

DATA+AI
SUMMIT 2022

Vision AI

Animal Health
Industry use-cases
using Databricks on Azure



ORGANIZED BY  databricks



VirooPax Mirji

Director - Solution Area Specialist AI
Microsoft Corporation

Agenda: "Vision AI" Solution

1 Business Context & relevance of this Animal Health use case

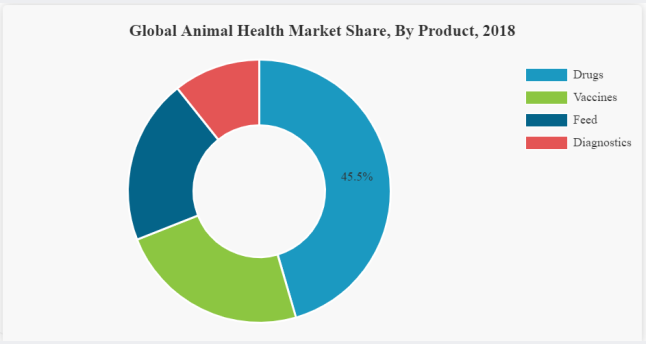
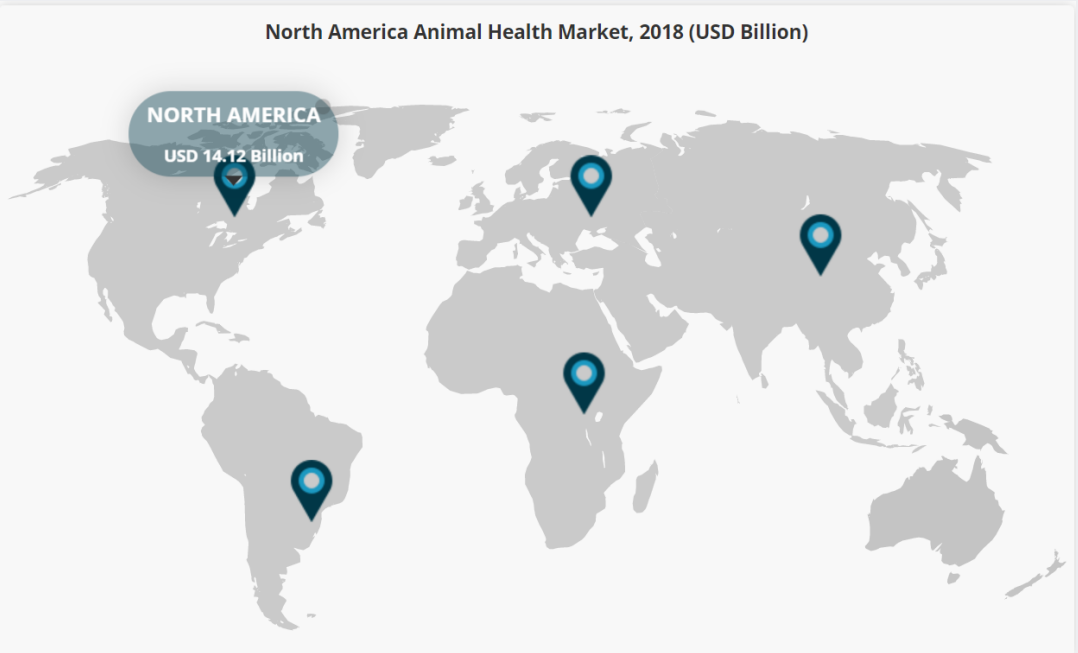
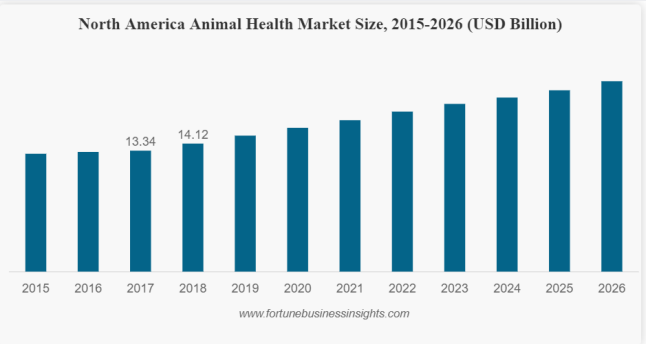
2 Solution WAF Readiness & Extensibility of the solution

3 User Experience & Demo

4 Value to Microsoft & Customers



Global Animal Health market size was USD 47.50 B and is projected to reach USD 67.56 B in 2026, exhibiting a CAGR of 6.3% during the forecast period



Animal Health Market Segmentation

Animal Types

- **Companion Animal**
 - Dogs
 - Cats
 - Horses
 - Others
- **Production Animal**
 - Poultry
 - Swine
 - Cattle
 - Sheep & Goats
 - Fish

Animal Products

- **Vaccines**
 - Live Attenuated Vaccines
 - DNA Vaccines
 - Recombinant Vaccines
 - Inactivated Vaccines
 - Others
- **Pharmaceuticals**
 - Live Attenuated Vaccines
 - DNA Vaccines
 - Recombinant Vaccines
 - Inactivated Vaccines
 - Others
- **Feed Additives**
 - Nutritional
 - Medicinal
- **Diagnostics**
 - Instruments
 - Consumables
- **Others**

Distribution Channels

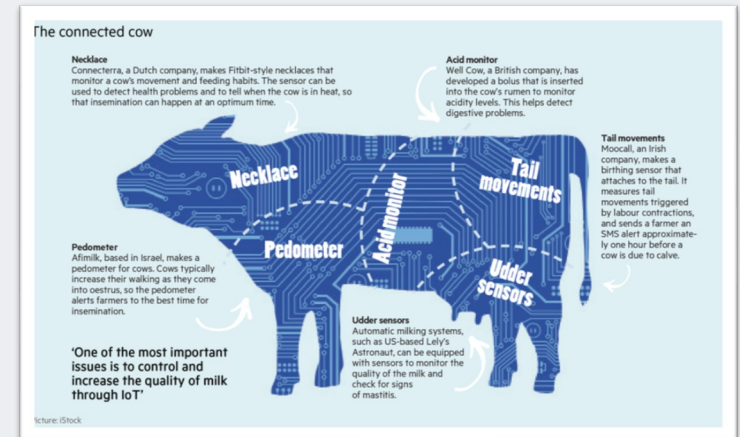
- Retail
- E-commerce
- Veterinary Hospitals & Clinics

Distribution Channels

- Reference Laboratories
- Point-of-care Testing/In-house Testing
- Veterinary Hospitals & Clinics
- Medical Solutions / Tech / Others

Region

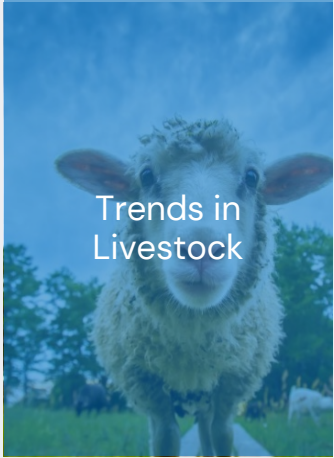
- **North America:** U.S., Canada
- **Europe:** U.K., Germany, France, Italy, Russia, Spain, Netherlands, Switzerland, Sweden, Ireland, Poland
- **Asia Pacific:** Japan, China, India, Indonesia, Thailand, Australia, South Korea, Philippines, Malaysia, Singapore
- **Latin America:** Brazil, Mexico, Argentina
- **Middle East & Africa:** South Africa, Saudi Arabia, Turkey, Iran, United Arab Emirates, Israel



Industry Trends in Animal Health

Theme

Expectations



Trends in Livestock

Rising Protein Demand vs. Sustainability Concerns

Digital, Data & Analytics, AI/ML

Food Animal Health

- Increased demand for affordable & safe animal protein
- Increased consumer expectations for more sustainable production practices
- Climate change vs cattle farming
- Increased use of IOT sensors, data, genetics to improve productivity
- Broadened role of analytics and technology in clinical decisions and provision of services
- Growing demand for vaccines, antibiotics, parasiticides and other products
- Demand for nutritional health products like enzymes, probiotics and prebiotics



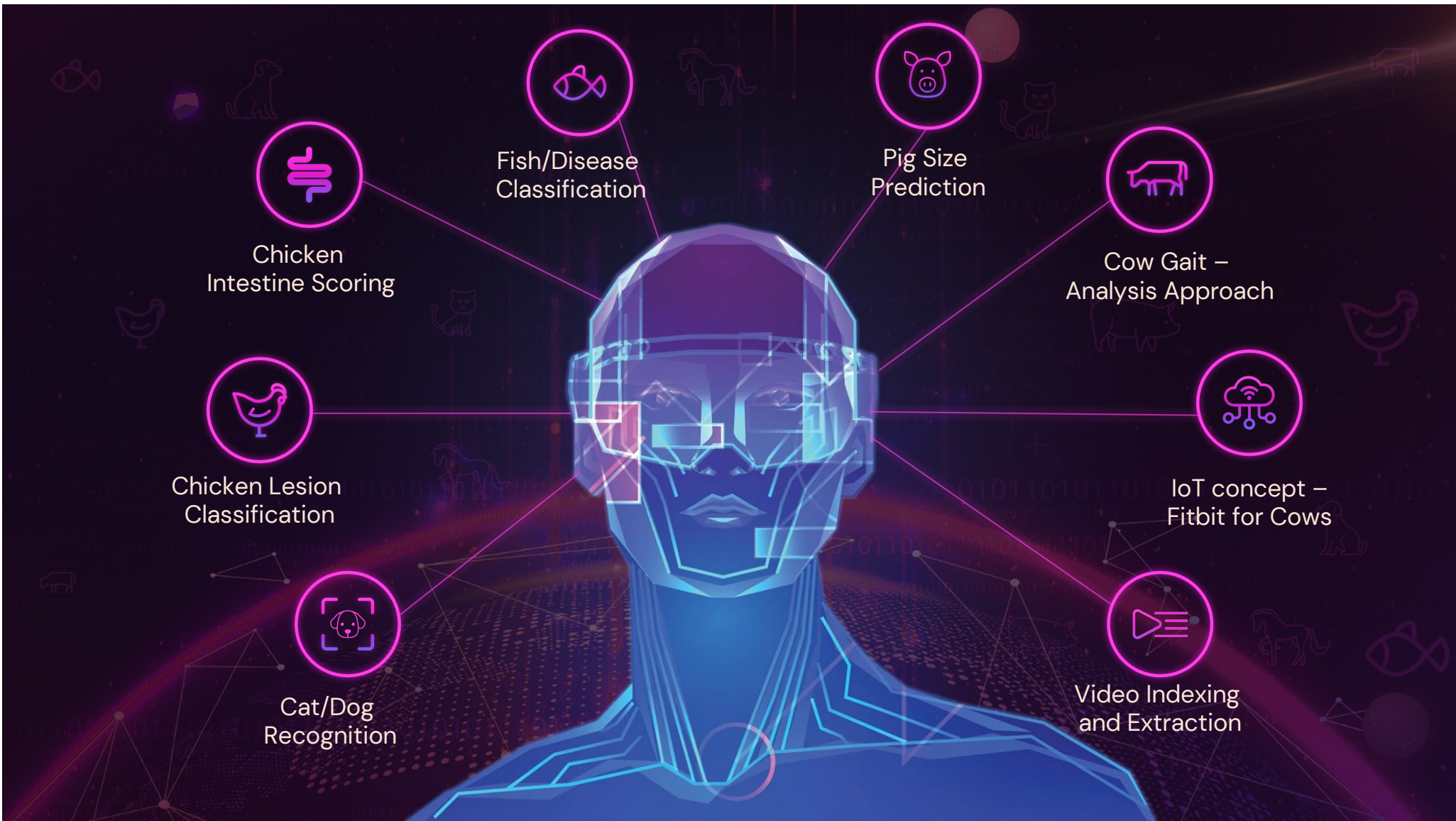
Trends in Companion Animals

Animal Health

Rising Pet Owner Influence

Consolidation

- Products for the treatment of pain and health conditions.
- State of the art parasiticides and vaccine products
- Covid-19 strengthening human-animal bond; rising animal health spend
- Demand for convenience and price transparency driving online sales
- Consolidation of customers and distributors
- Need for unified relationship
- Rising expectations on pricing and service

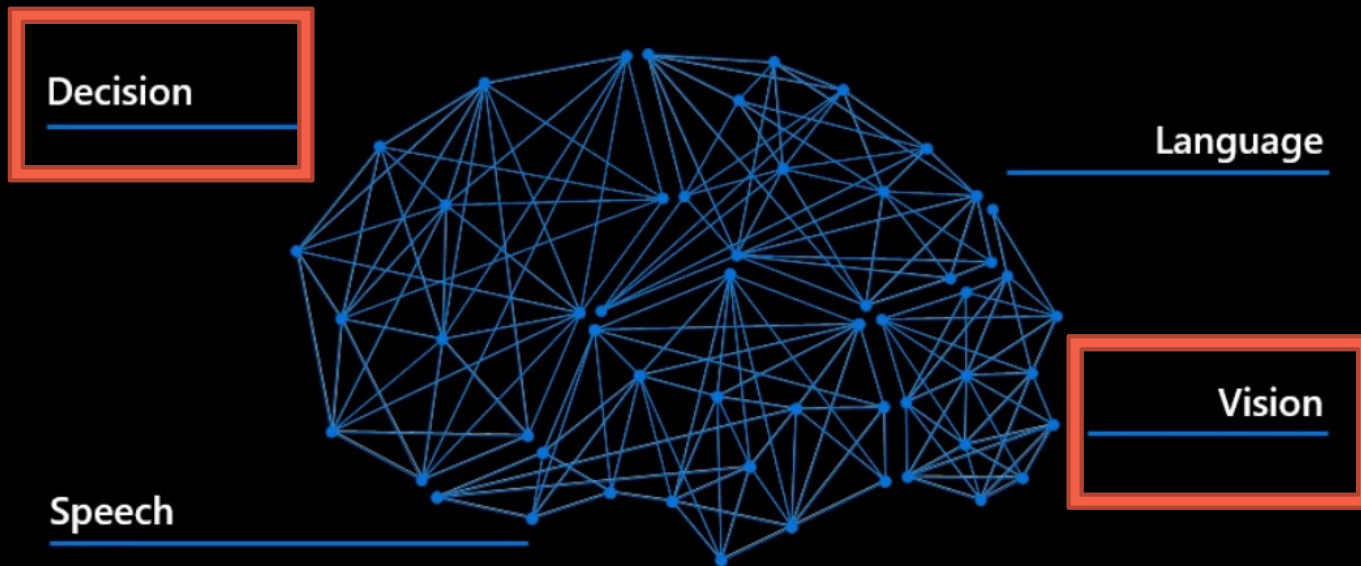


Prioritizing animal health use-cases based on strategic alignment & its business impact

Cognitive Use Case to be chosen & its Value	Operational Efficiencies	Net New Revenue	Cost Savings	Biz Impact
1. Knowledge (Cognitive Search & Decision AI)				H
2. Pig Size Estimation				M
3. Poultry Performance (i2 scoring)				H
4. Lyme Disease Predictions				M
5. Gait-Analysis / Abnormality Predictions for Cows				M
6. Animal Health Tracking (IOT, Streaming Data)				VH
7. Animal Image Recognition & Classification (healthy vs. unhealthy)				L Foundational

Sample

Azure Cognitive Services



Mission

A man with a beard, wearing a blue button-down shirt over a white t-shirt, is looking at a tablet computer. He is standing in a farm or livestock facility, with a cow visible in the background. The entire image has a blue tint.

Aiming to Tackle
**#1 Economic Loss for Livestock
Industry**

- Save Lives of millions of Cattle & Poultry
- Reduce Zoonotic-Born Human Disease
- Stabilize Protein Production for Rapidly Expanding Human Population

Ex: Why maintaining the health of cows is critical?

In the livestock industry, maintaining the health of cows is critical to ensure their ability to breed & produce milk.

Hurdle

- A major hurdle to the health of farm cattle is **bovine respiratory disease**

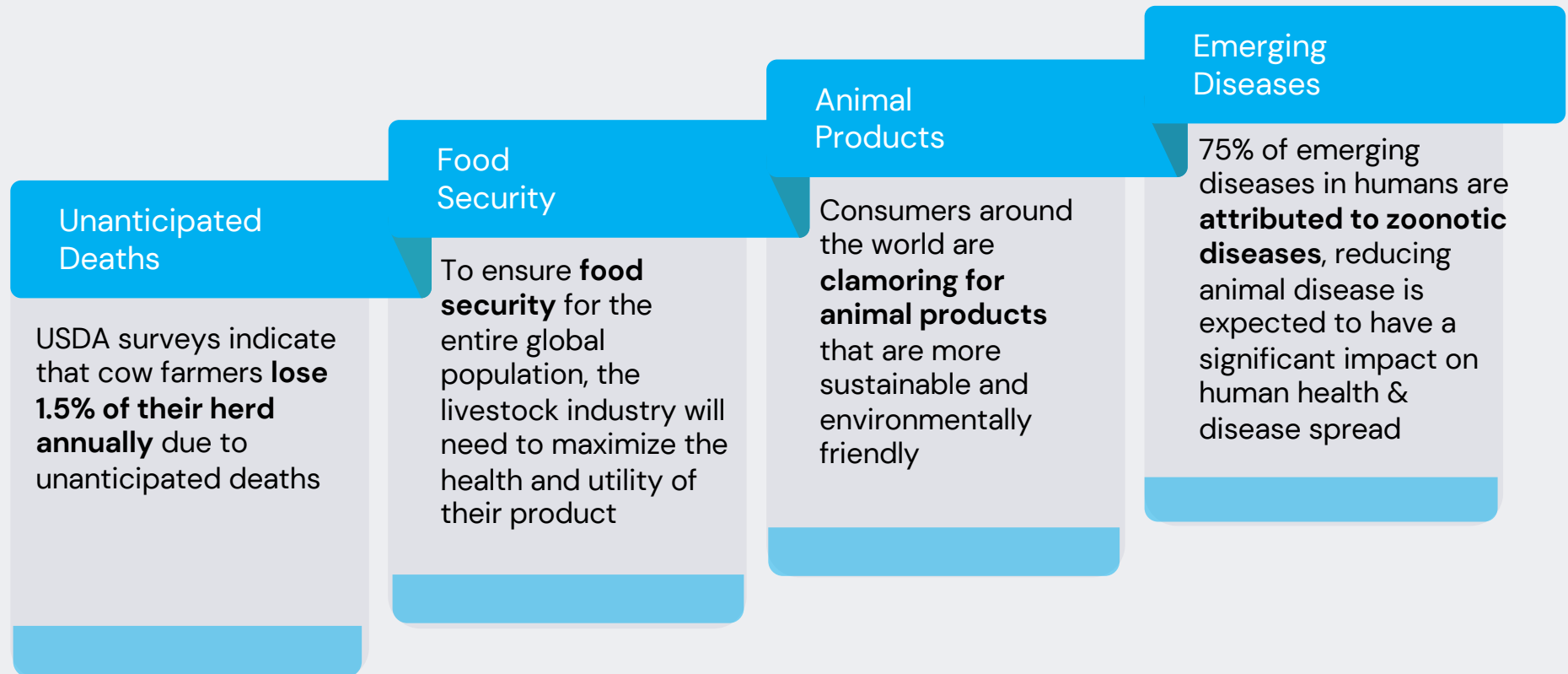
Traditional Solution

- Use **CT and ultrasound scans** to capture videos of cow lungs to identify any malformations or negative prognostic risk factors

Challenge with Status Quo

- Due to the **lengthy review time** and the hundreds of millions of cows around the world that require evaluation, this process is typically only performed on a yearly basis, resulting in millions of **unnecessary animal deaths**

The long gap between evaluations is a significant problem for the livestock industry



- To help reduce the rate of unnecessary livestock deaths and drive increased revenue for cow and poultry farmers
- Many in the industry are turning to **advanced monitoring technology**, a market that is expected to grow from **\$1.4 billion to 2.3 billion by 2026**.

<https://www.marketsandmarkets.com/Market-Reports/livestock-monitoring-market-72634532.html>

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Identified Challenge & Problem Statement

How might we "reimagine experiences" for Vets/Farmers/Animal Pharma firms to leverage Image/Video recognition technologies in MS Azure AI & Databricks to make better decisions in serving their audiences/customers?

"How do we make the AI based **Self-Service Experience** a true competitive differentiator"

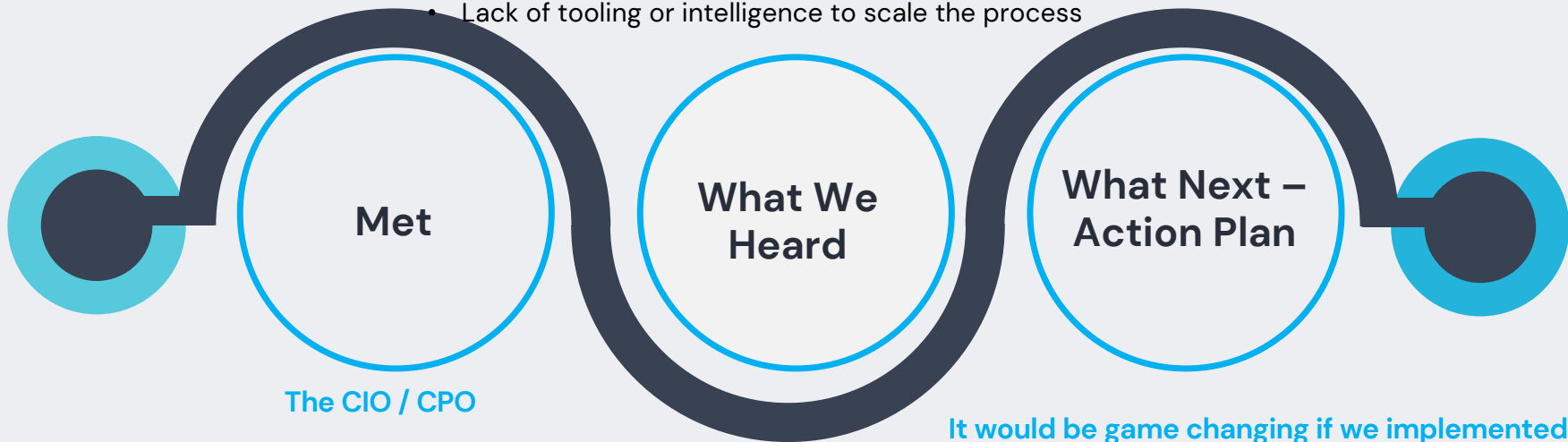
"How might we **scale up our people, processes and tools** to provide greater user delight ?"

"How might we **scale based on demand , just-in-time** without burning resources/people out ?"

“Empathize” with Animal Health / Pharma Customer

We were amazed to realize

- Lack of Process Streamlining (time consuming activities – TAT, Cycle time)
- Very manual data analysis process & dependency on SMEs
- Lack of awareness of new tech
- Not using tech to track/reduce ‘Loss’ in Animal operations
- Lack of tooling or intelligence to scale the process



It would be game changing if we implemented

- NBA, Prediction/Recommendation of drugs in rapid time. Integrate KB across farms (across Geo).
- Proactive Decisions if AI utilized
- Failure detection to help other farms.

“Empathizing” with Vet / Animal care givers too

We were amazed to realize

- SOPs non-standard and not automated in anyway consistently
- Lack of Process Streamlining (time consuming activities – TAT, Cycle time)
- Very manual cloud upload, data analysis process
- Lack of awareness of new tech

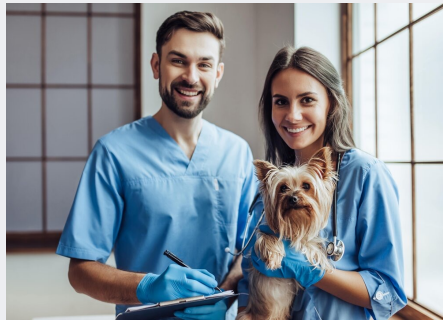


It would be game changing if we could use

- Less people and
- Less time can be spent in processing/filling data sheets, Collect images, click and
- collate/integrate with cloud software. etc. (7-8 hours per day limitation + travel time on bikes, too).

Value proposition for our use-cases with cow and chicken (poultry / farms)

Salient points



Helps the pharma companies in understanding **the cattle health condition** to provide medical help, propose relevant **medications/drugs** and specific preventive measures + education



Improve **accuracy of analysis** and as well setup process for more frequent health monitoring

The farmer would be alerted to the **health condition of the cattle** before hand (for proactive action/ drugs)



Elimination of **manual process** to go through the videos



Value proposition for our use-cases with cow and chicken (poultry / farms) – Contd..

Business ROI and Global Sustainability Impacts



Production of healthy livestock helps to **ensure a safe food supply** and keep consumer prices stable



Animal's health is linked to Human Health & disease spreads across the states and countries

Animal diseases **impact livestock production** through direct costs (deaths, morbidity, reduction in productivity) and indirect costs (prevention and control measures)

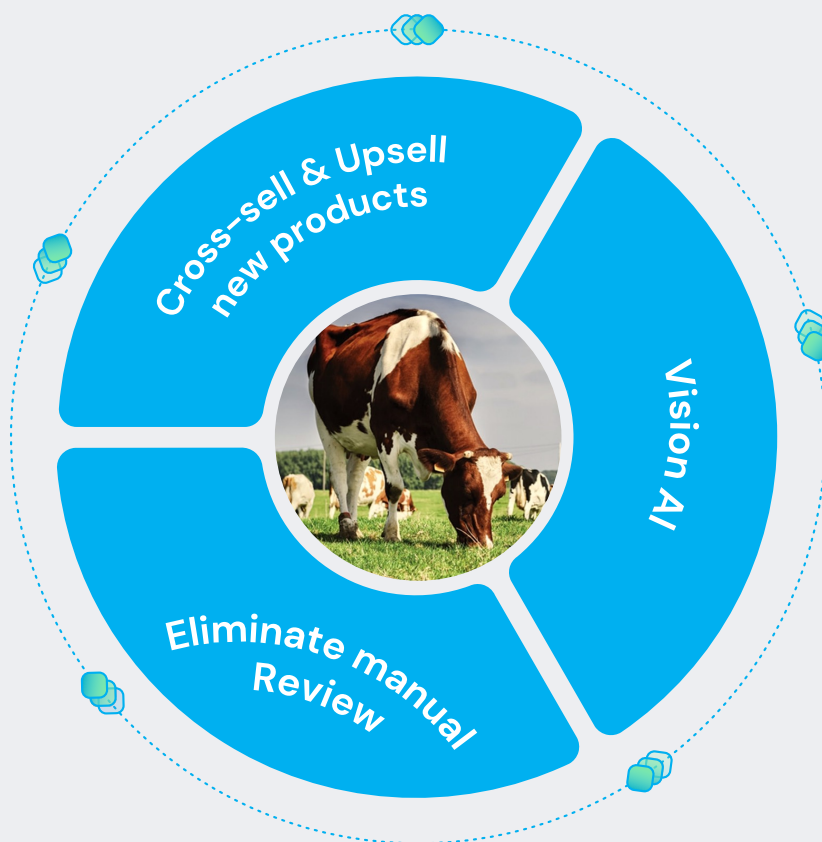


Technical feasibility, & Ease of use of Vision AI as we see a global **rise in number of dairy farms & cattle population.**



Vision AI is poised to have a significant effect on the livestock industry

- Pharmaceutical companies focusing on animal health drugs can cross-sell and upsell new products in a more cost-effective and proactive manner to the vets & farm-owners.
- Vets no longer have to manually review every single scan and can focus on just the animals identified as being at risk



- Vision AI enables livestock farmers to dramatically reduce the rate of unanticipated cattle and poultry deaths that occur, resulting in massive economic gains.
- Just as significant are the ethical strides made in preventing unnecessary animal death, the positive environmental impact, and the reduction in livestock disease spread that could potentially impact humans.

Can be implemented by over **2 million cattle farms** in the US alone, in addition to millions more worldwide.

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1

Business Context & relevance of this Animal Health use case

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Solution WAF Readiness & Extensibility of the solution

3

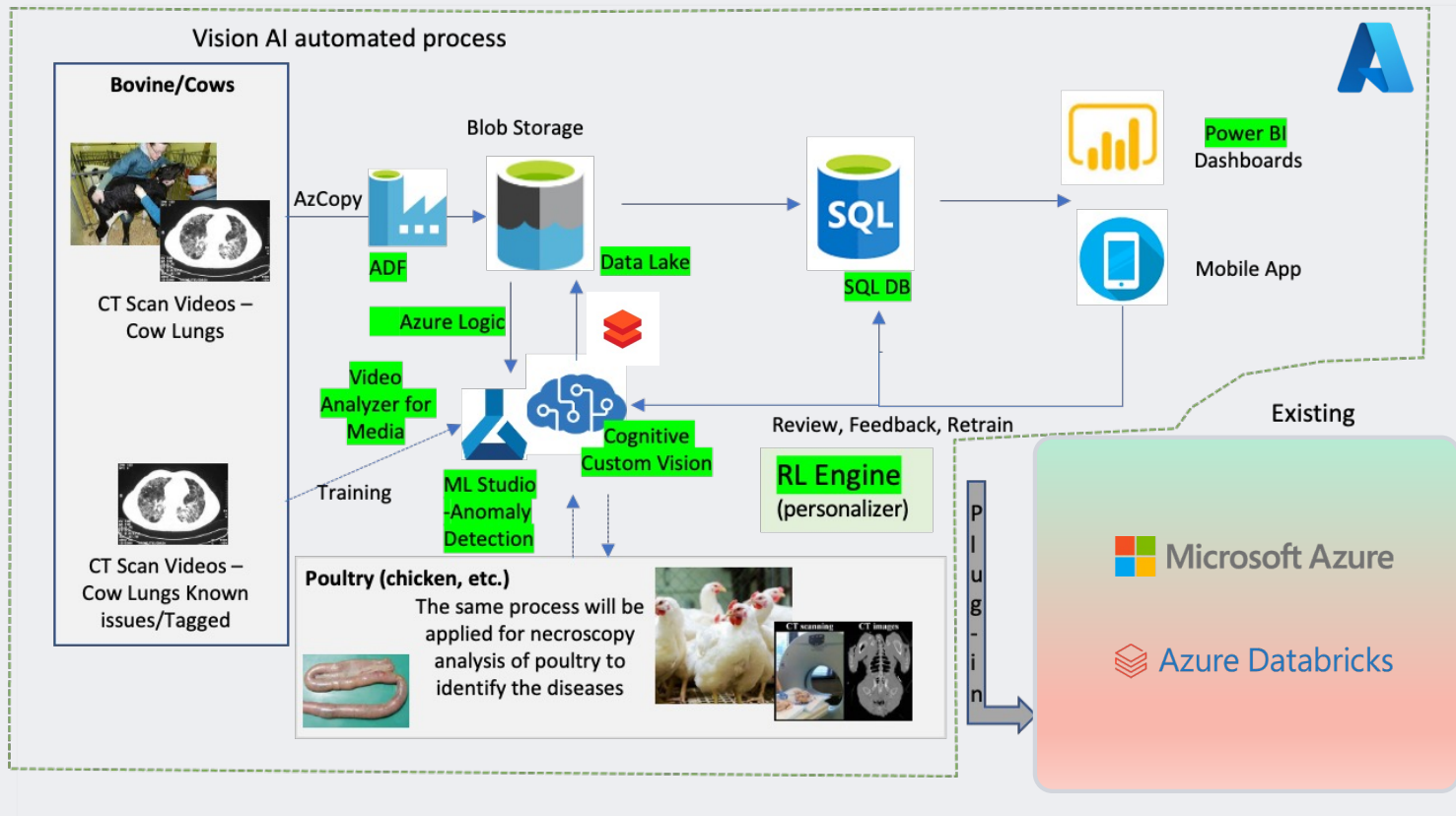
User Experience & Demo

4

Value to Microsoft & Customers

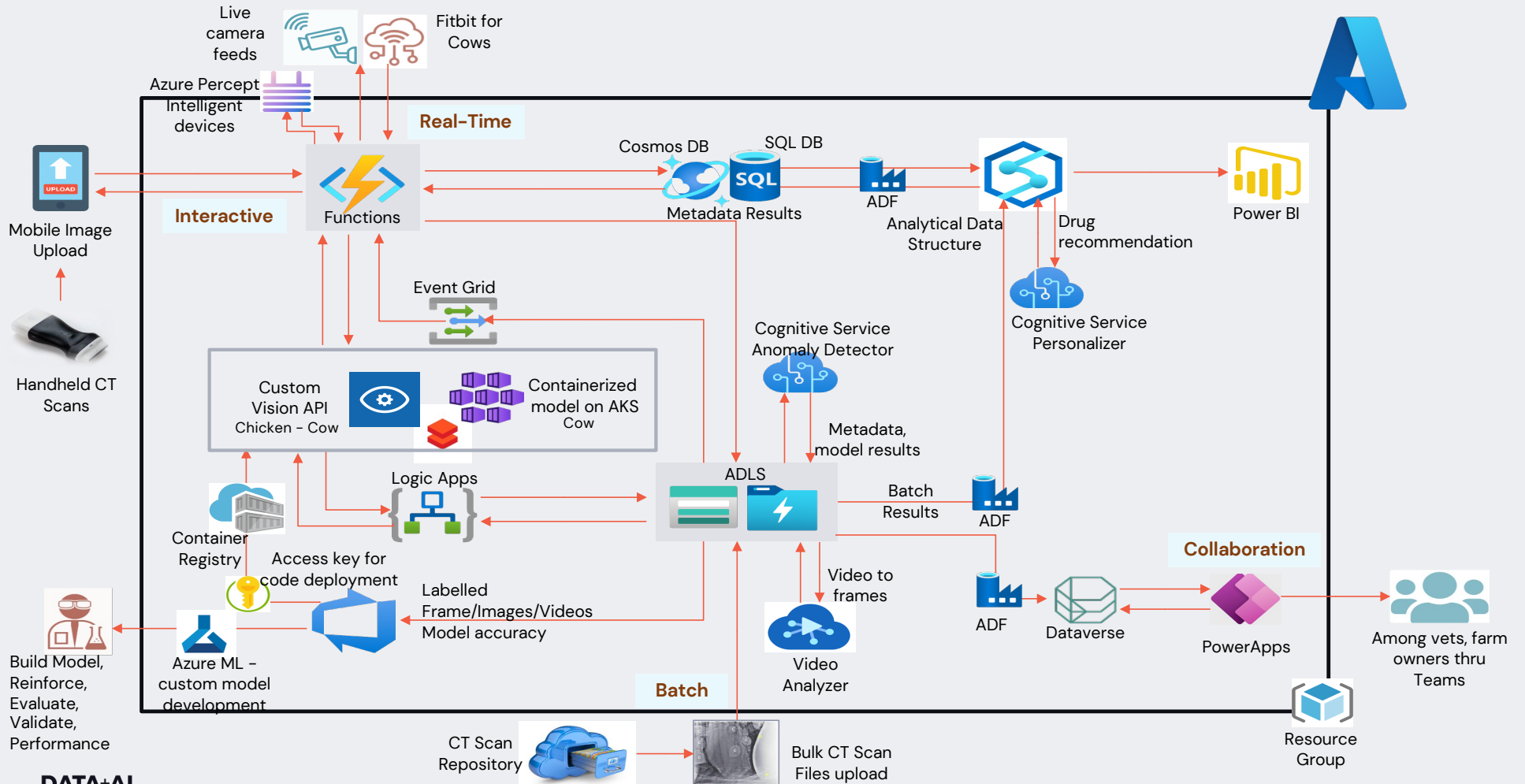


Logical / Functional Architecture for Selected Use-Case on Animal Health Vision AI



- Applying **Azure data storage & analytics, machine learning, and AI** technology to scan ultrasound videos and intestinal images to automatically identify common health risk indicators.
- When predetermined risk factors are identified, **veterinarians and farmers are immediately notified** so that they can review the relevant footage and take appropriate action.

Detailed Architecture : Animal Health Vision AI with Databricks



WAF principles considered

Reliability



Scalability through multiple region for Function, Logic Apps for batch, AKS containerization.

Resiliency for all are managed services, so at a regional level they are all resilient automatically

Cost Optimization



Azure monitor to understand services usage and Azure Advisor recommendations
Azure Policy for cost control rules
Azure Metrics Advisor

Operational Excellence



Security



Azure Key Vault for storage of passwords. Azure monitor logs for insights on the apps and resources. Azure Sentinel/Defender as needed

Datastore level security and access

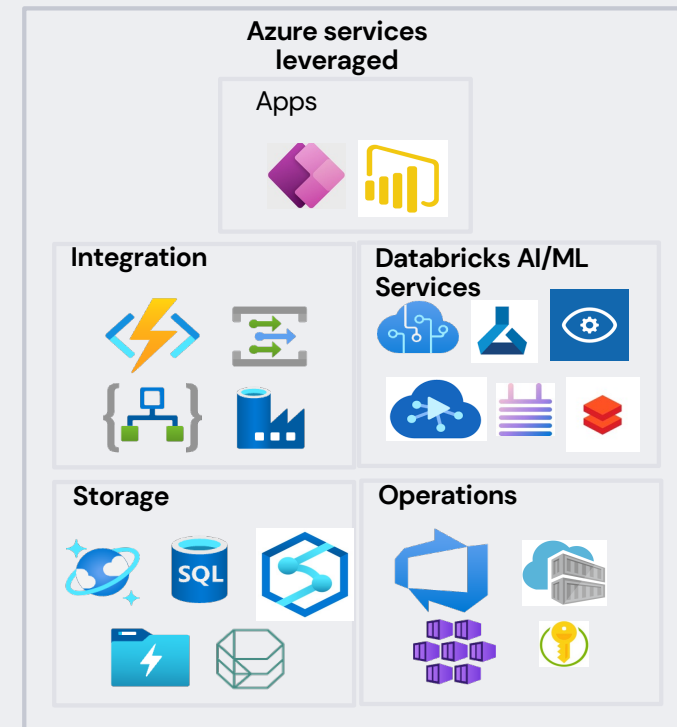
Role based security access with active directory

Performance Efficiency

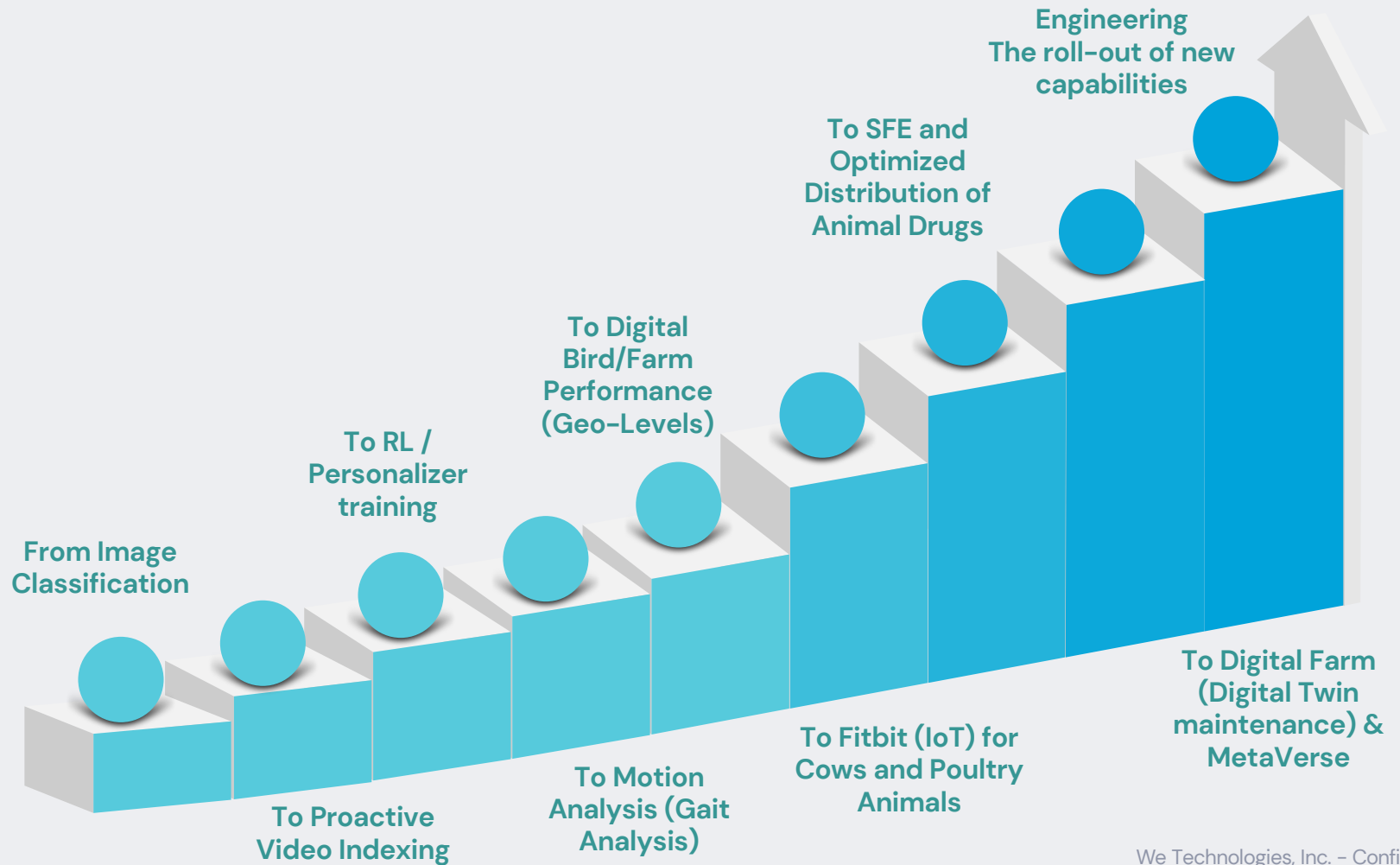


Evaluate workload with Azure Monitor and Log Analytics, provision resources dynamically

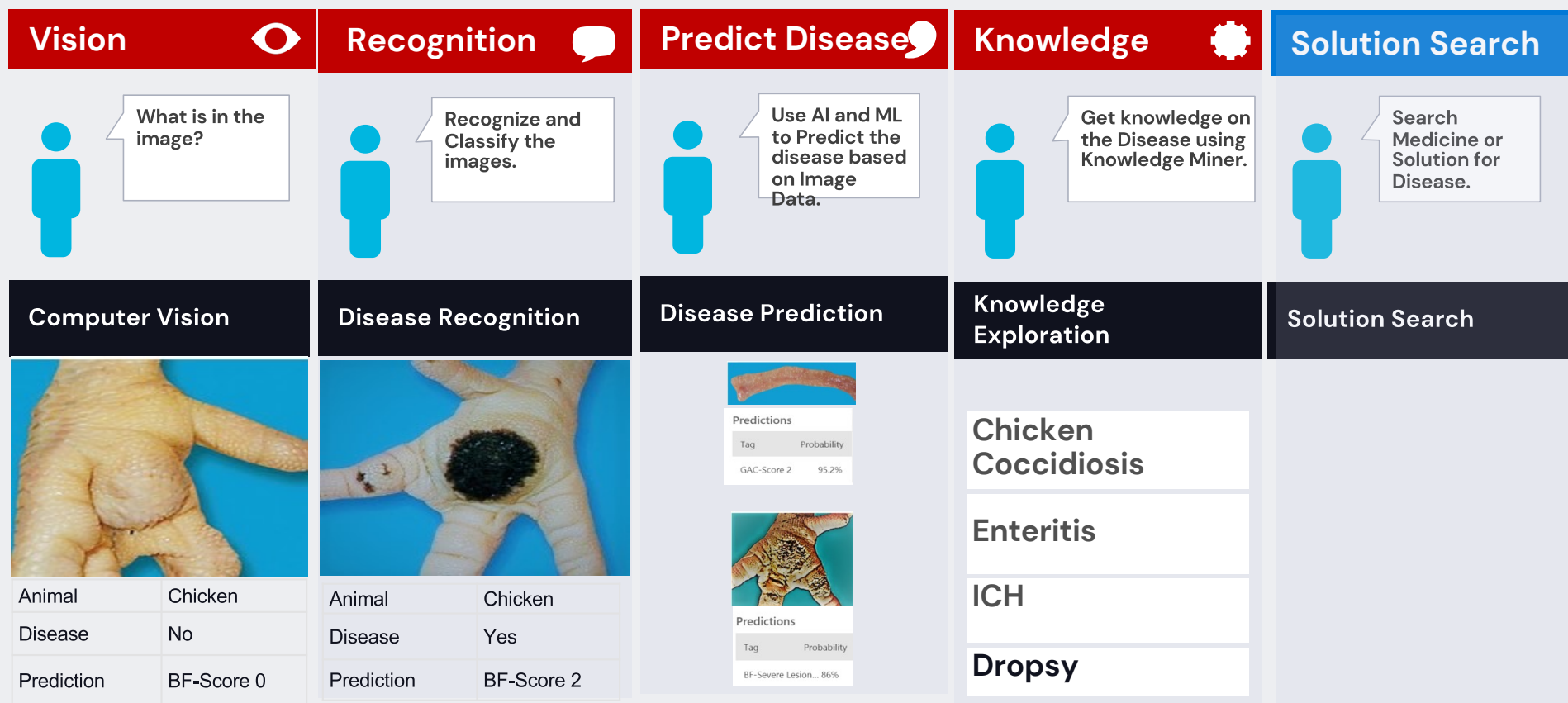
Cosmos DB/ SQL DB, ADLS, Synapse provide auto scale based on load ensuring the performance is efficient across varied loads



Extensibility of the Solution

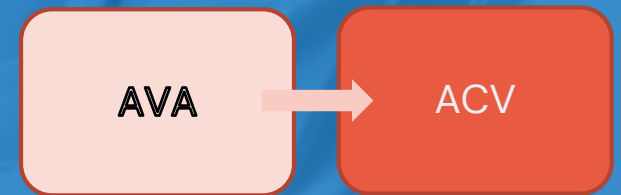


Animal Health: Using Cognitive services on Azure



UX & Demo

- Cow Lung (Ultrasound Scan Video) Analysis & RL based TUS Scoring & NBA ✓
- Chicken Lesion (Image) Analysis & RL based i2 Scoring & Insights/NBA ✓



User Experience

Personas

End-Users



Farm Owners



Vets

Administrators/Pharm
a

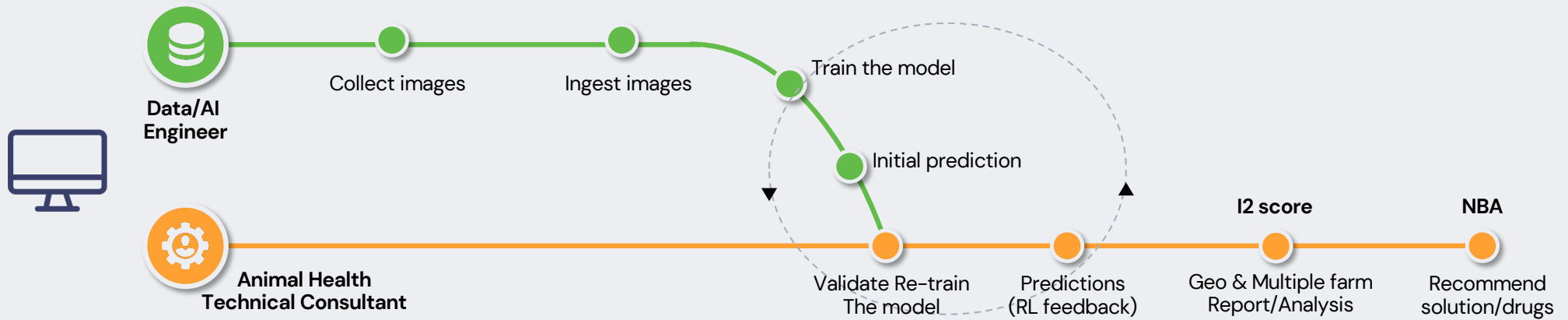
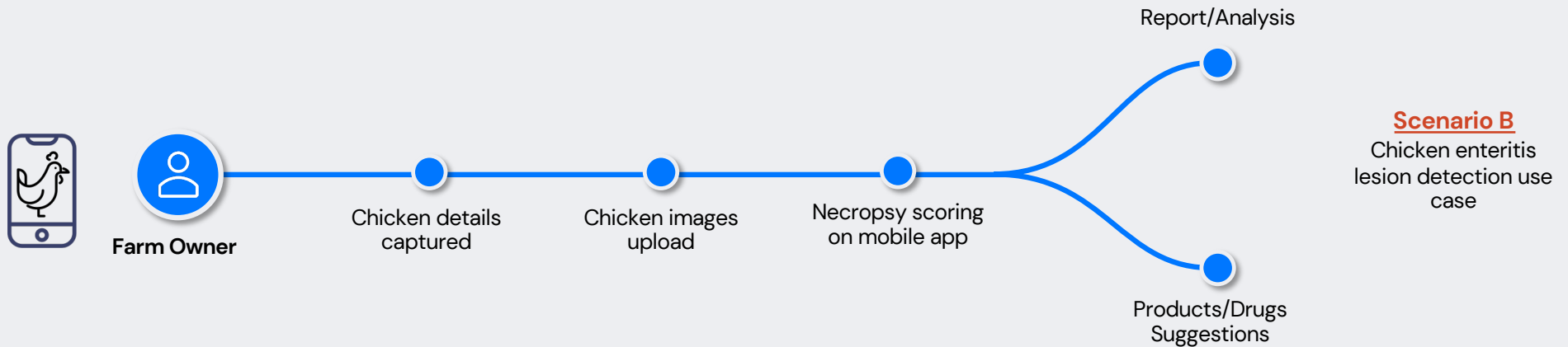


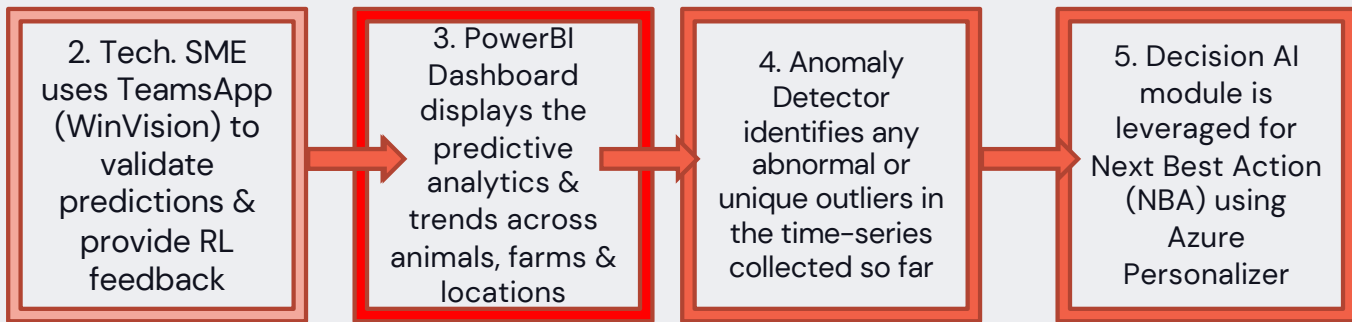
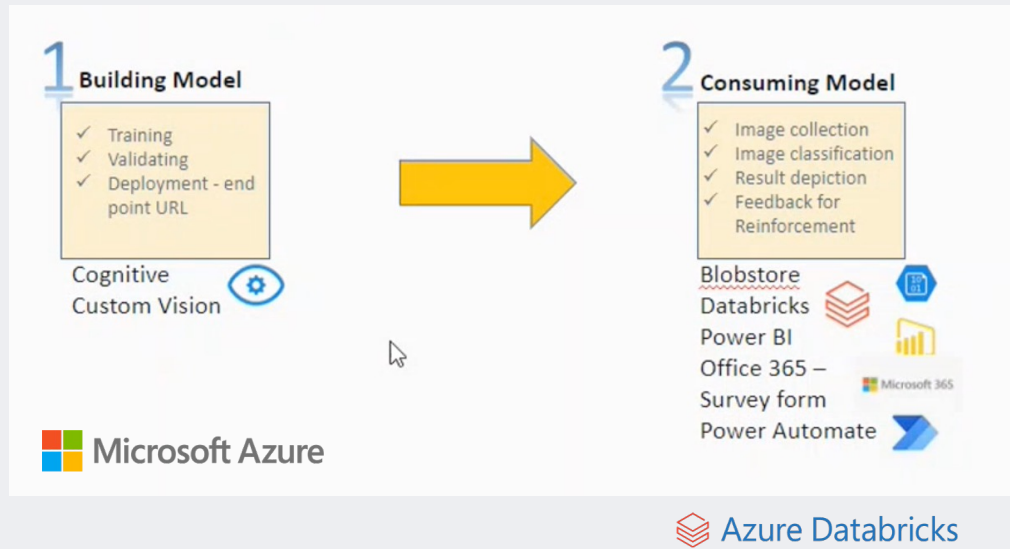
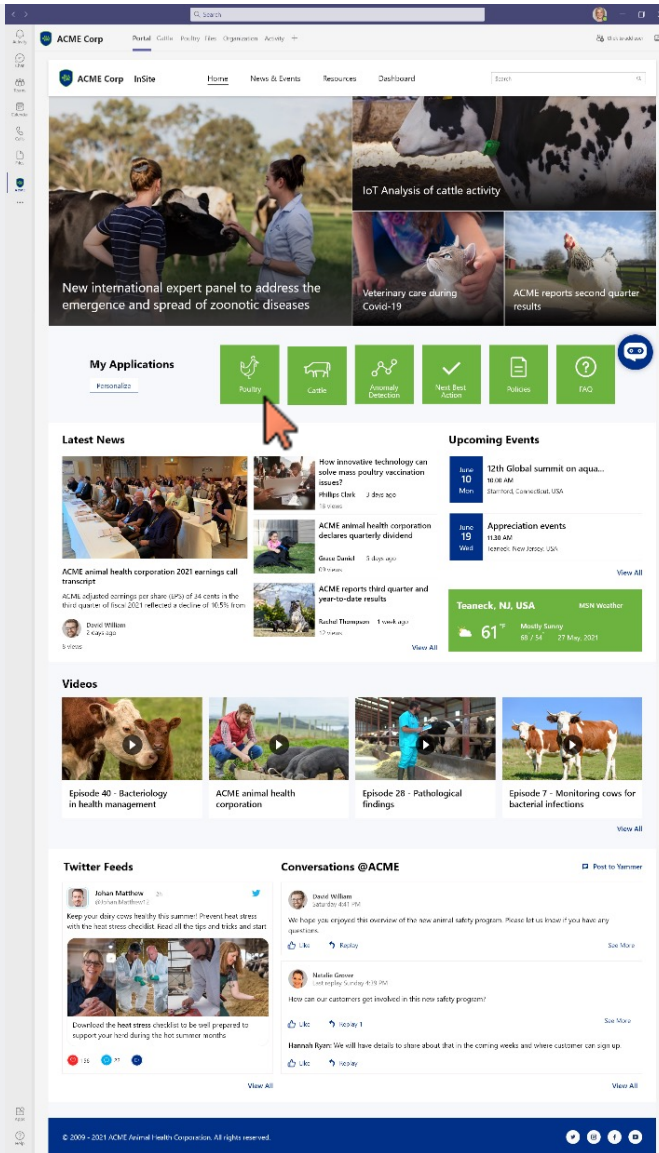
Data Sciences
Personnel



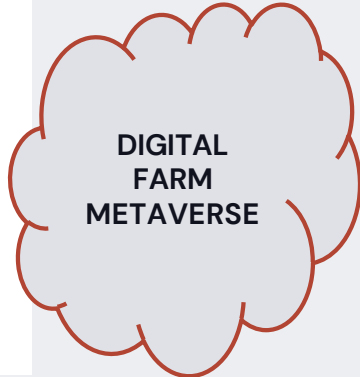
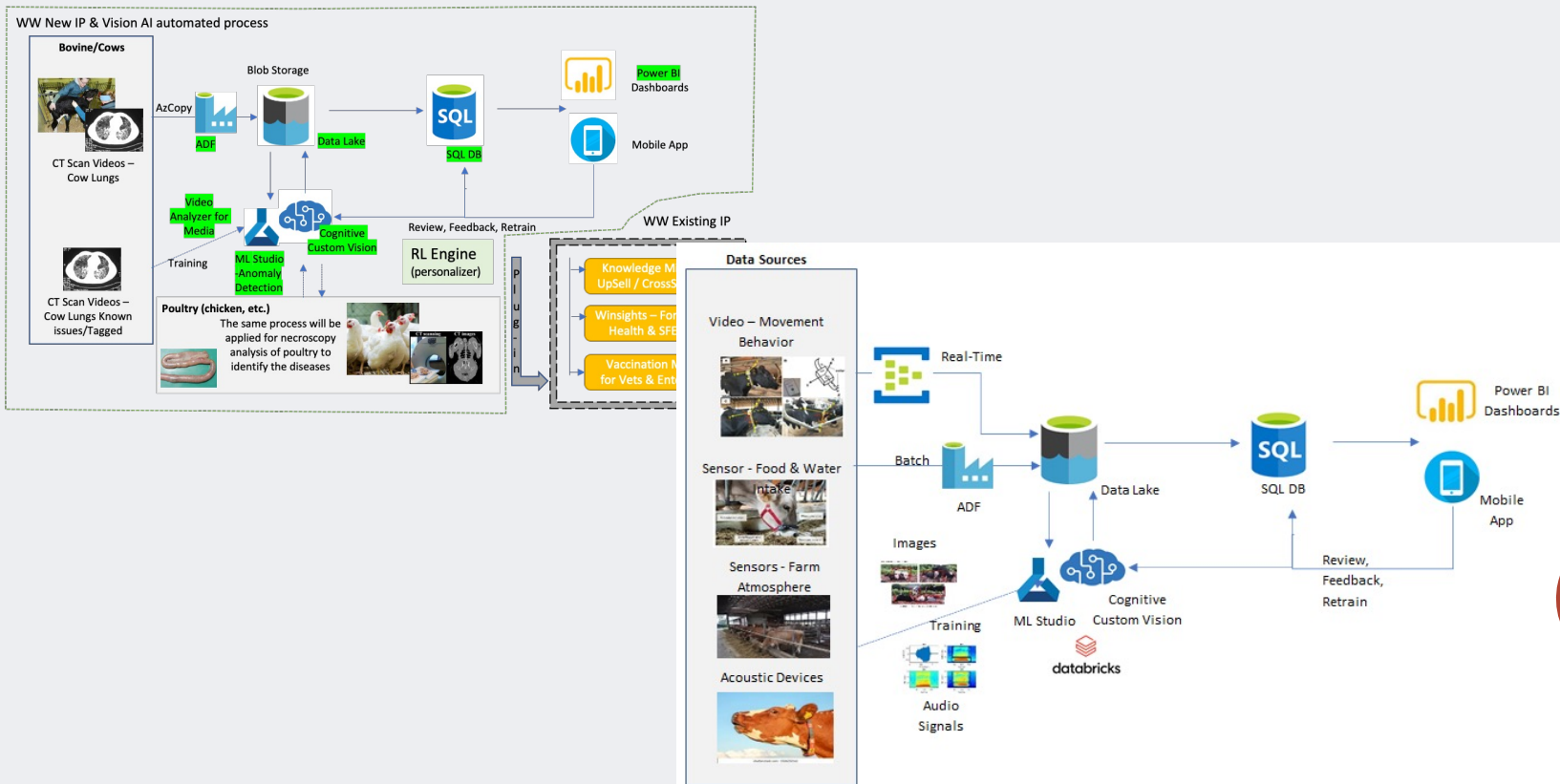
Technical
Disease SME

Chicken Lesion Intestinal Integrity Scoring





Plugging into overall Livestock Health Intelligence Suite of Solutions & Digital Farm MetaVerse



Livestock Health Intelligence platform

Eventually, We will expand their Livestock Health Intelligence platform to leverage the **Microsoft Metaverse technology stack**.

This will enable “digital farms” that will be able to remotely monitor, manage, and maintain farm infrastructure, feeds, and water supply, perform simulated tests, and accurately predict which farm animals need individual attention.



Direct cost reductions such as reduced **unanticipated deaths, greater cattle productivity**, and fewer manual health interventions.



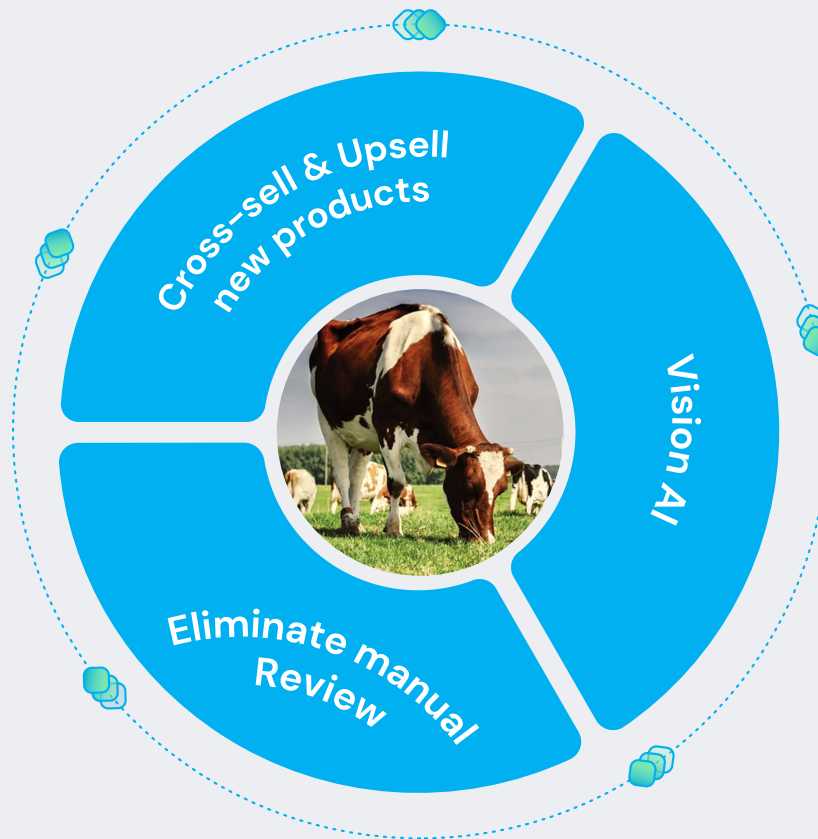
Ensure a safe **consumer food supply** with greater ability to stop zoonotic diseases before they spread.



Reduced **environmental impact**.

Innovation in Vision AI is poised to have a significant effect on the livestock industry

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- Vets no longer have to manually review every single scan and can focus on just the animals identified as being at risk



- Vision AI enables livestock farmers to dramatically reduce the rate of unanticipated cattle and poultry deaths that occur, resulting in massive economic gains.
- Just as significant are the ethical strides made in preventing unnecessary animal death, the positive environmental impact, and the reduction in livestock disease spread that could potentially impact humans.

The Vision AI solution can be implemented by 2+ million cattle farms in the US alone to start with

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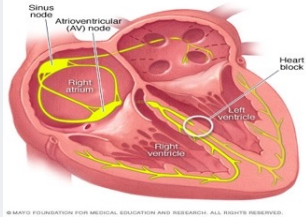








Thank you



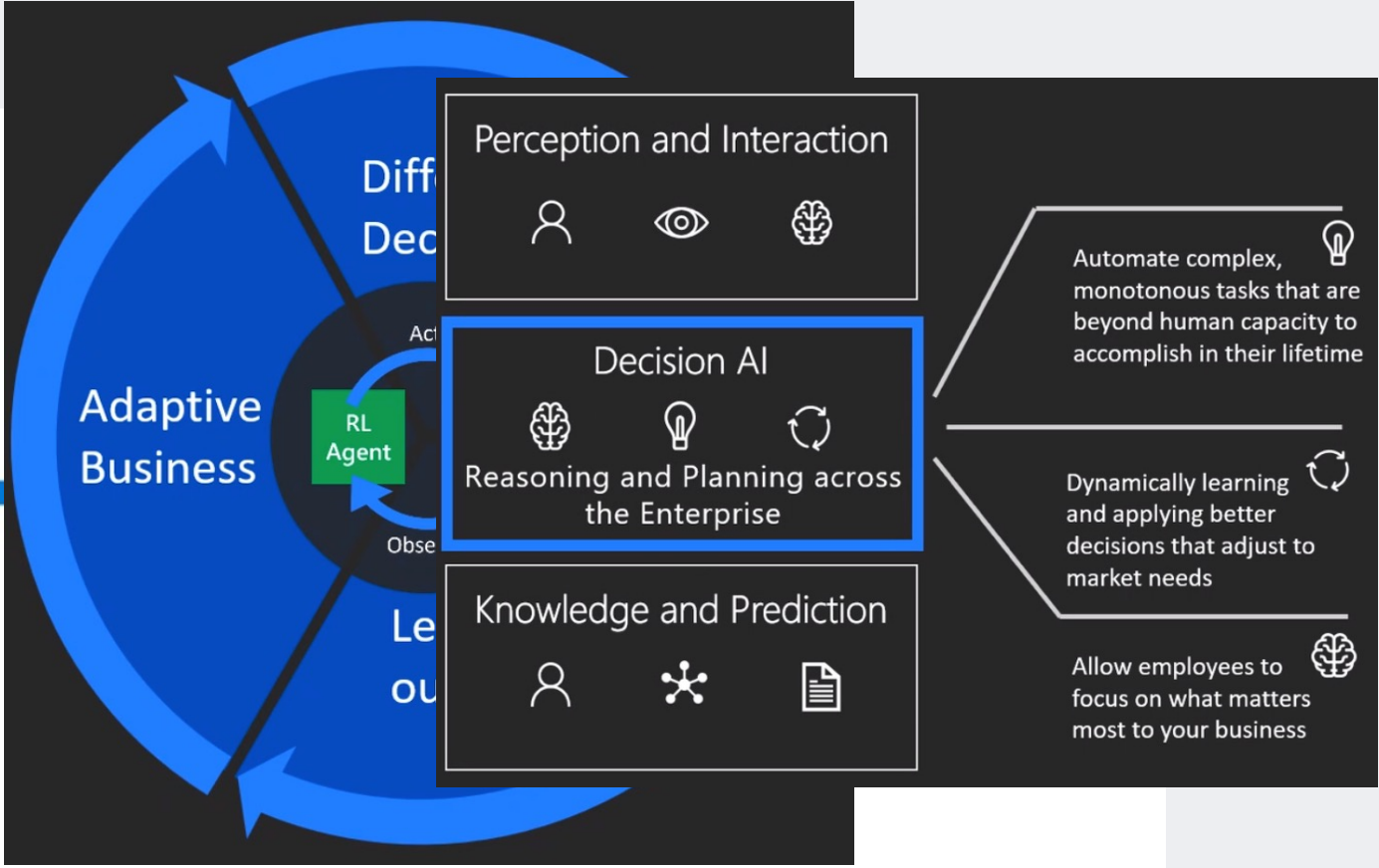
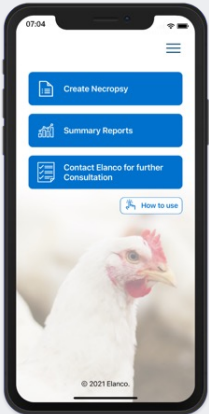
VirooPax Mirji
Director Specialist (Data & AI)



Cognitive services that we enable for our clients

Vision 	Speech 	Language 	Knowledge 	Search 								
 <p>What is in the image?</p>	 <p>Give me directions to the nearest food center.</p>	 <p>Play today's customer call recording.</p>	 <p>Top publications in customer lifecycle trends?</p>	 <p>Search for 'fraud prevention'</p>								
Computer Vision	Bing Speech	Language Understanding	Knowledge Exploration	Bing News Search								
		<p>Natural Language Processing</p> <div data-bbox="884 959 1222 1096" style="border: 1px solid gray; padding: 5px;"> <p>Intent: PlayCall Content: Customer# DateTime.date: today</p> </div>	<p>Here are the top results:</p> <div data-bbox="1264 938 1598 1274" style="border: 1px solid gray; padding: 5px;"> <p>Customer Relationship Management – 5 Key Trends for 2014 CRM <small>Oct 28, 2015 – Here are FIVE key trends in 2014 that would help marketers in rolling ... Of late, marketers are looking at customer lifecycle management (CLM)</small></p> <p>Predictive Customer Lifecycle Management (CLM) <small>The purpose of Customer Life-cycle Management (CLM) is to maximize both customer retention and ... Predictive trend analysis provides business visibility.</small></p> <p>Trends 2016: The Future of Customer Service <small>Jan 5, 2016 – The top 10 customer service trends for 2016 that ... North American Consumer</small></p> <p>Language Around Customer Lifecycles in the Banking Industry <small>View PDF</small></p> </div>	<p>Here is what I found:</p> <div data-bbox="1631 938 1984 1247" style="border: 1px solid gray; padding: 5px;"> <p>Information Communications Media Market News <small>It also investigates the top three expected Fraud Detection and Prevention programs, in terms of demand in key markets...</small></p> <p>The Big Question: In-House or Outsourced Fraud Protection? <small>First, let's point out that there is not one absolute answer—there are "pros" and "cons" to each. Those who favor in-house...</small></p> <p>How to Protect Your Business from Online Fraud this Holiday Season <small>Michael heads fraud prevention tool. Online and mobile shopping are expected to continue growing space...</small></p> </div>								
<table border="1"> <tr> <td>Category</td> <td>Male heart block</td> </tr> <tr> <td>Heart</td> <td>False/False</td> </tr> <tr> <td>Dominant colors</td> <td></td> </tr> <tr> <td>Accent color</td> <td></td> </tr> </table>	Category	Male heart block	Heart	False/False	Dominant colors		Accent color		<p>Convert spoken audio to text</p> <p>Convert text to spoken audio</p> <p>Extract intent of user</p>	<div data-bbox="884 1109 1222 1291" style="border: 1px solid gray; padding: 10px; text-align: center;">  <p>Now Playing</p> <p>11/29/2016 Customer Call</p> </div>		
Category	Male heart block											
Heart	False/False											
Dominant colors												
Accent color												
<p>DATA+AI SUMMIT 2022</p>												

Custom Vision Potential Target Architecture



Other AI Demos & Examples

- [Form Recognizer & Automated Document Parsing](#) & Enrichment
- Hands On with AI : <https://aidemos.microsoft.com/>
- Popular AI Labs : <https://www.microsoft.com/en-us/ai/ai-lab>
- AI-School : <https://www.microsoft.com/en-us/ai/ai-school>

Insert your charts or images

Take advantage of the content panels

Insert Image by URL

If you want to insert a gif or other image from the web, simply navigate to *Insert > Image > by URL*.

Crop and resize your image to fit within content panels, if you're feeling fancy.



Code Display

Paste snippets

```
1 // Open connection to SQL Server database
2 SqlConnection Conn;
3 Conn = new SqlConnection("host=nc-star;port=4100;User ID=test01;
4 Password=test01;Database Name=Test");
5 try
6 {
7 Conn.Open();
8 Console.WriteLine ("Connection successful!");
9 }
10
```

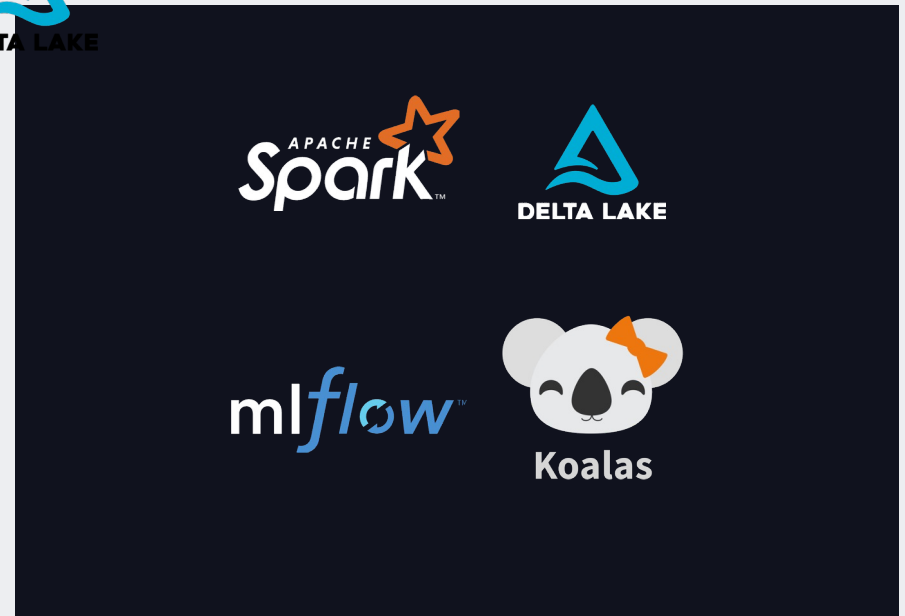
Use breaker
slides to divide
your deck into
sections

Logos

Open source projects
Partners and cloud platforms



Koalas



Logos

Open source projects

