IBM **TechXchange** 2024

The Binary Brains

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Agriculture Supply Chain Automation

Transforming Agriculture with Generative AI:
A Platform for Distributors and Producers

Deloitte. Insights

According to a Deloitte report, distributors are under pressure to satisfy the fast and dependable delivery expectations of 84% of customers.

Digital transformation | Deloitte Insights

Gartner

Sourcing & procurement becoming more critical

Not only are we more reliant on suppliers than ever, but also how we use suppliers is changing: More than 70% of sourcing & procurement professionals report using suppliers to tap into new-in-kind technology services or something outside of their organization's core business model. It's the role of sourcing & procurement to unlock new value from the supply base and protect the organization from future disruption.

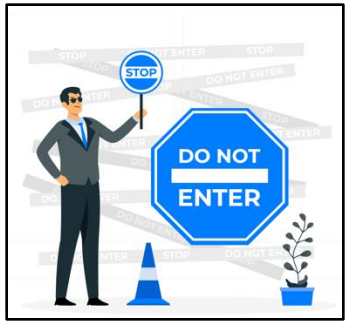
3 Principles for Inventory Excellence | Gartner

Issues

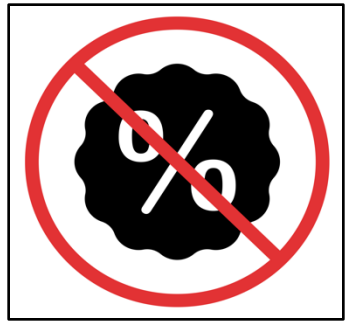
1. Fragmented Communication

2. Demand Forecasting Challenges

3. Limited Access to Market Trends & Distributor Network



4. Lack of Price Transparency



… And Consumer Trends are Evolving

Increased Demand for Local Produce

Limited Adoption of Data Driven Insights

User Persona

Name : **Thompson**
Occupation : **Farmer**
Crops: **Apples, Wheat**

Pain Points

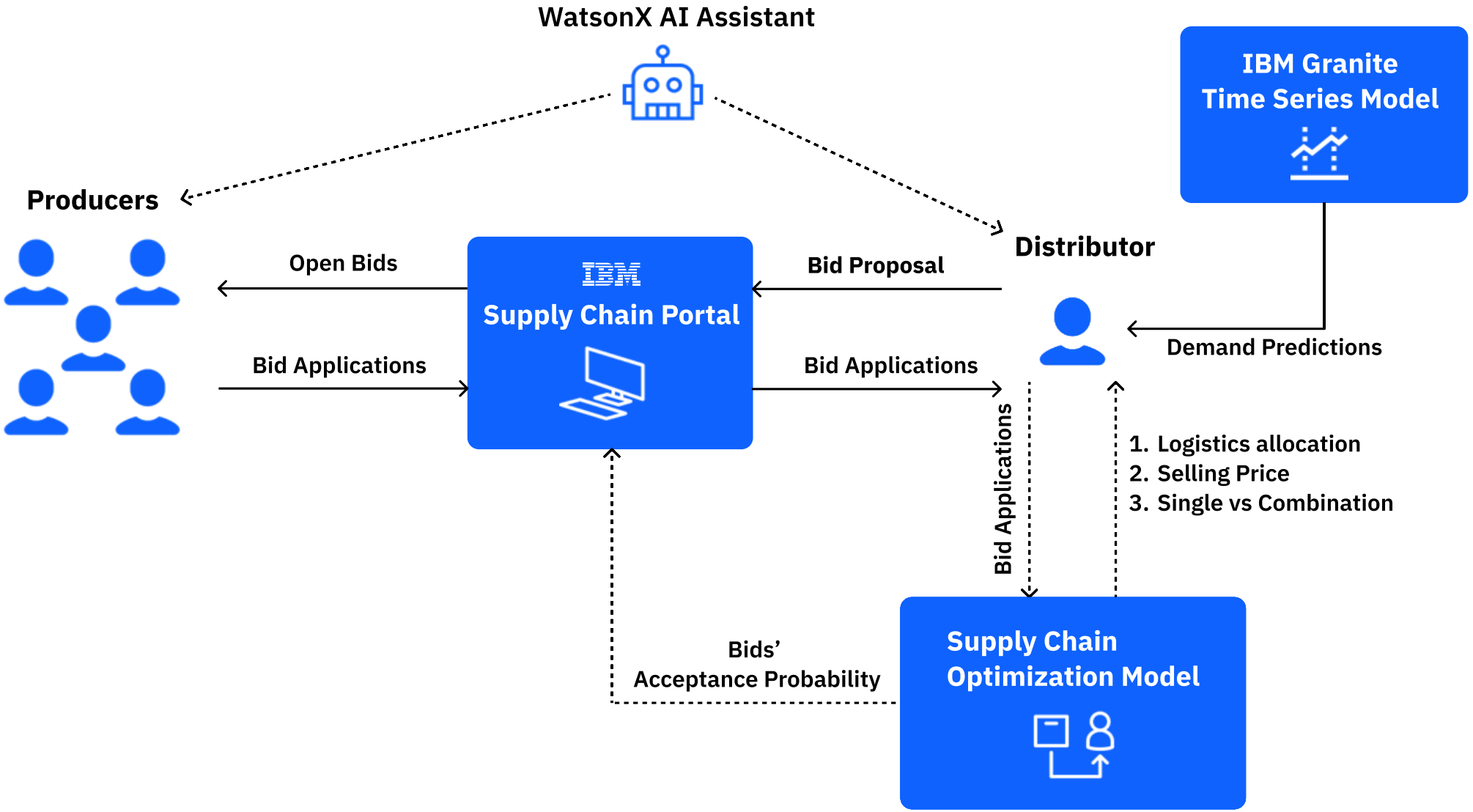
- Inaccurate market demand predictions, causing surplus or shortages.
- Limited distributor access, hindering market expansion and sales.
- Uncertainty in crop demand, risking mismatches with consumer preferences.

Name : **Ever-Fresh**
Occupation : **Distributor**

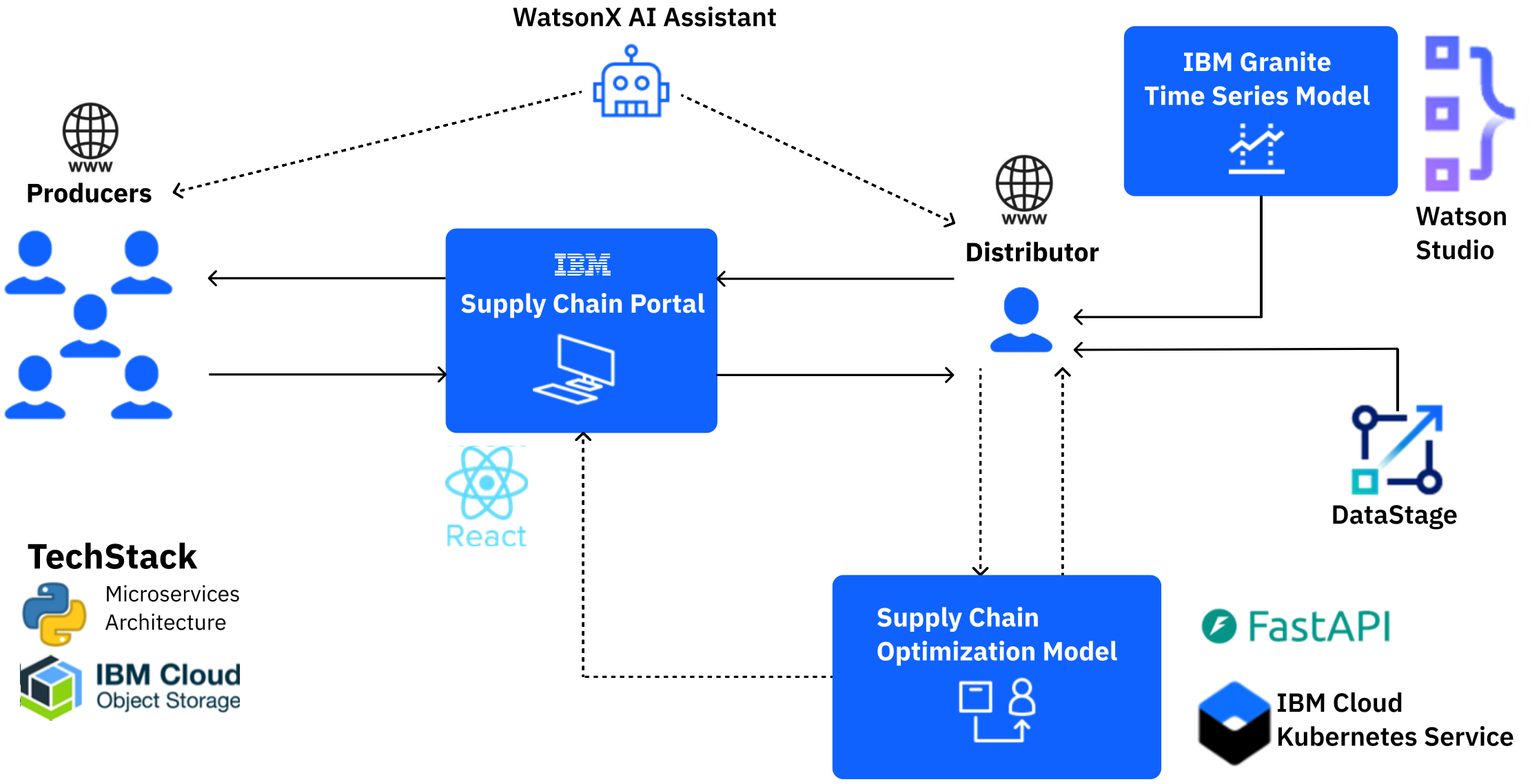
Goals

- Increase the number of producers and suppliers to diversify product offerings.
- Maintain optimal stock levels to meet fluctuating demand without overstocking.
- Streamline logistics and reduce logistics time

Platform Overview



Platform Overview



Key GenAI Features

Insights for producers to improve bid success probability without bid prices for fair market practices

Insights for distributors to improve tender fulfillment by adjusting the profit range according to market economy

Agentic AI

Producer: Monitors crop prices to trigger new bids if prices rise

Distributor: Monitors crop prices to trigger new tenders if prices fall

Premium Features

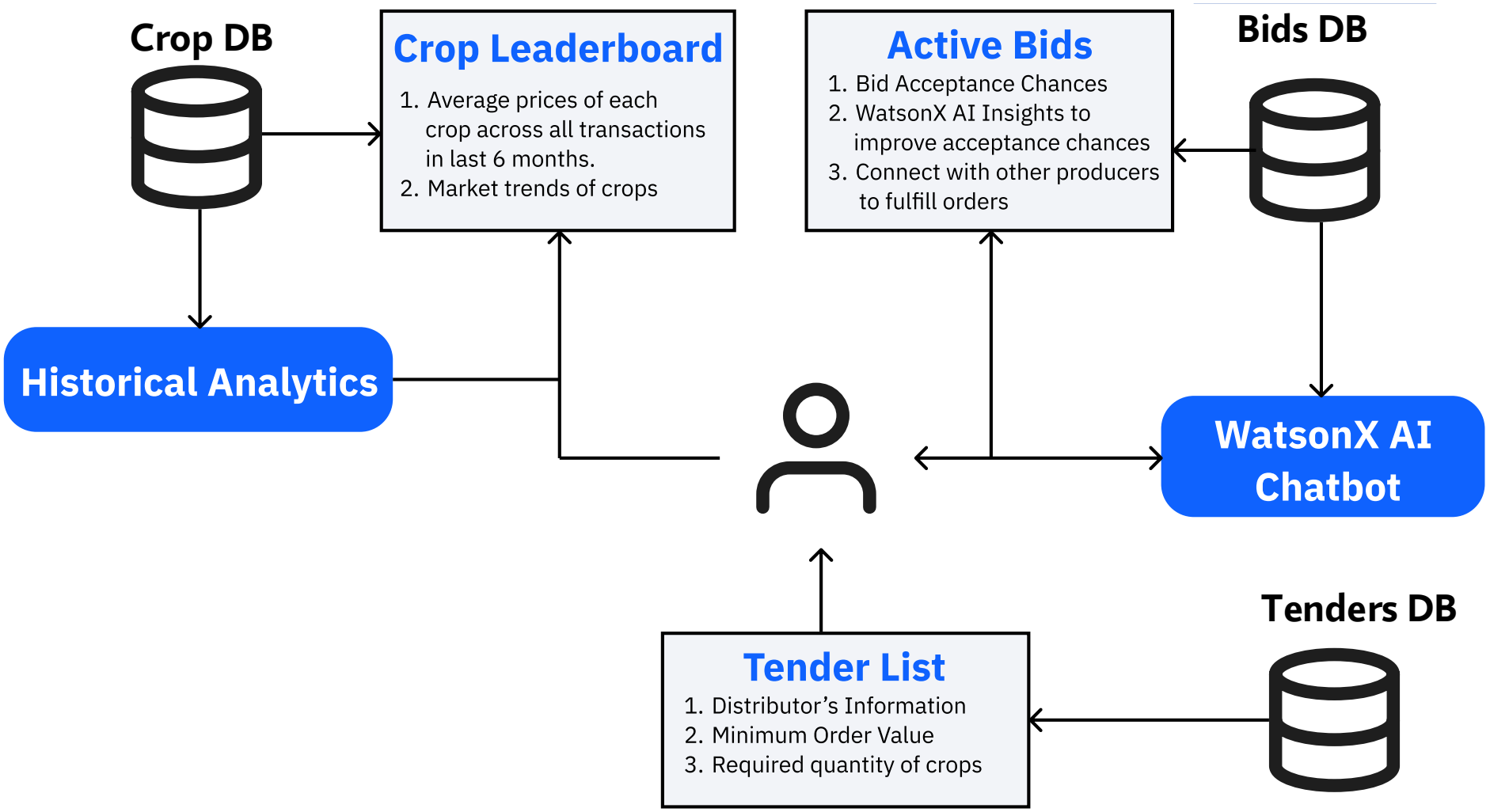
Producers

- Recommendations on next season’s crop based on recent trends
- Promotional content generation for beginner producers
- Insights on competitive bids

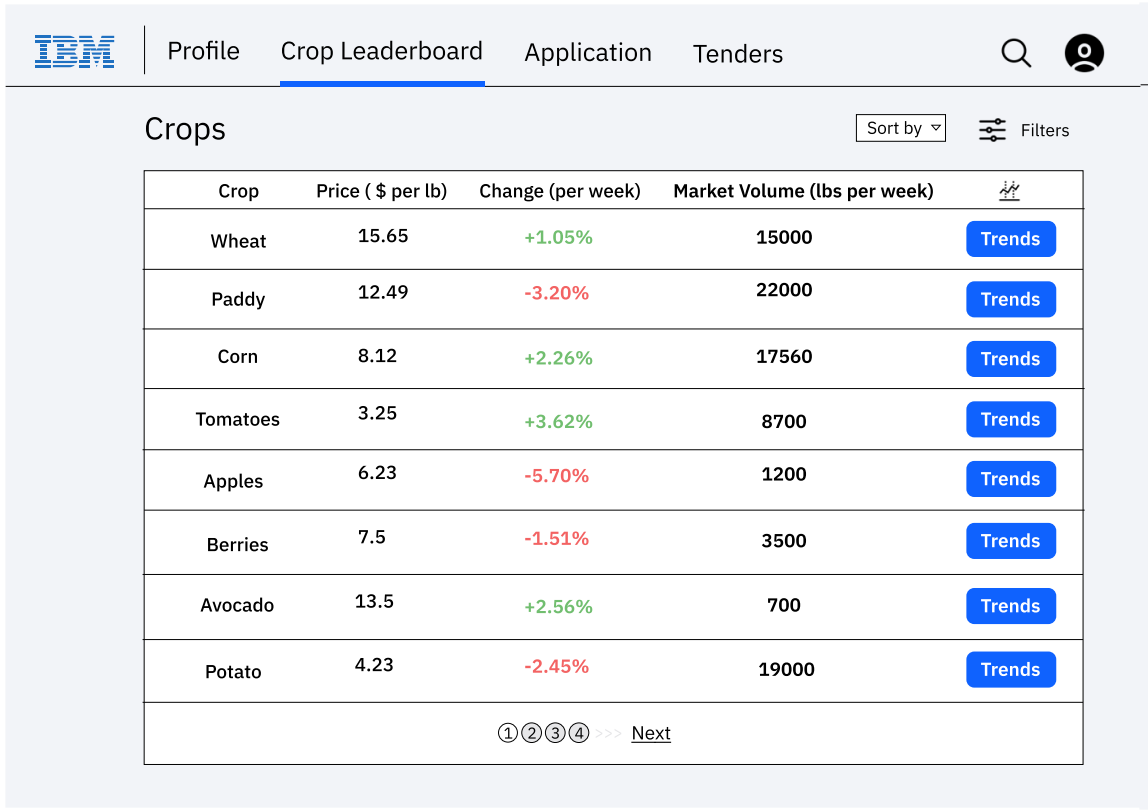
Distributor

- Elimination of spam bids based on quoted profit range
- In case of zero bids, auto-adjustment of profit range based on crop leaderboard
- Combination bids to fulfill order to maximize service level and profit

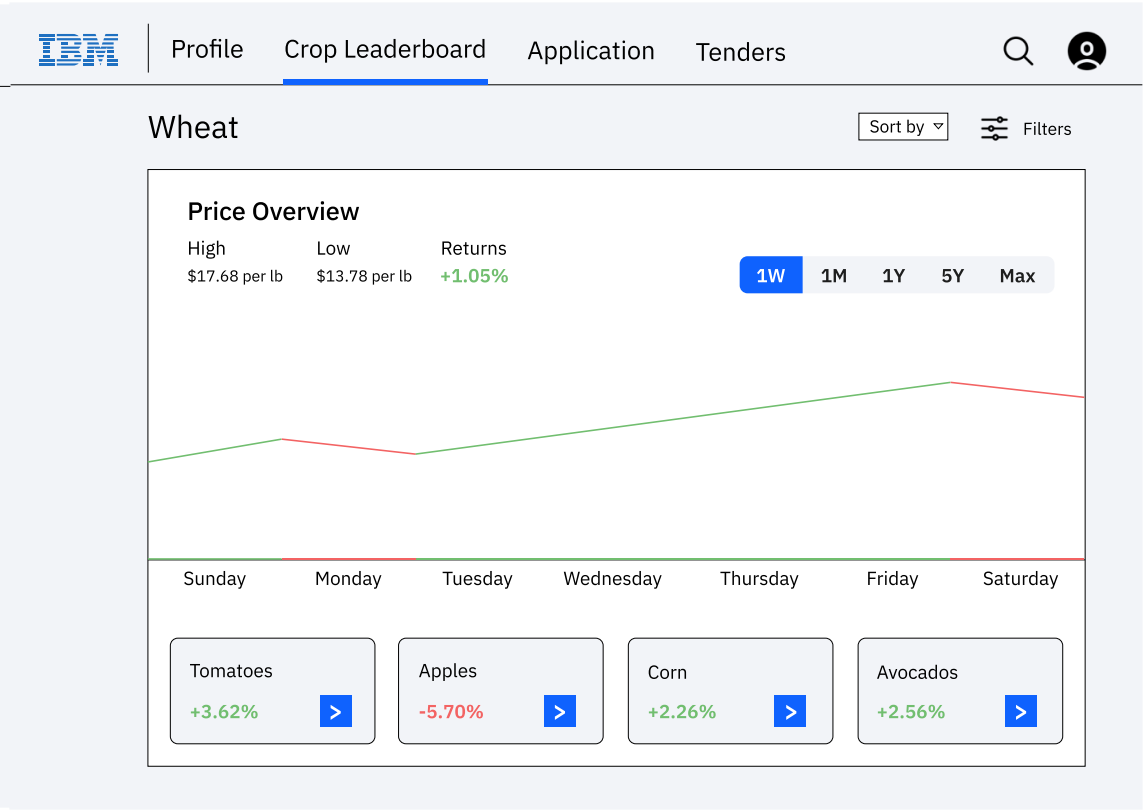
Producer Portal



Insights Driven Crop Leaderboard (Producer Portal)



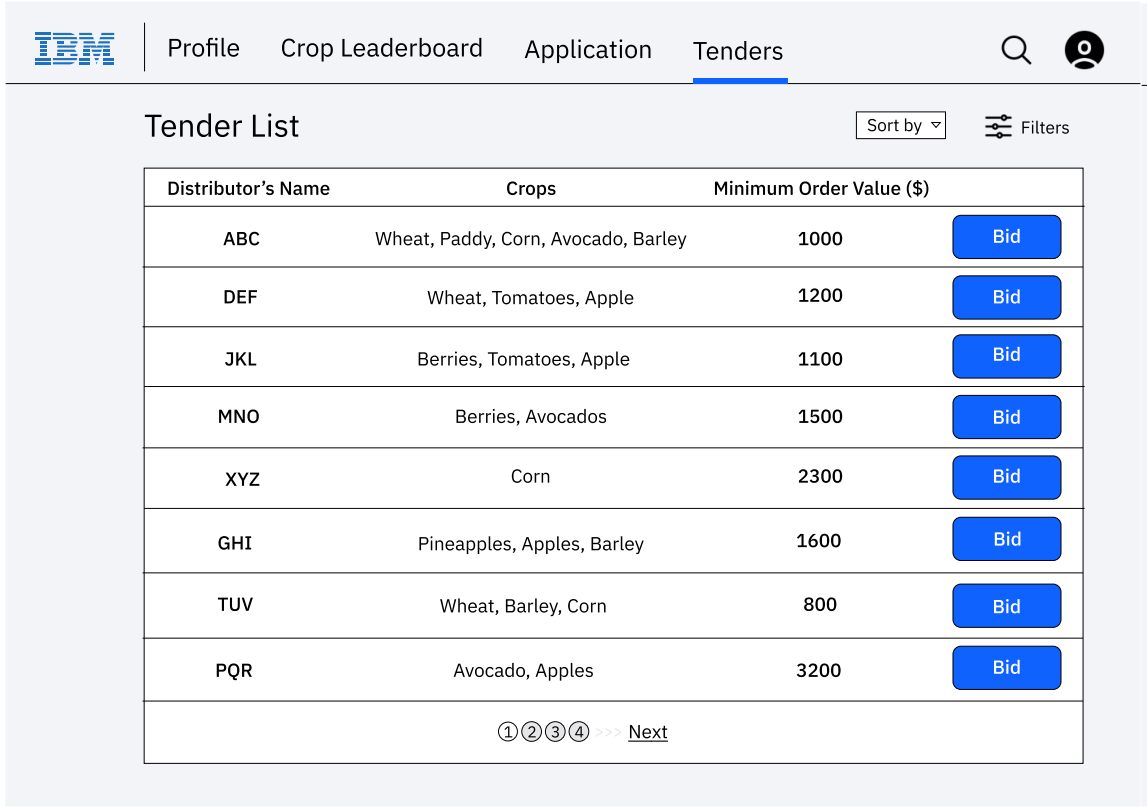
Real-time Crop Prices Monitoring

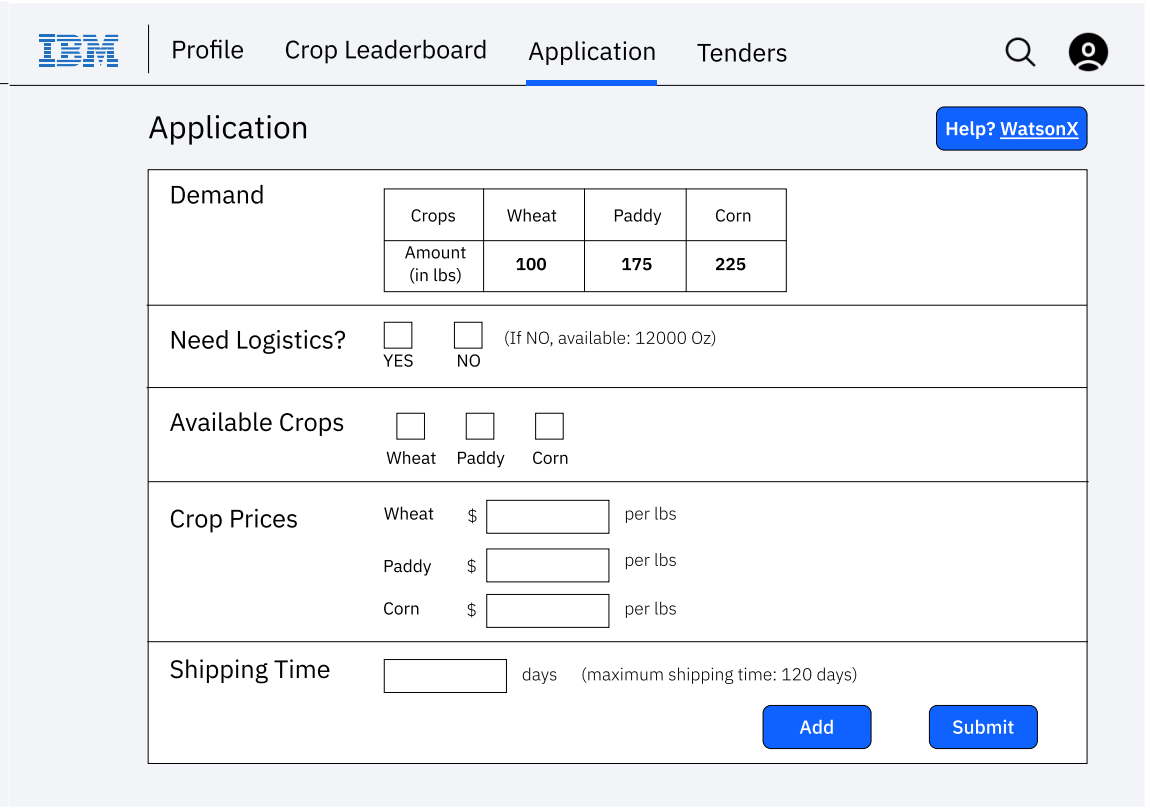


Historical Price Analytics

Using the average crop prices from previous transactions over a 6-month period.

Connect, Bid, and Grow! (Producer Portal)

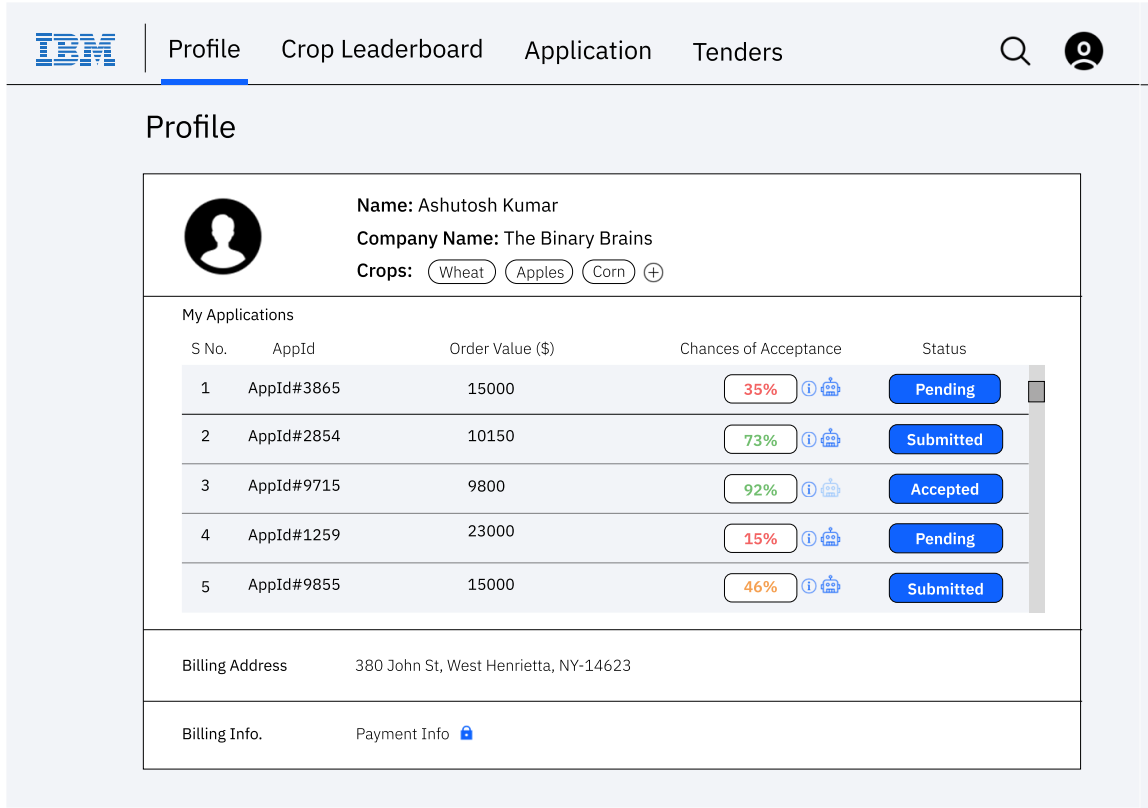


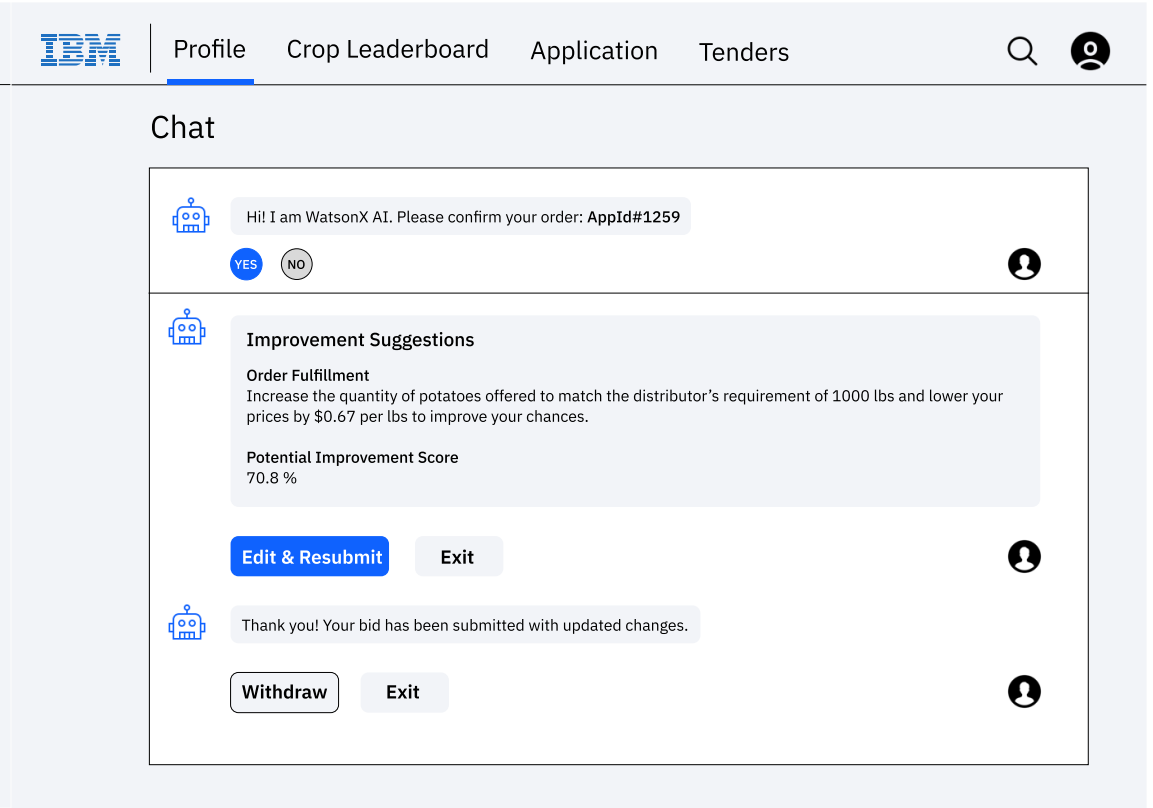


Access to Verified Distributors Network

Fill Out and Submit Bids

Track and Improve Your Bids ! (Producer Portal)



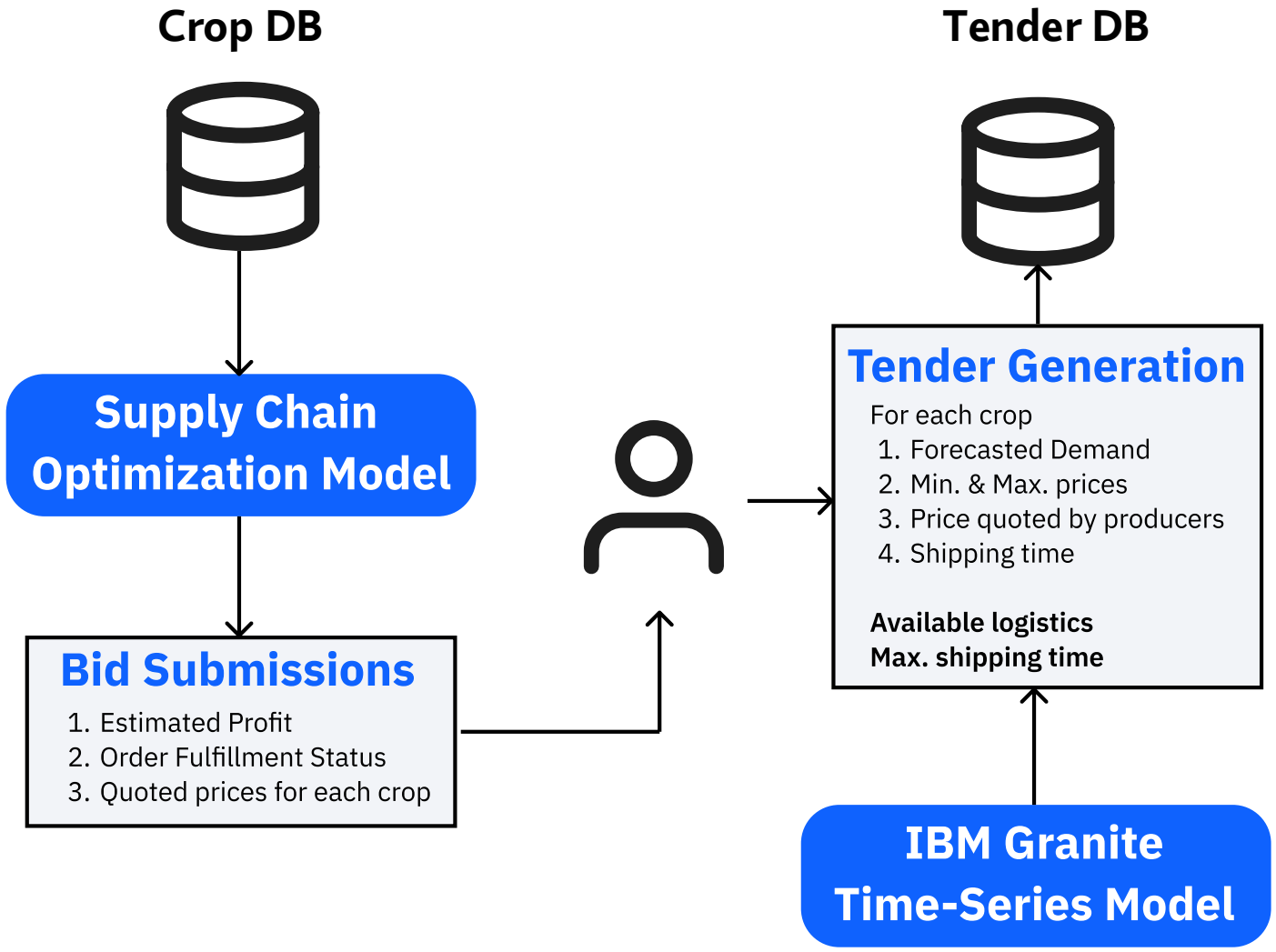


Bids Application Tracker with Insights

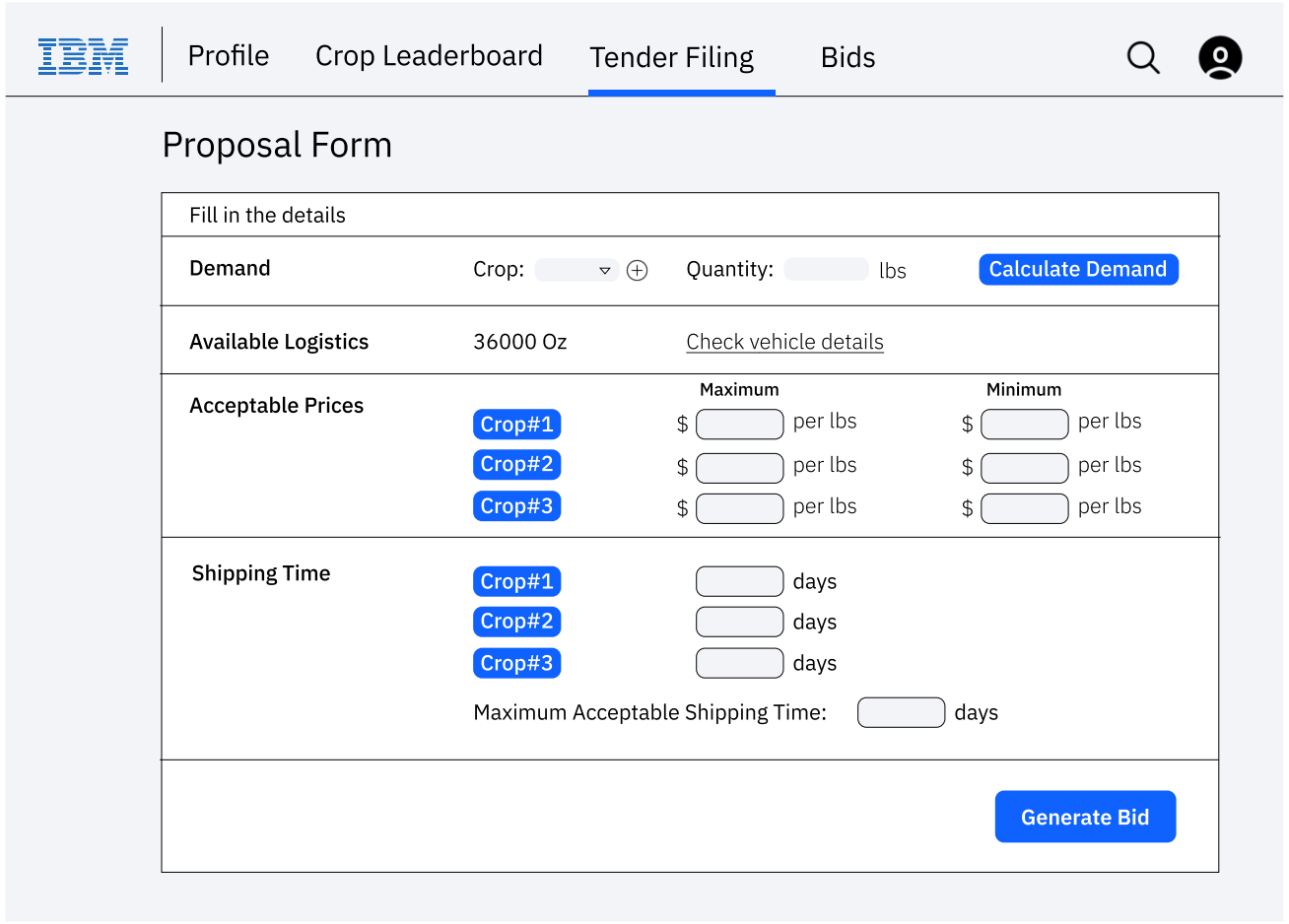
WatsonX AI Insights

Based on the output from the OR Optimization and Probability Module

Distributor Portal

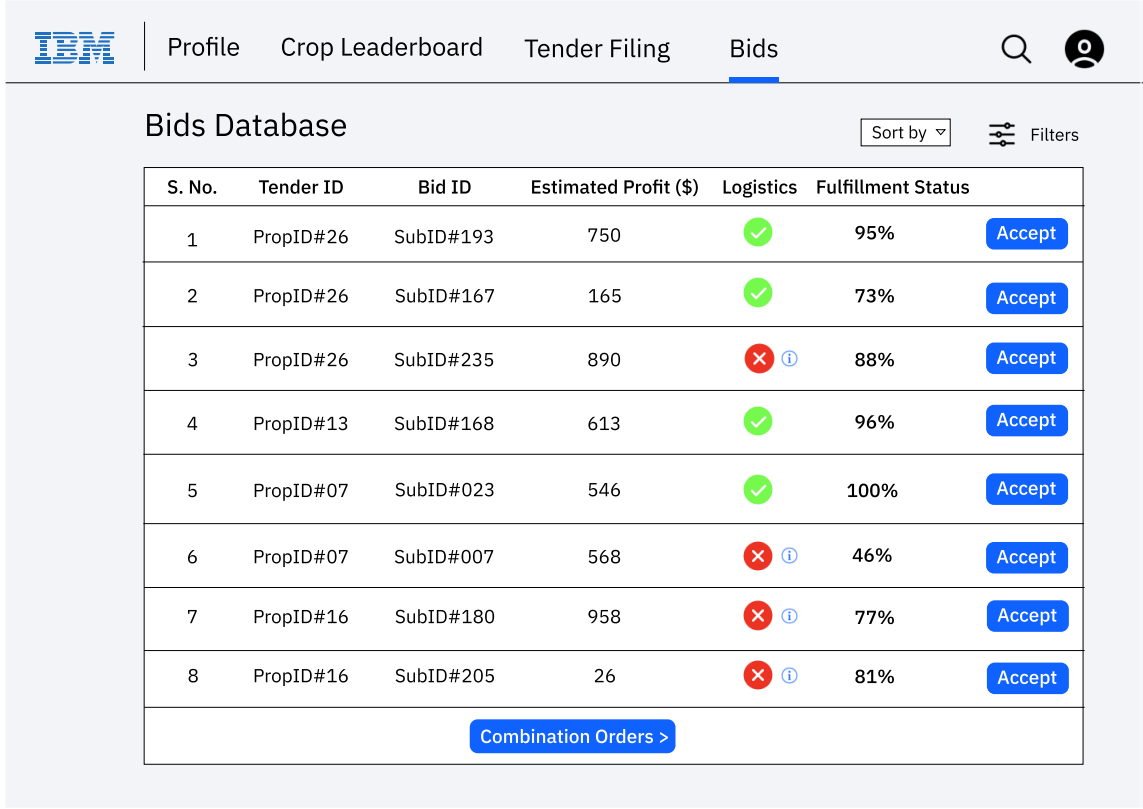


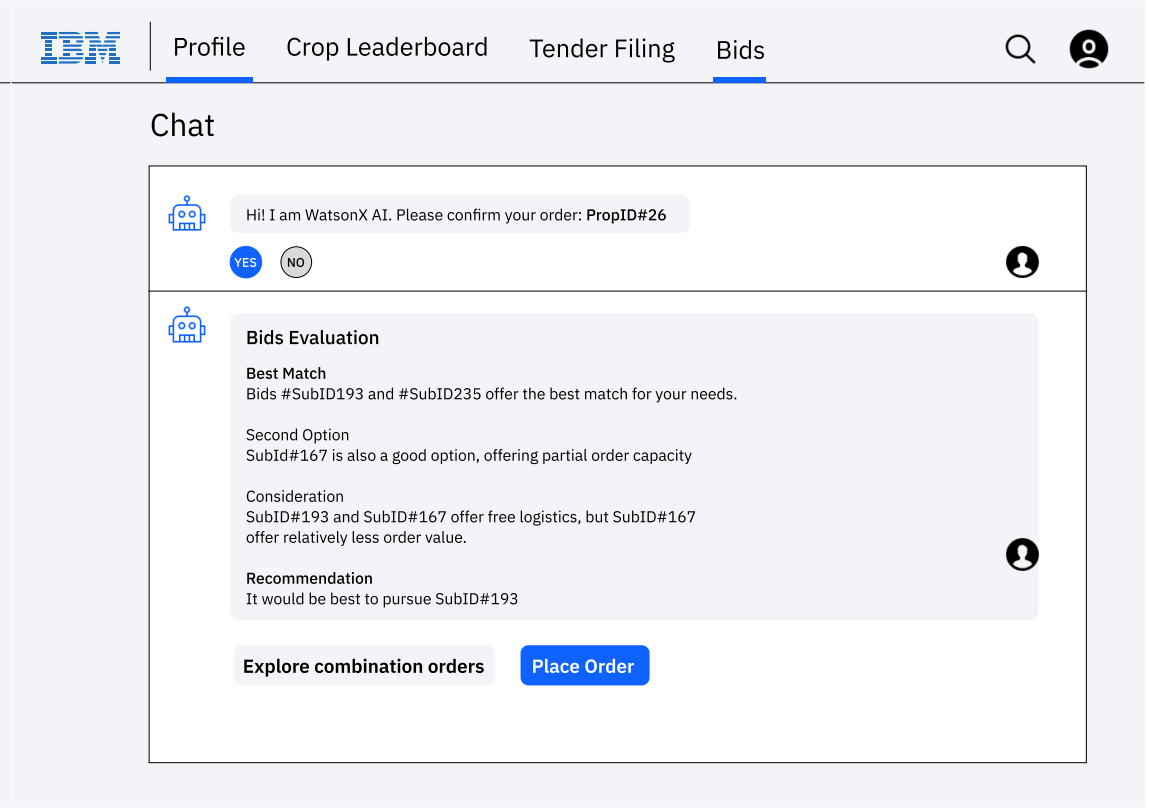
Tender Filing Form (Distributor Portal)



Tender Filing using forecasted demand for each crop

Bid Submissions (Distributor Portal)





Estimated Profits from Submitted Bids

Evaluation of Bids using WatsonX AI

Based on the output from the OR Optimization and Probability Module

Supply Chain Optimization Model

Distributor's Parameters

1. d_i: Known demand for crop i (in lbs)
2. L_{total}: Total available logistics capacity (in Oz)
3. c_l: Cost of logistics per unit volume ($/Oz)
4. ρ_i: Density of crops i (lbs/Oz)
5. t_{max}: Maximum acceptable shipping time (in days)
6. t_i: Shipping time for crop i (in days)
7. m_{min}: Minimum acceptable profit margin (as a percentage)
8. m_{max}: Maximum acceptable profit margin (as a percentage)
9. D_{total}: Total demands to be met (in lbs)

Decision Variables

1. y_i: Binary variable, 1 if crop i is selected from a producer, 0 otherwise
2. l_i: Logistics capacity allocated to crop i (in Oz)
3. s_i: Selling price of crop i to retailers (per lbs)

Objective Function

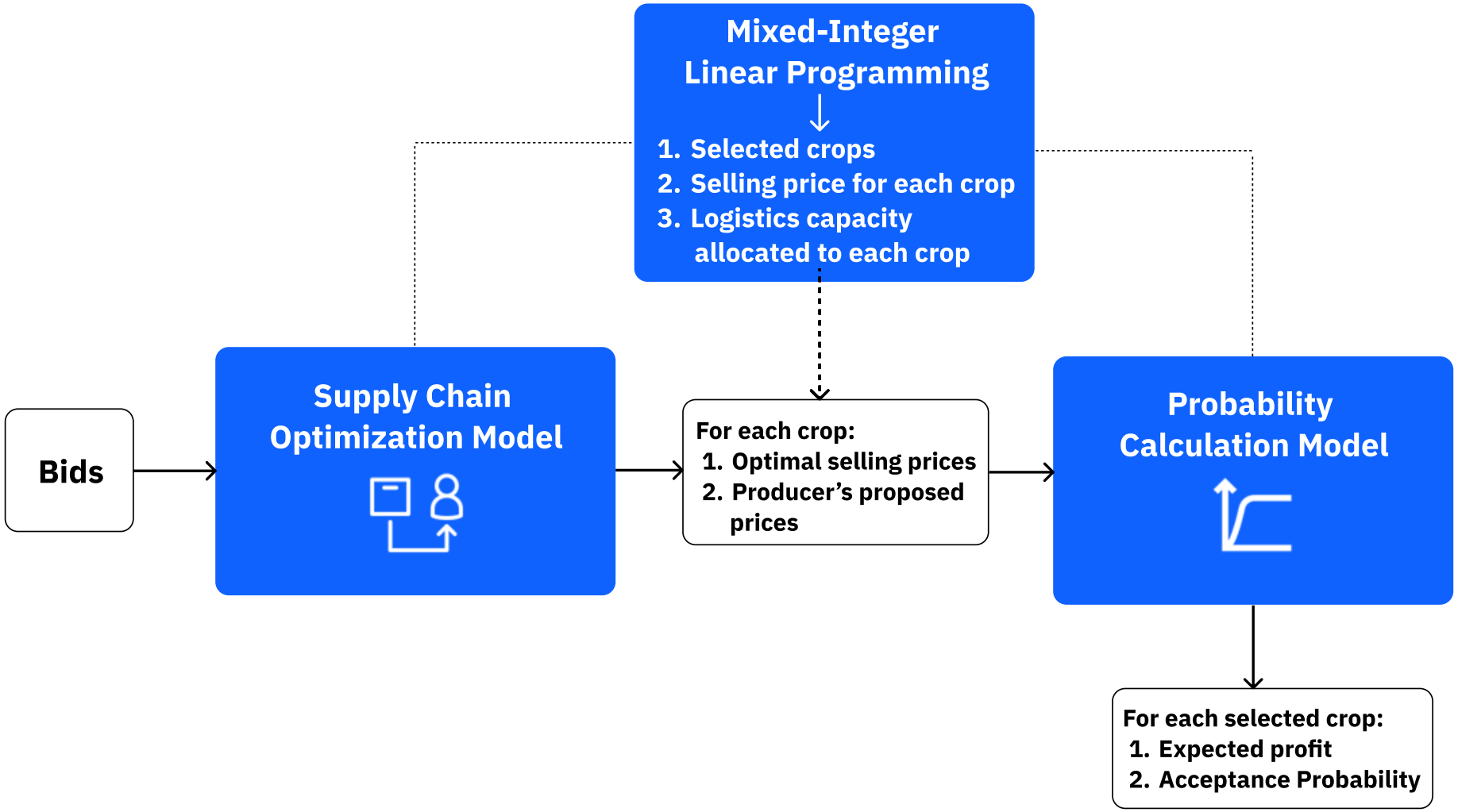
Maximize total profit

Max $Z = \sum_i (s_i - p_i - c_l l_i / d_i) d_i y_i$

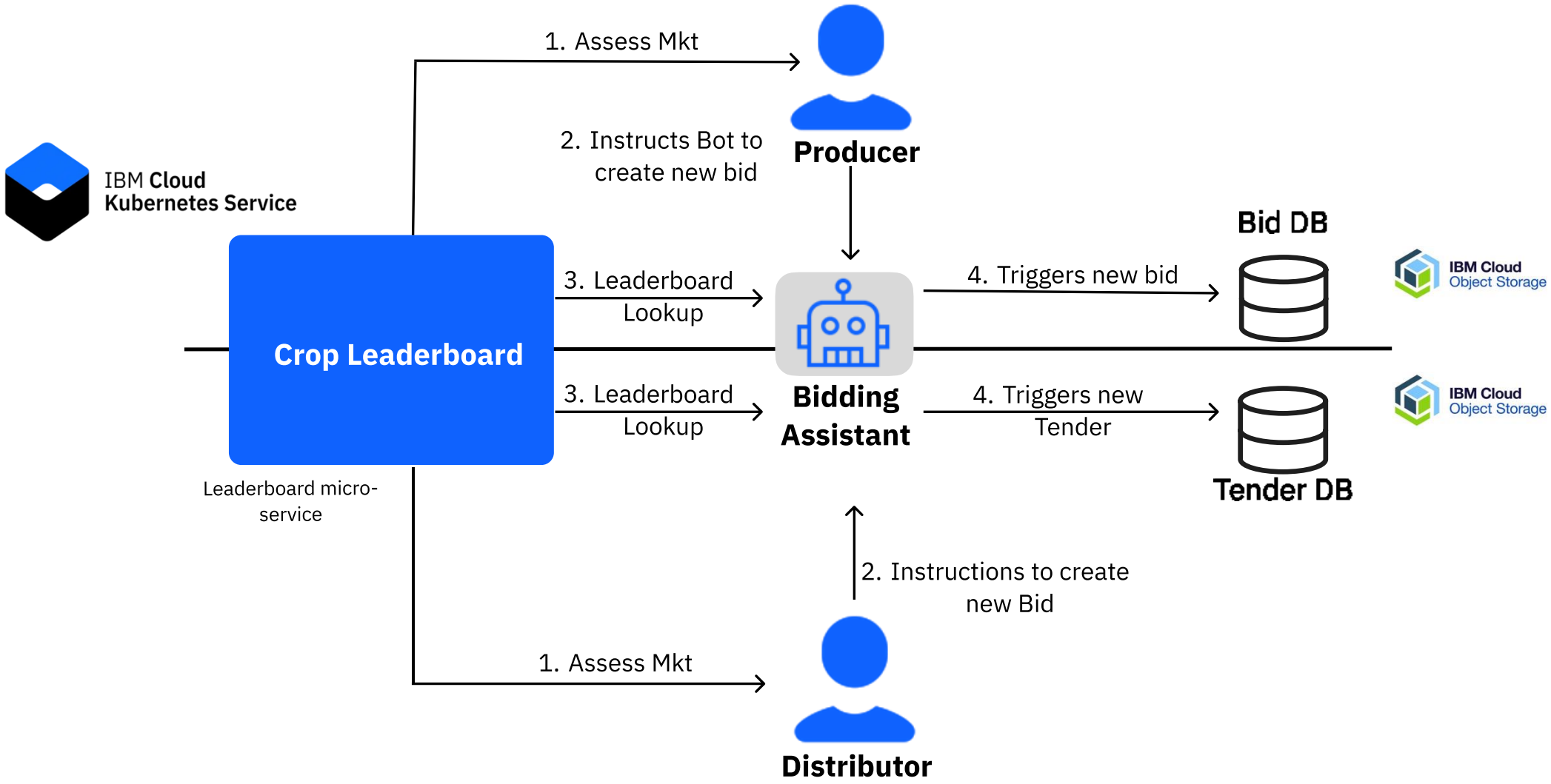
Constraints

1. Logistics capacity constraints: $\sum_i l_i \leq L_{total}$
2. Crop Volume Constraint: $l_i \geq \frac{d_i}{\rho_i} y_i, \forall i$
3. Maximum Shipping Time Constraint: $t_i \leq t_{max}, \forall i$
4. Demand Satisfaction Constraint: $\sum_i d_i y_i \geq D_{total}$
5. Profit Margin Constraints: $p_i(1 + m_{min} \leq s_i \leq p_i(1 + m_{max}), \forall i$
6. Binary Constraint: $y_i \in 0, 1$
7. Non-negativity Constraint: $l_i, s_i \geq 0, \forall i$

Solution Approach



Always a step ahead with Agentic AI



Next up– Demos!