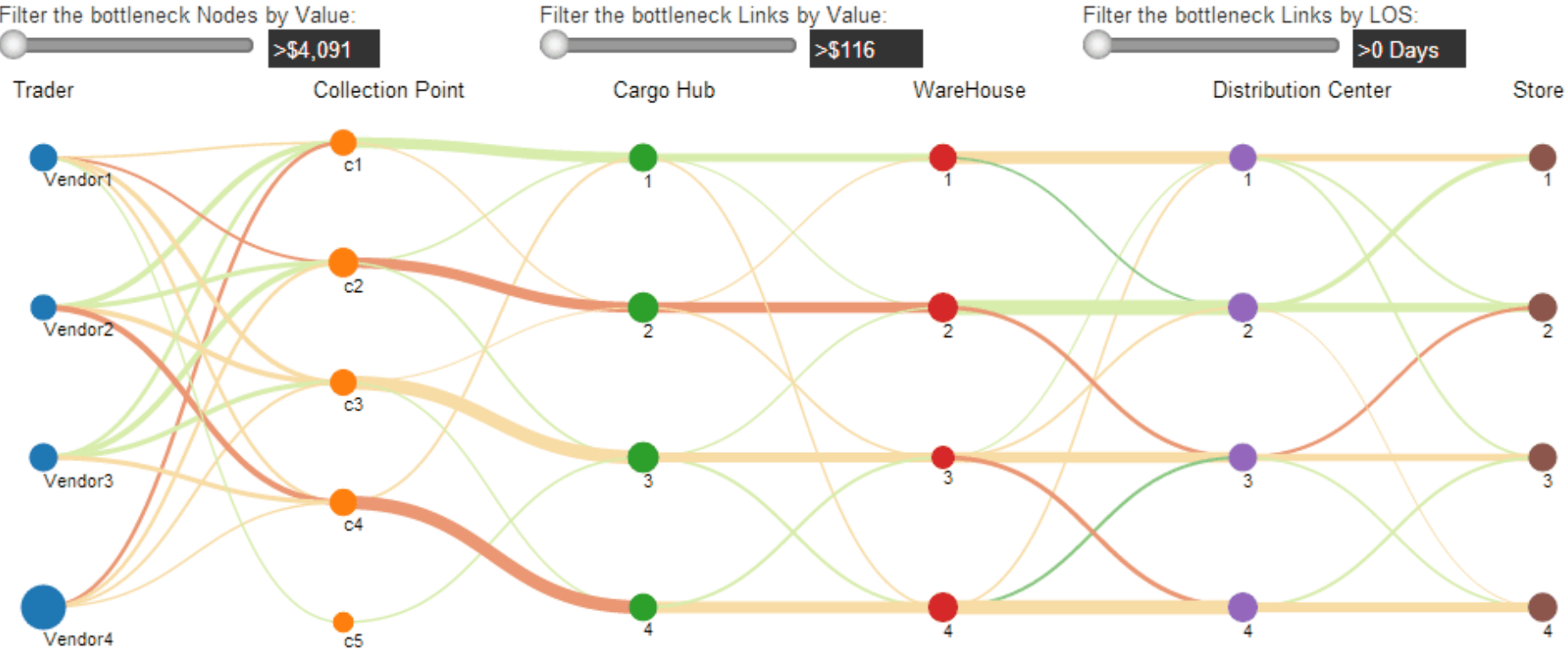
Interactive controls aided visual exploration of hotspots



OUTCOME

The visual analytics solution clearly identified the bottlenecks along one strand of the supply chain, on which shipments were delayed by **more than 200%** of the normal shipment duration.

MANAGING THE SUPPLY CHAIN



Trader_ID	Trader	Int1	LOS1	Collection	Collection	Int2	LOS2	Cargo	Cargo	Int3	LOS3	Warehouse	Warehouse	Int4	LOS4	Distribution	Distribution	Int5	LOS5	Store_ID	Store
Vendor1	2308.0	260.0	2.0	c4	1512	440	2.0	1	2357	326	2.0	4	1985	358	2.0	1	3738	175	2.0	1	2405
Vendor1	1454.0	129.0	1.0	c2	3929	273	1.0	2	4308	378	1.0	2	1357	553	1.0	2	2356	347	1.0	2	3358
Vendor1	3611.0	473.0	1.0	c3	1795	287	1.0	4	2364	225	1.0	3	197	623	0.0	4	1621	340	1.0	3	1771
Vendor1	3668.0	292.0	1.0	c5	4092	380	1.0	3	4561	174	1.0	4	2350	274	0.0	3	3811	430	1.0	4	2710
Vendor1	1756.0	183.0	1.0	c1	2083	271	1.0	1	3610	136	1.0	1	2503	368	0.0	2	2647	473	1.0	1	4293
Vendor1	2107.0	251.0	3.0	c2	3186	485	3.0	2	4733	120	3.0	2	4715	431	3.0	3	4400	444	3.0	2	4762

AI/ML Can Identify Logistics Bottlenecks through Simulations



PROBLEM

A global airline wanted to identify the **factors driving delay** in cargo delivery.

Specifically, the time from when the flight lands to when the cargo reaches the warehouse is the bottleneck. This needed to be optimized.



APPROACH

A visual analytics solution helped identify the drivers of delay and created a **what-if model** that showed the impact of changing the underlying drivers.

This was presented as an **interactive visual dashboard**.

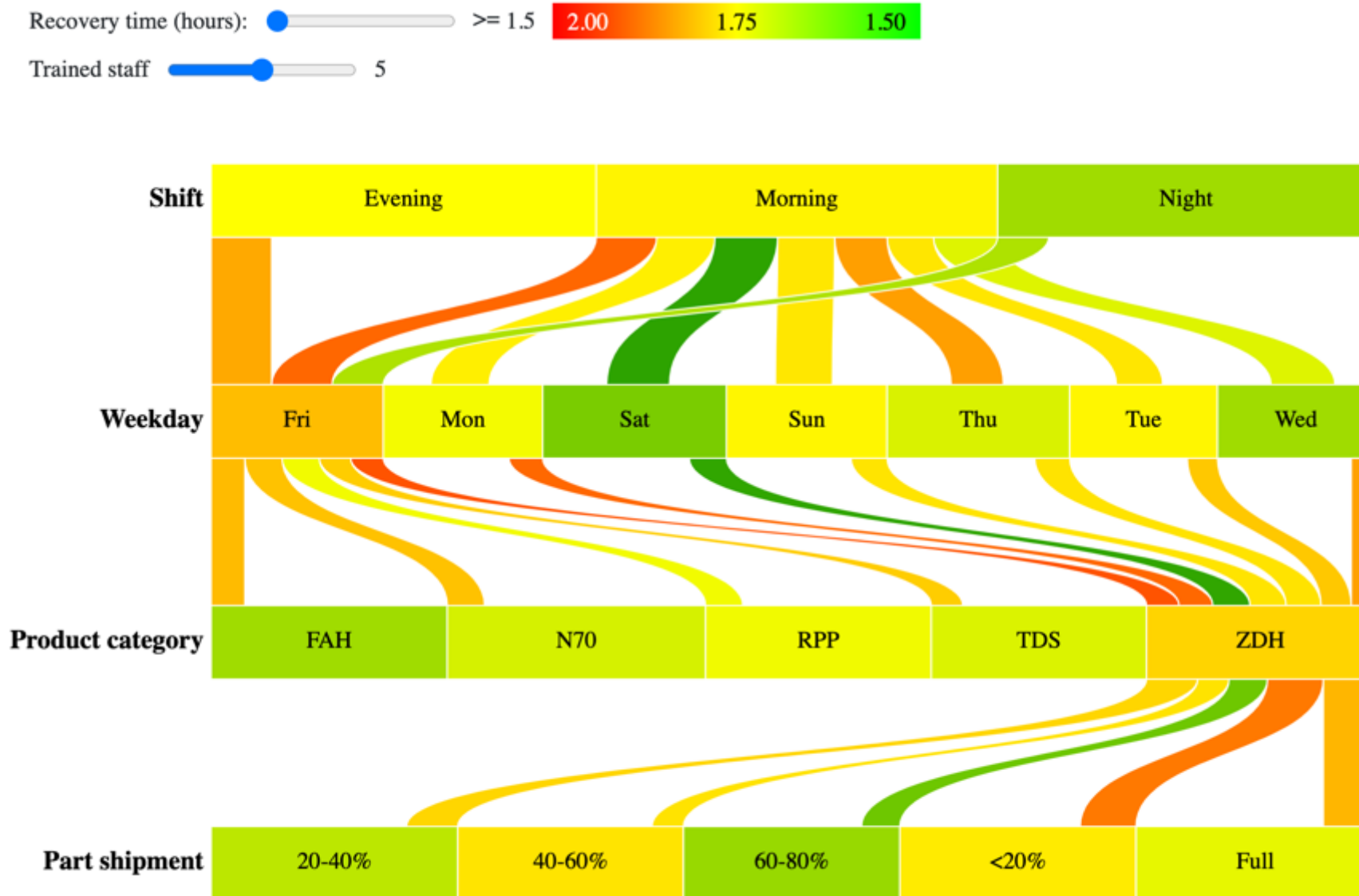


OUTCOME

The number of **trained staff** and number of **forklifts** (among others) emerged as the biggest drivers.

Visualizing the impact of changing staffing levels and forklifts, airports re-structured their budgets and **met all SLAs**.

What drives the delay in my Cargo Handling?



AI/ML can flag risks in your procurement contracts by reading them



PROBLEM

Contract writing, review and risk identification poses a challenge for companies due to:

- high **volume** of contracts
- deliberate **verbosity**, at times
- **error-prone** manual effort

An efficient, automated solution can bring in huge efficiencies.



APPROACH

Deploy a **Deep Learning** based solution that trains **language models** on the legal corpus.

The trained language models use a **multi-label classification** approach to identify the category and risk level for every clause. This solution is packaged as a **Human-in-the-loop AI** solution.

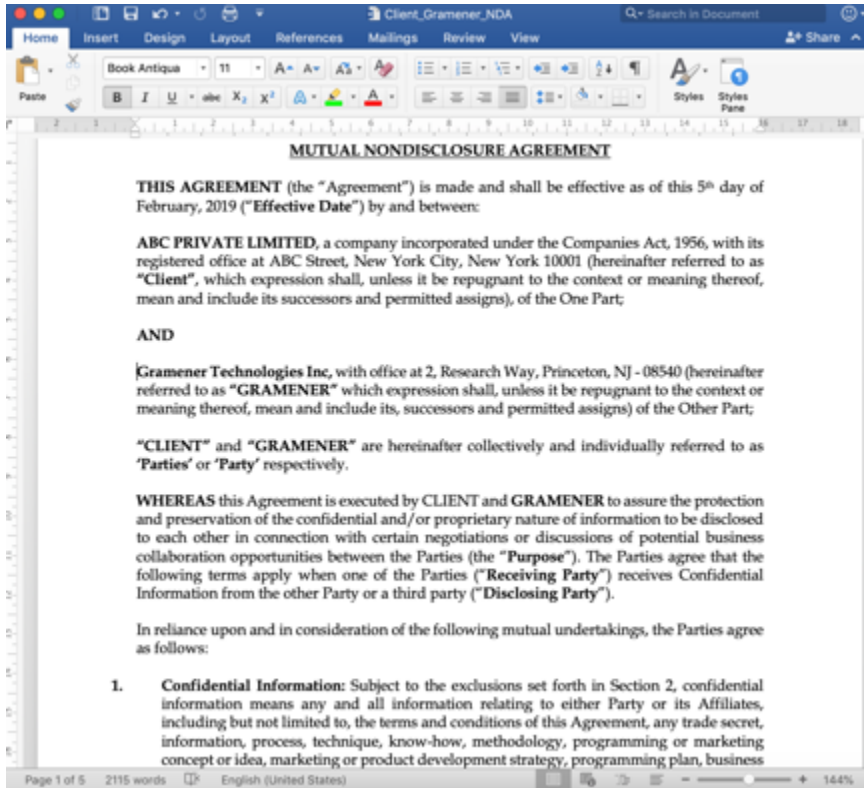


OUTCOME

The **Smart Contract Risk identification** solution can automatically parse contracts, classify them into categories and flag the risky ones.

The solution comes with a **reviewer-approver workflow** that enables human re-classification of clauses for a **continuous feedback** loop to the model.

Smart Contract Risk Identification



- ✓ Categorize clauses
- ✓ Assess risk levels
- ✓ Simplify review process

100+ Documents



6000+ Clauses

Term. This Agreement shall be in force for a period of two (2) years from the Effective Date. This Agreement may be terminated by either Party at any time upon thirty (30) days written notice to the other Party. Provided however that the termination of this Agreement shall not relieve any Party of its obligations with respect to Confidential Information disclosed under this Agreement for a period of five (5) years after the expiry/termination of this Agreement.

Classify every clause into a Category...

Agreement
Confidentiality
Dispute Resolution
IP Rights
Terms And Conditions
Warranty

Liability-Indemnity
Others
Payment Terms
Scope
Sub Contract

... and Criticality:

Non-Critical
Critical

A quick preview

Smart Contract Risk Identification

AI Driven legal documents analyzer.

Clause Types

Filter clause category. Total Clauses: 309

- ☐ Confidentiality (30/ 34)
- ☐ Finance (35/ 35)
- ☐ Intellectual Property (18/ 18)
- ☒ Legal (28/ 31)
- ☐ Others (23/ 170)
- ☐ Non Compete (0/ 0)
- ☐ Non Solicitation (0/ 1)
- ☐ Scope (16/ 20)
- ☐ Sub Contract (0/ 0)

Contract Clauses

Edit Feedback

ABC Operations & Technology Pvt. Ltd. (ABCOT), a company incorporated under the Companies Act, 1956, the registered office of which is located at RFA Eco Tech Park, East BLR, Bangalore – 560103/ (ABCOT/Client) which expression shall be deemed to mean and include its subsidiaries and successors in interest and permitted assigns) and represented herein by Sanjay Purandare

Legal (99.40)

Gramener Technology Solutions Pvt Ltd a Company having its office which is located at #Plot no 9/2,2nd Floor,Survey No.64,HUDA Enclave, Phase –II,Madhapur,Hyderabad,-500081 ,Telangana,India represented herein by Ravinder I Reddy- Director (hereinafter referred to as VENDOR, which expression shall be deemed to mean and include its subsidiaries and successors in interest and permitted assigns).

Legal (99.22)

The meaning of the terms set out below shall be determined from the following definitions unless the context of the term shall otherwise require. The definitions are printed alphabetically and shall not take precedence over each other.

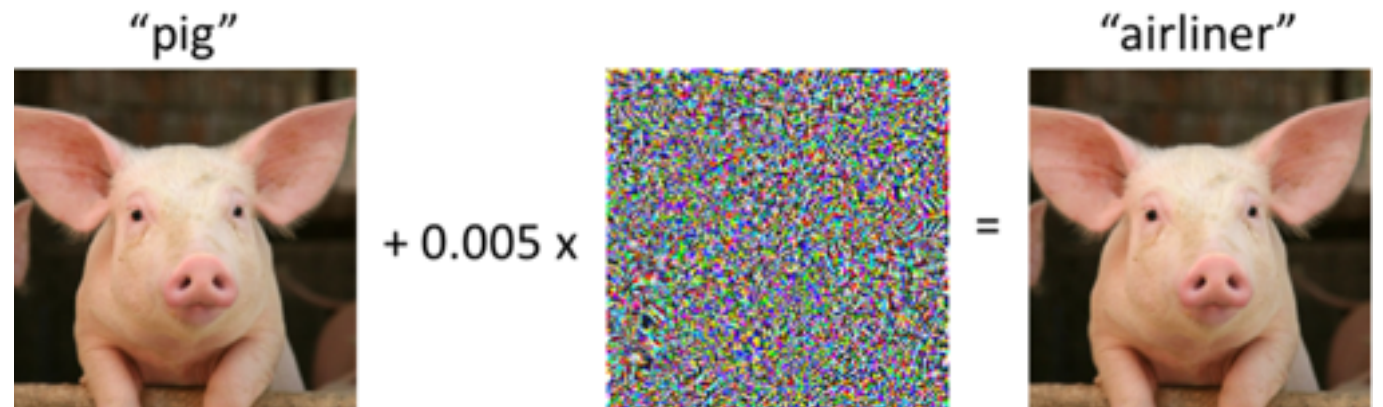
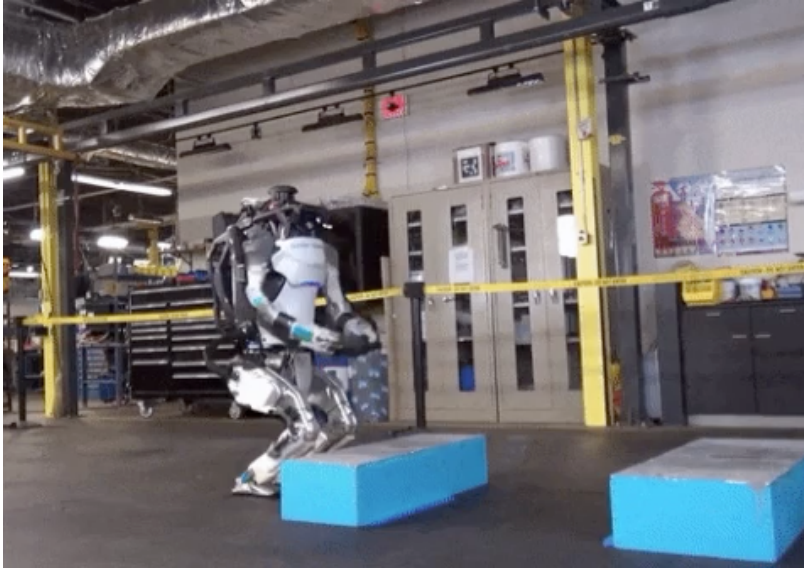
Legal (50.08)

Clause Criticality

Non-Critical (3)

Critical (28)

AI IS NOT REALLY THAT SMART... YET!



5 SITUATIONS WHERE YOU SHOULD NOT INVEST IN AI

1. When simpler solutions will get the job done
2. When you don't have enough data
3. Where AI is still in experimentation
4. When the costs outweigh the benefits
5. Where you need understanding and empathy

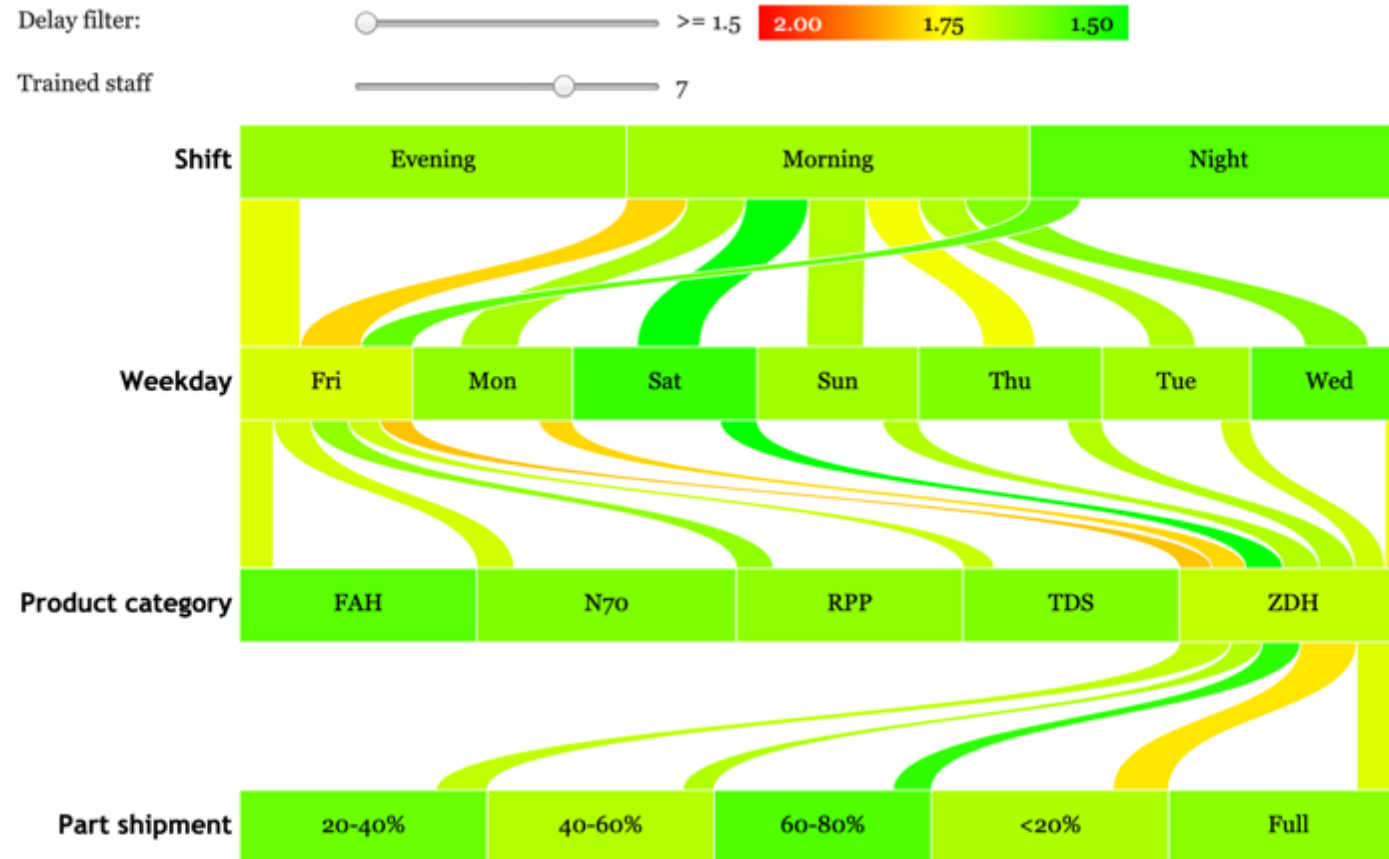


How Can You Upskill in AI/ML?

Photo by [Humphrey Muleba](#) on [Unsplash](#)

LET'S TAKE THIS EXAMPLE WE JUST SAW..

CARGO DELAY



..AND BREAK IT DOWN INTO THE BUILDING BLOCKS

Domain



- Business workflow
- Influencing factors

Analytics

$$\begin{cases} 2x_1 + x_2 = 7 \\ x_1 + x_2 - 3x_3 = -10 \\ 6x_2 - 2x_3 + x_4 = 7 \\ 2x_3 - 3x_4 = 13 \end{cases}$$

- Impact analytics
- Clustering techniques

Design



- User journey
- Visuals & aesthetics

Development



- Frontend/backend coding
- Data transformation

Project Management



- Piecing it all together
- Change management

HERE ARE THE 5 ROLES & SKILLS CRITICAL FOR AI

Domain



- Domain expertise
- Business analysis
- Solutioning

Analytics



- Stats & ML
- Interpret insights
- Scripting skills

Design



- Information design
- User centered design
- Interface/visual design (parts)

Development



- Software engineering
- Front/back-end coding
- Data pipelining

Project Management



- Project management
- Business analysis/solutioning
- Team handling

Poll #3

Which of these roles do you think is relevant for you?

(choose one)

- *Data Translator*
- *Data Scientist*
- *Information Designer*
- *ML Engineer*
- *Data Science Manager*
- *None of these: I just want to top up my skills with an understanding of AI*

HERE'S HOW TO UPSKILL IN AI

Pick a role, build the skills...

Start with data literacy – read, write and converse in data

Learn how to identify insights by applying data analytics

Understand how to present insights and communicate with information

Stay in touch with the business applications of ML/AI

..and hone your craft

Online certifications or Academic programs

Practice your data skills on professional or personal projects

Join online data communities to compete and collaborate on AI

Maintain a public portfolio and showcase your skills



“

AI is the new electricity.

- Andrew Ng

THANK YOU!

Download today's
presentation

gkesari.com/APICS



valuechainplanning.com



[in/chockalingam](https://in.linkedin.com/in/chockalingam)



gramener.com



[in/gkesari](https://in.linkedin.com/in/gkesari)



gkesari.substack.com



Gramener
Insights as Stories