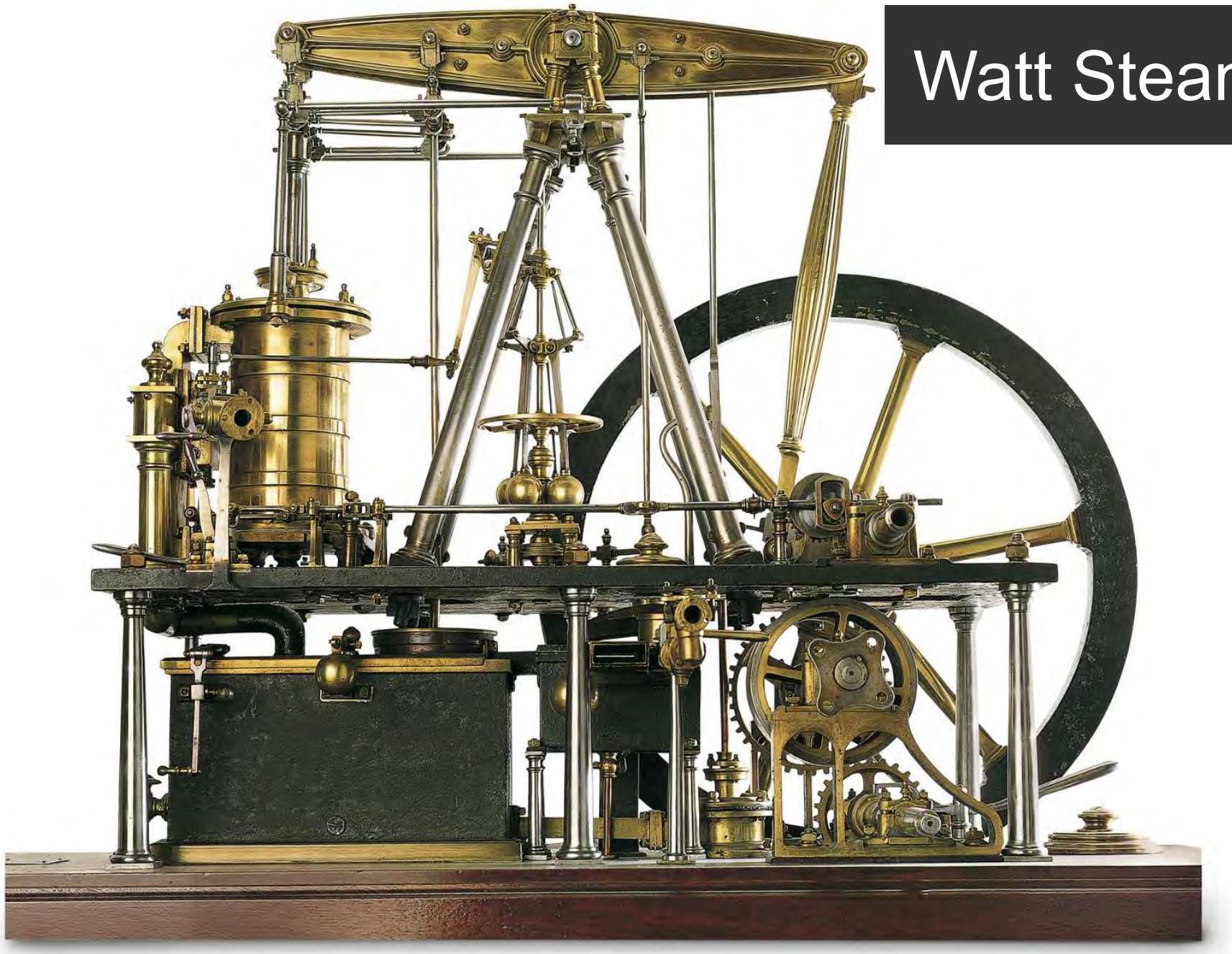
MATLAB EXPO 2019

Beyond the “I” in AI

Richard Rovner
VP Marketing, MathWorks

Watt Steam Engine



Artificial intelligence is a transformative technology

AI will create $13 trillion in value by 2030

based on McKinsey's latest AI forecast – September 2018

AI has tremendous potential to increase productivity

=

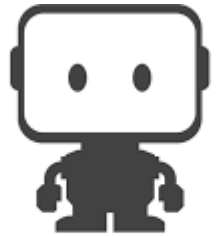
McKinsey Global Institute, September 2018

But, AI is struggling

DigitalTonto
At the Crossroads of Media, Marketing and Technology...

Most AI Projects Fail. Here's How to Make Yours Successful.

July, 2018



DataRobot

Why Most AI Projects Fail

Oct, 2017

CMS WiRE

3 Common Reasons Artificial Intelligence Projects Fail

May, 2018

There are many ways Artificial Intelligence can fail

No data scientists

Incomplete tools

Beyond the skill of the team

Can't interact with other systems

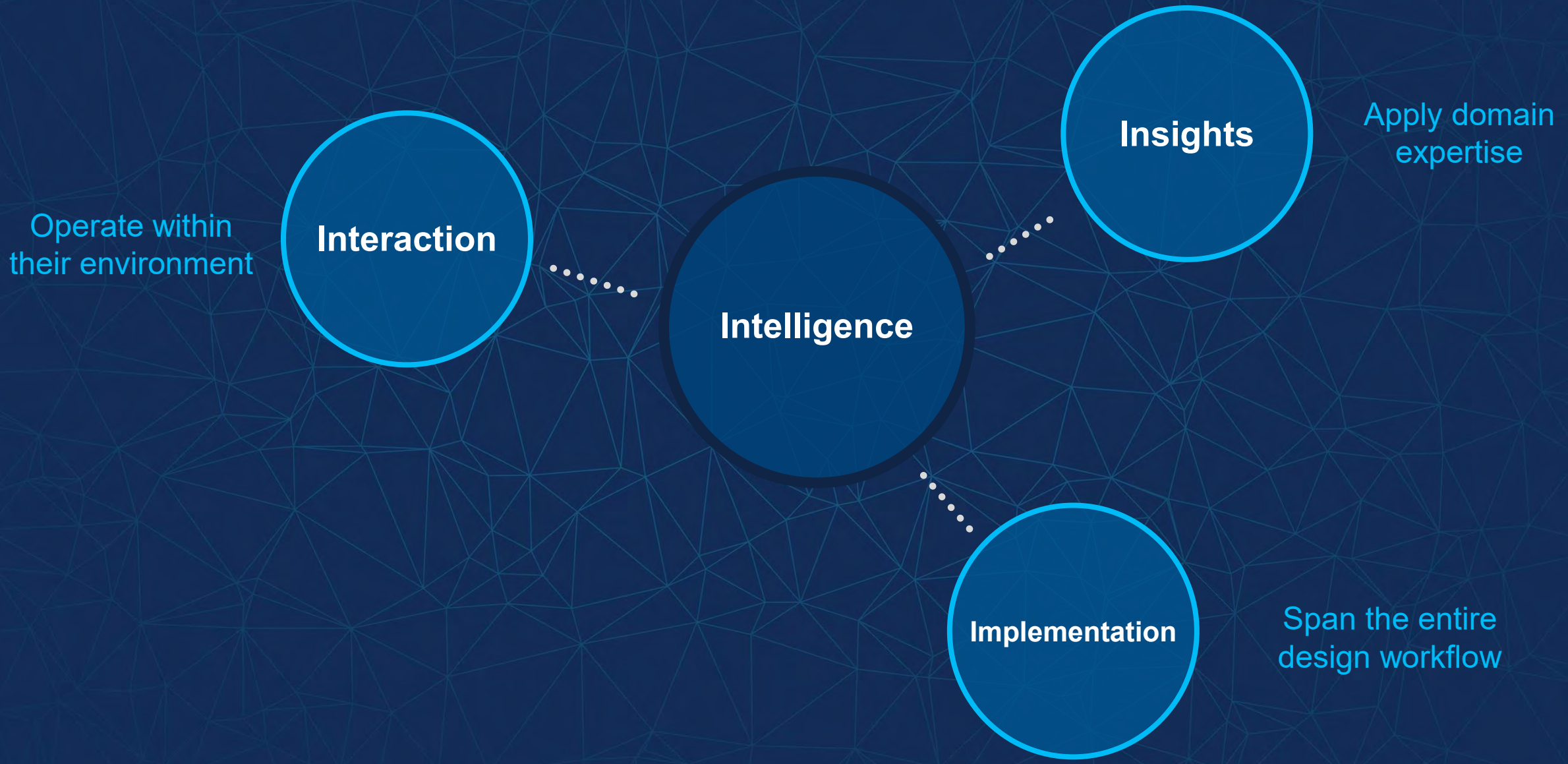
Too much data

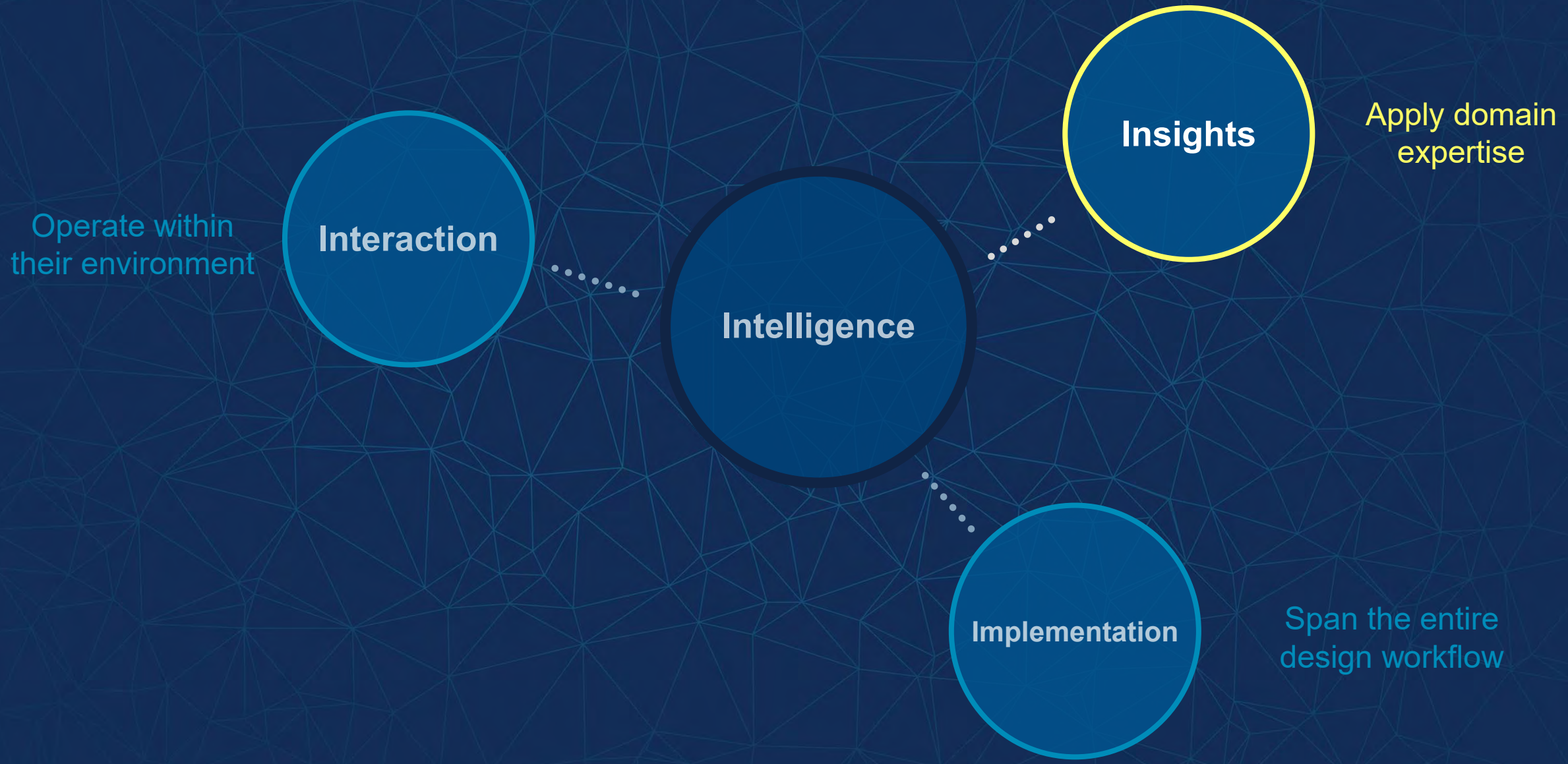
Low ROI

Not enough data

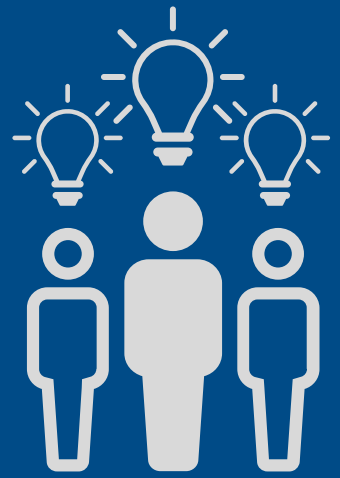
Problem is a poor fit for AI

AI is more than just the intelligence of the algorithm




Operate within their environment
Interaction
Intelligence
Insights
Apply domain expertise
Implementation
Span the entire design workflow

Bring human insights into AI



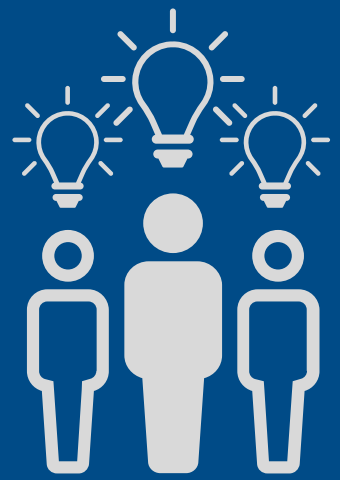
Select data

Make tradeoffs

Evaluate results

AI

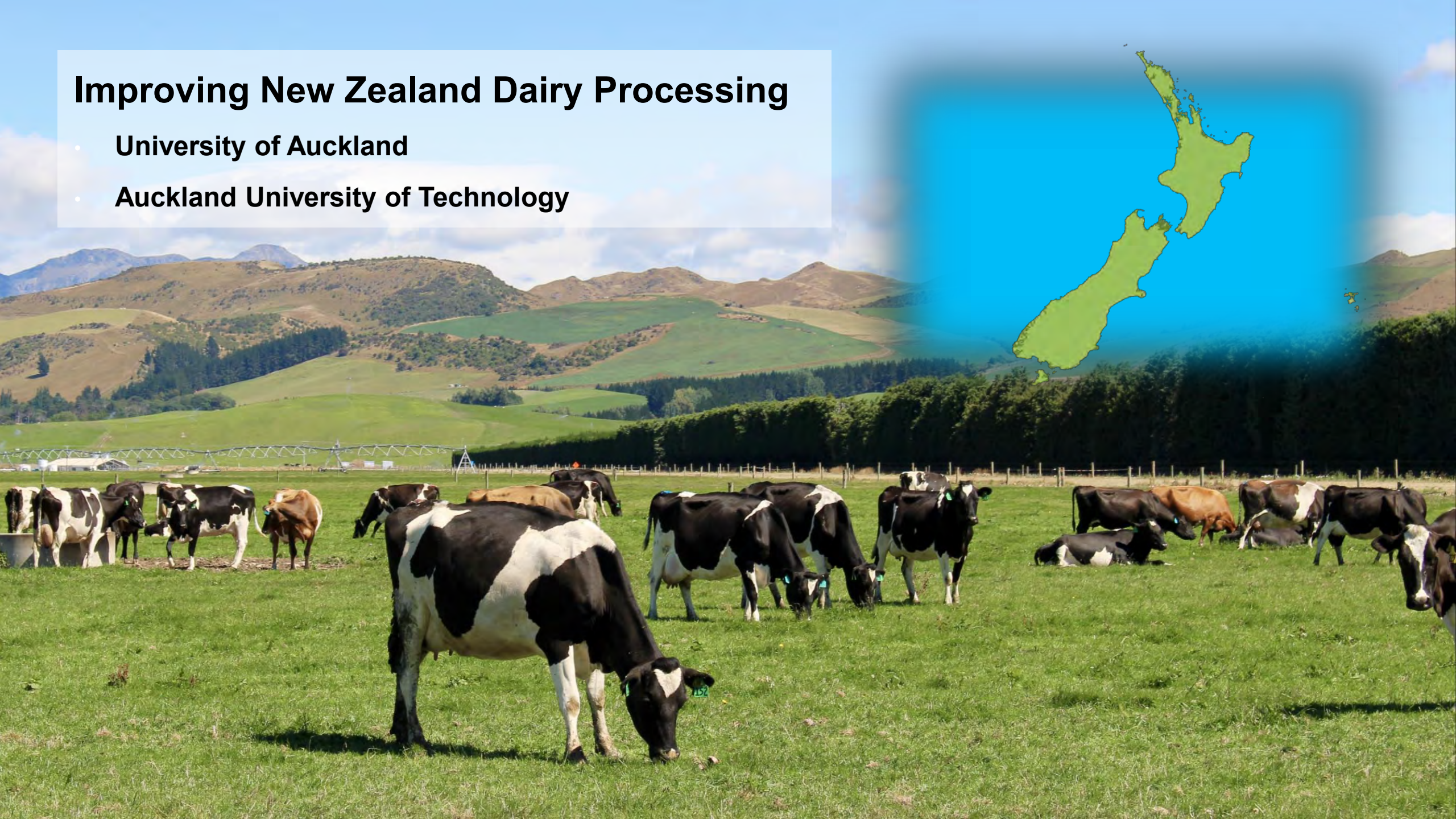
Bring human insights into AI



- We are the domain experts
- Shortage of data scientists
- We need the right tools

Improving New Zealand Dairy Processing

- University of Auckland
- Auckland University of Technology



Goal: Detect a bad product earlier

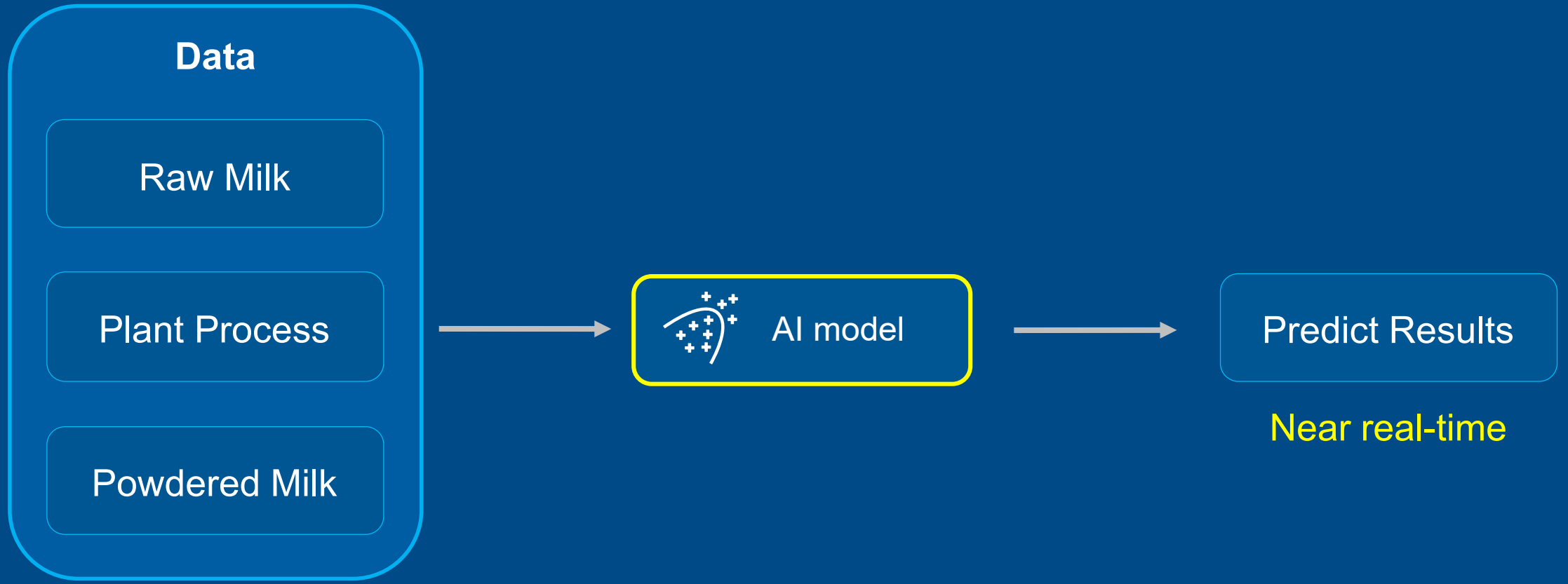
Raw Milk

Continuous Plant Process

Powdered Milk

Days later

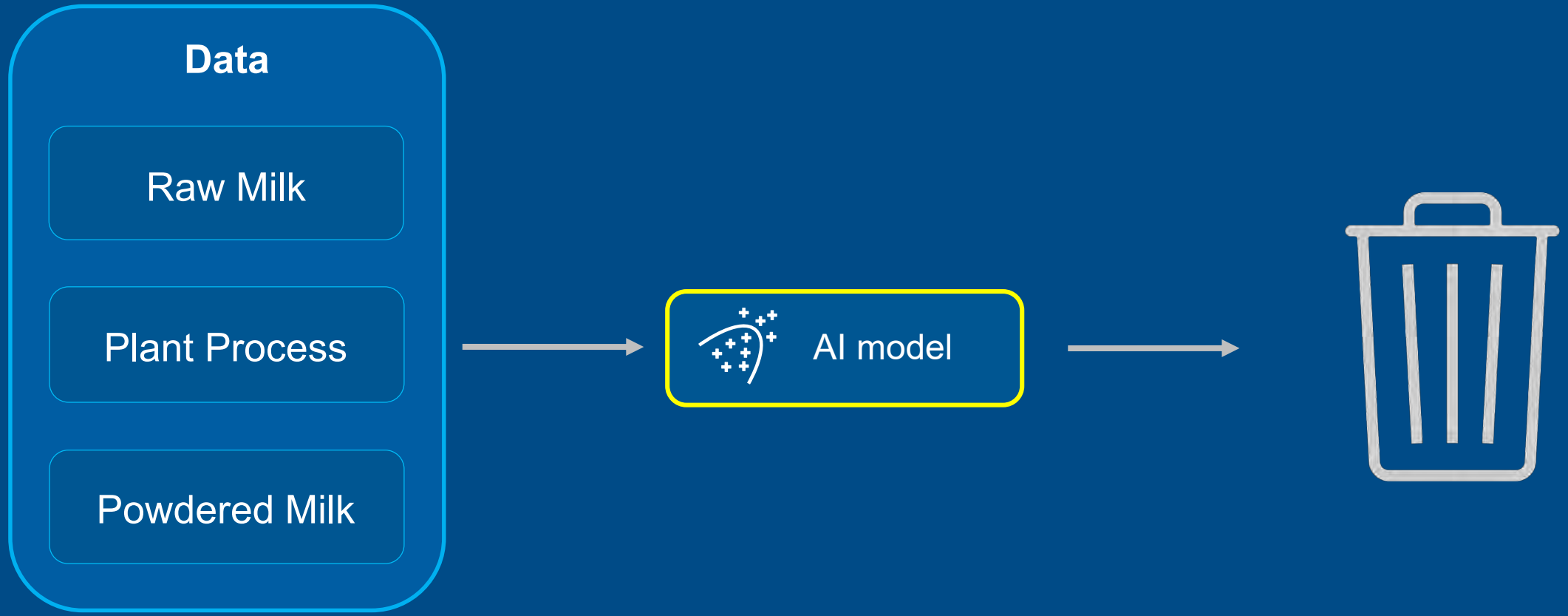
Goal: Detect a bad product earlier



They had lots of data

- Millions of data points
- 6 years
- 3 plants

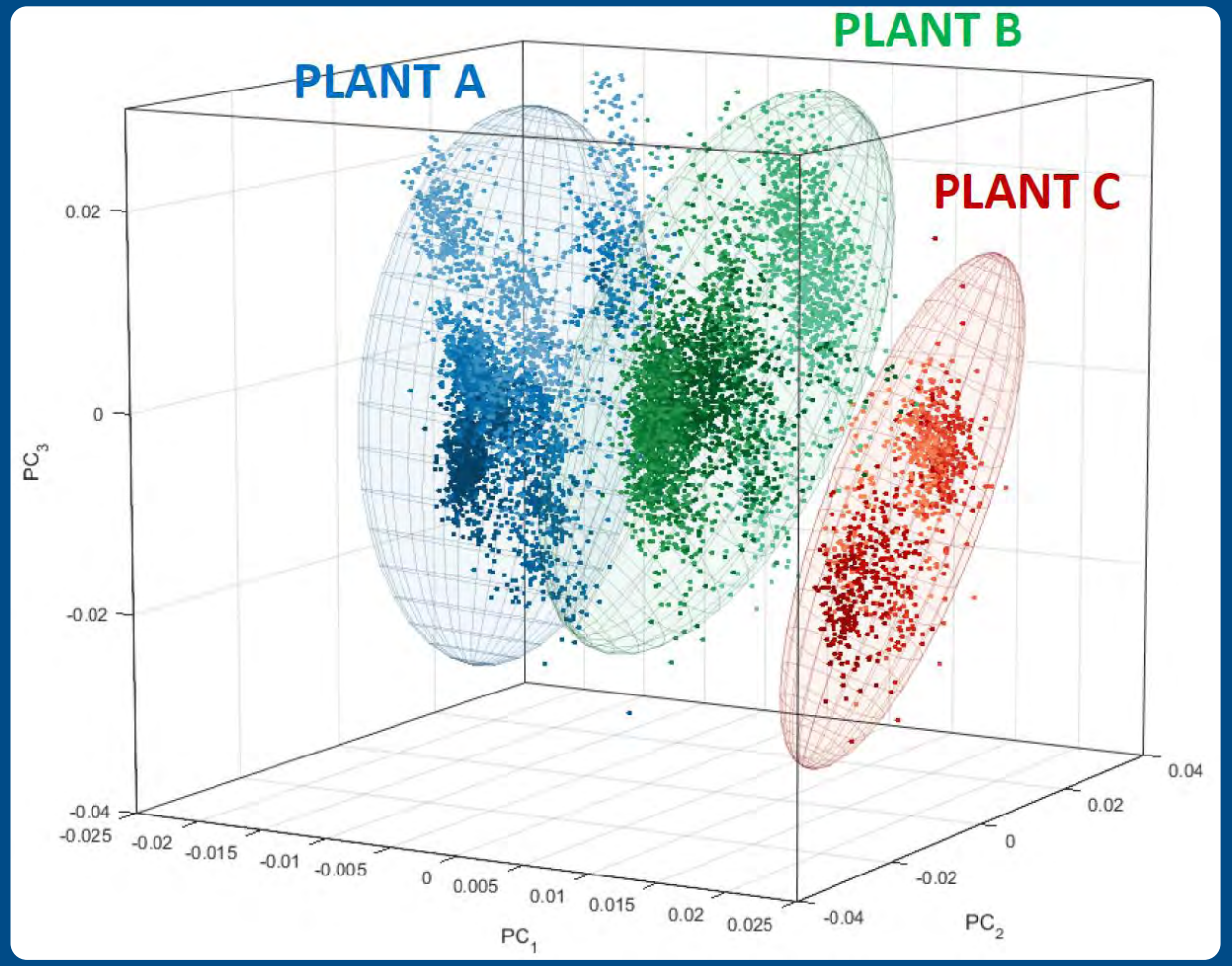
But…



They had three key insights

1. Need to build a separate model for each plant

Plants behaved differently from each another

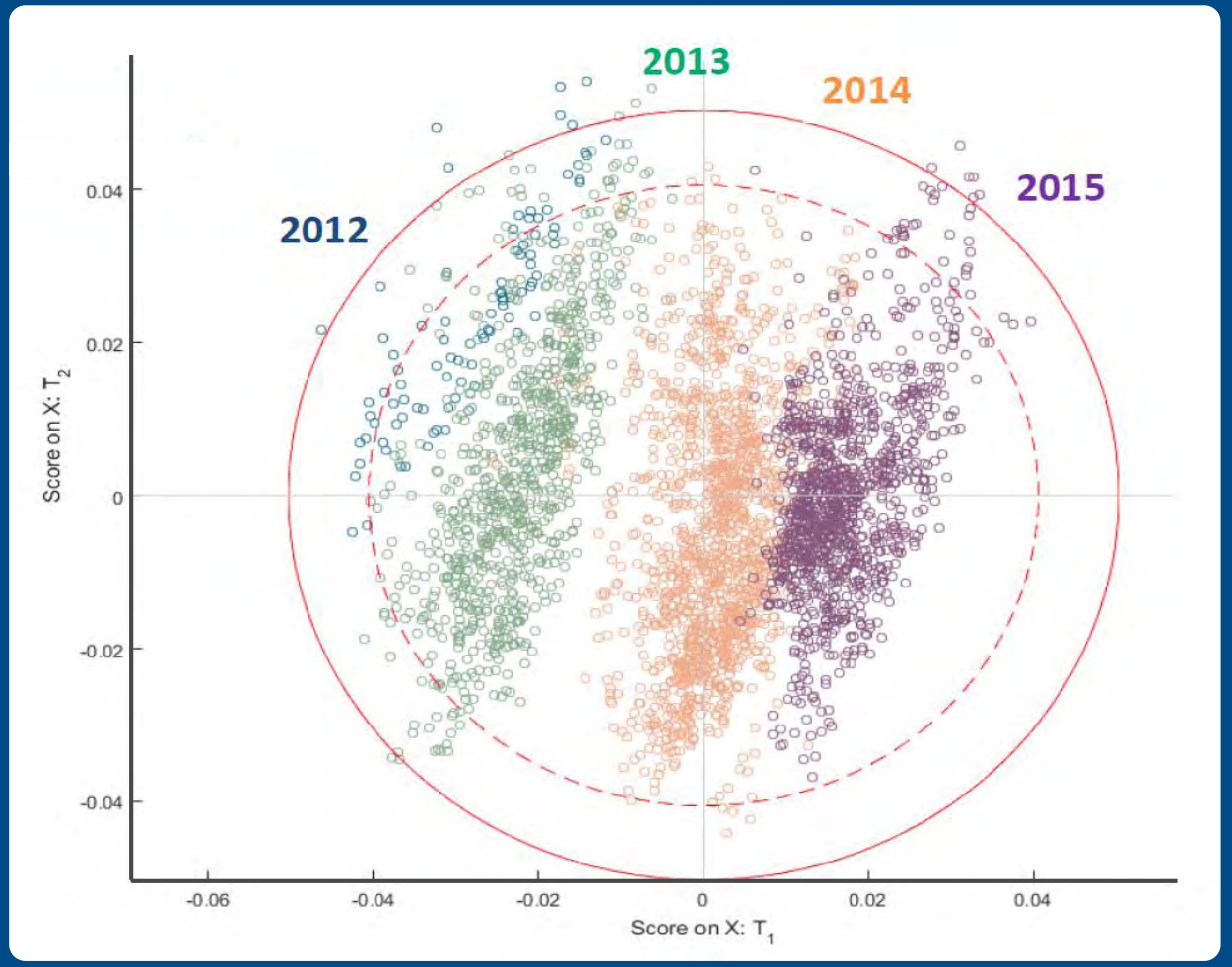


They had three key insights

1. Need to build a separate model for each plant

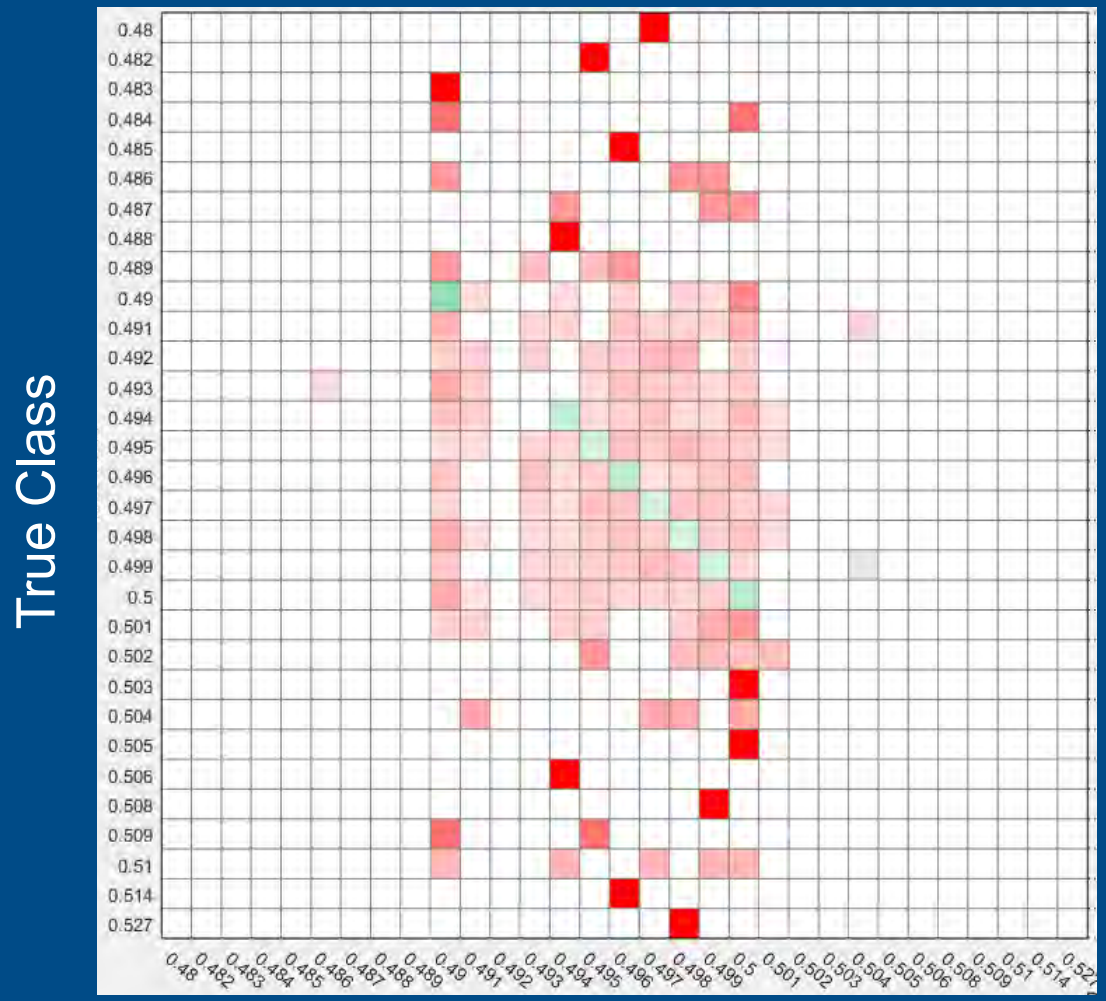
2. Plant's operating state changes each year

Each year was like a completely different plant



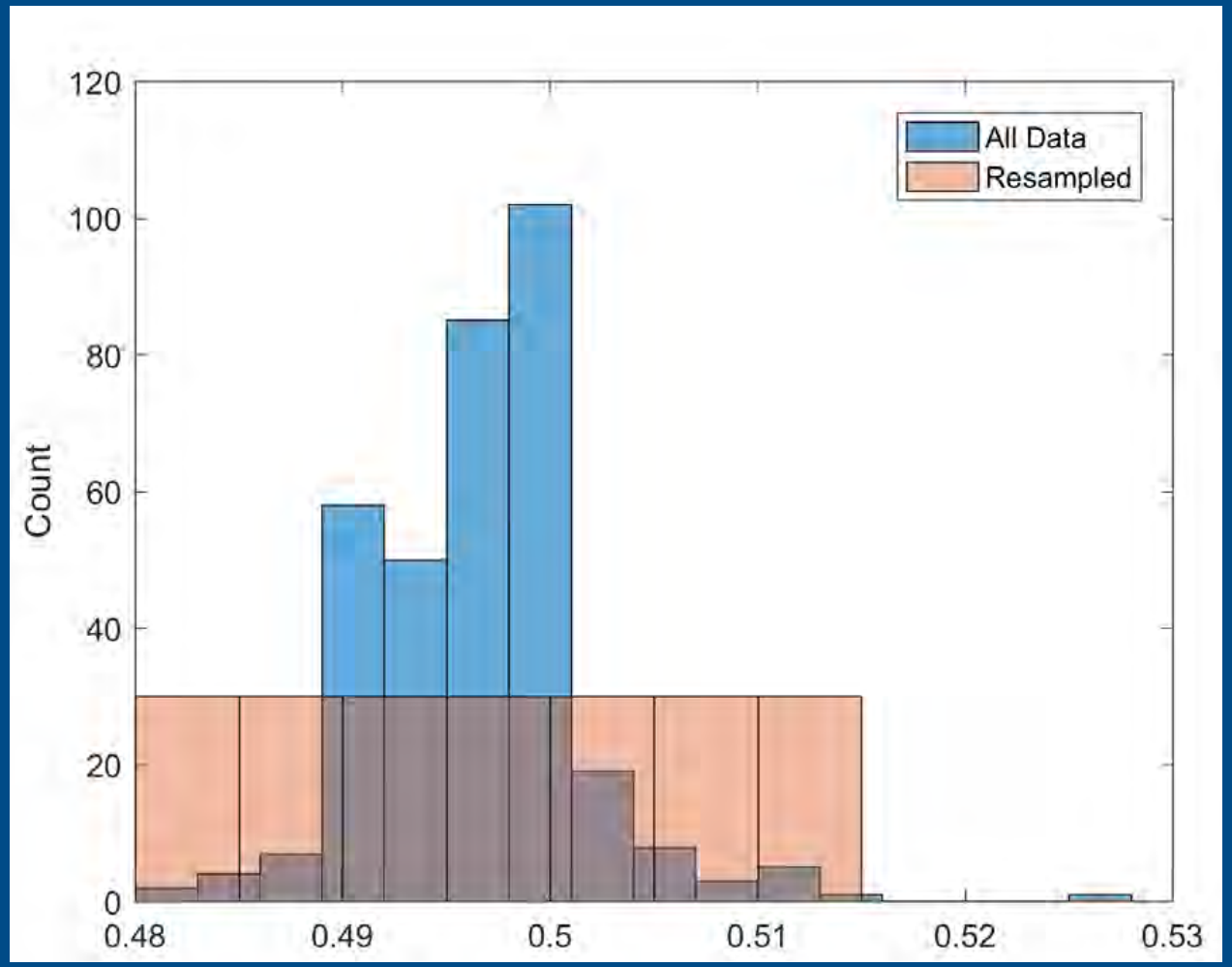
Bulk density prediction results were inaccurate

- Many false positives
- Unused classes



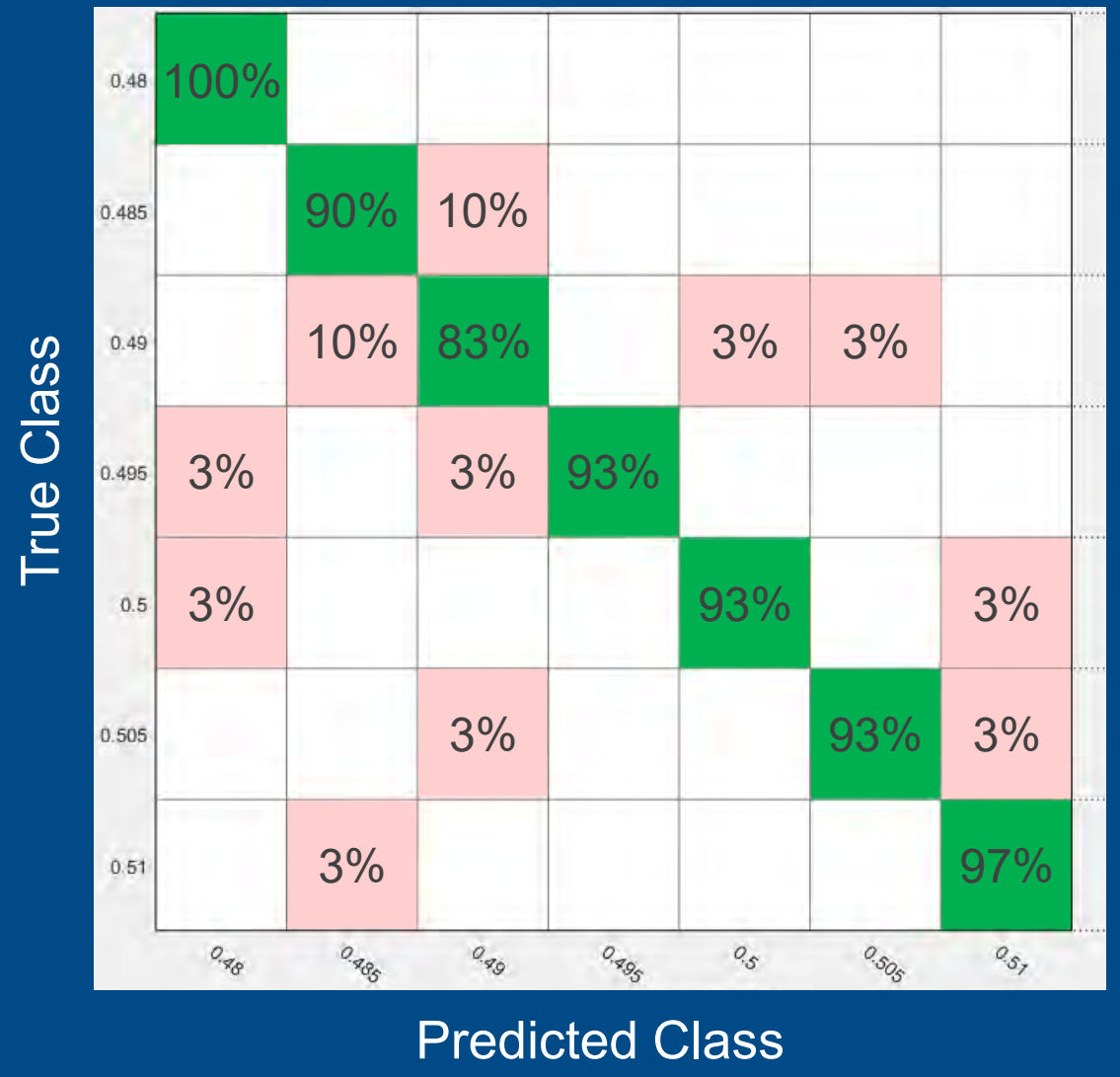
They had three key insights

1. Need to build a separate model for each plant
2. Plant's operating state changes each year
3. Training data was biased



Resampling data resulted in higher predictive accuracy

- Resampled data
- Reduced the number of bins



「MATLABによる非常に生産的なデータの可視化と解析の素早さを目の当たりにした時の、業界関係者の驚きを隠せない表情を見るのは非常に誇らしく思います。この結果が彼らの仮説を検証し、プロセス改善の新しいアイディアを生み出す事に大いに貢献してくれました。」

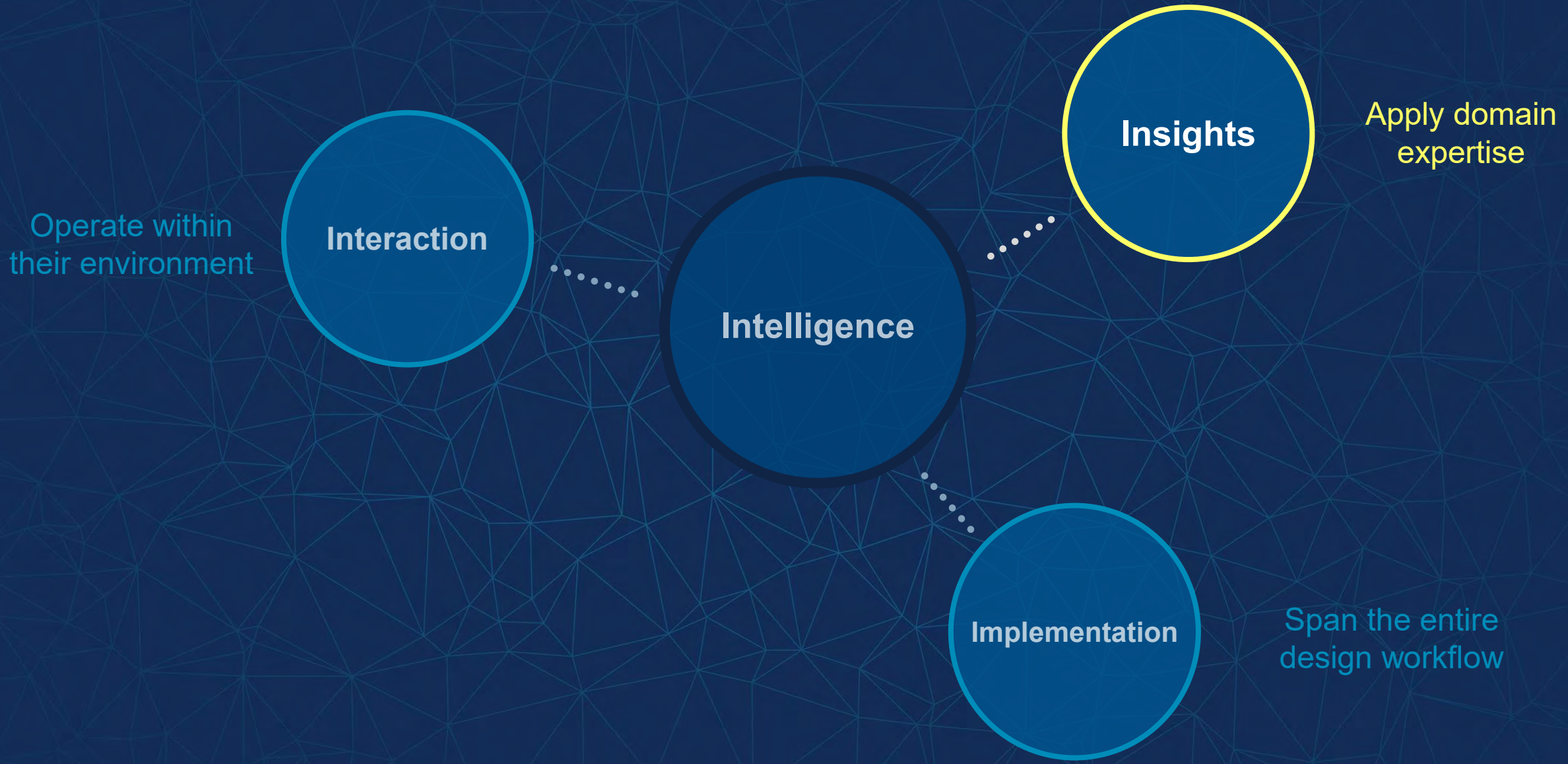
- *David Wilson, Industrial Information and Control Centre*

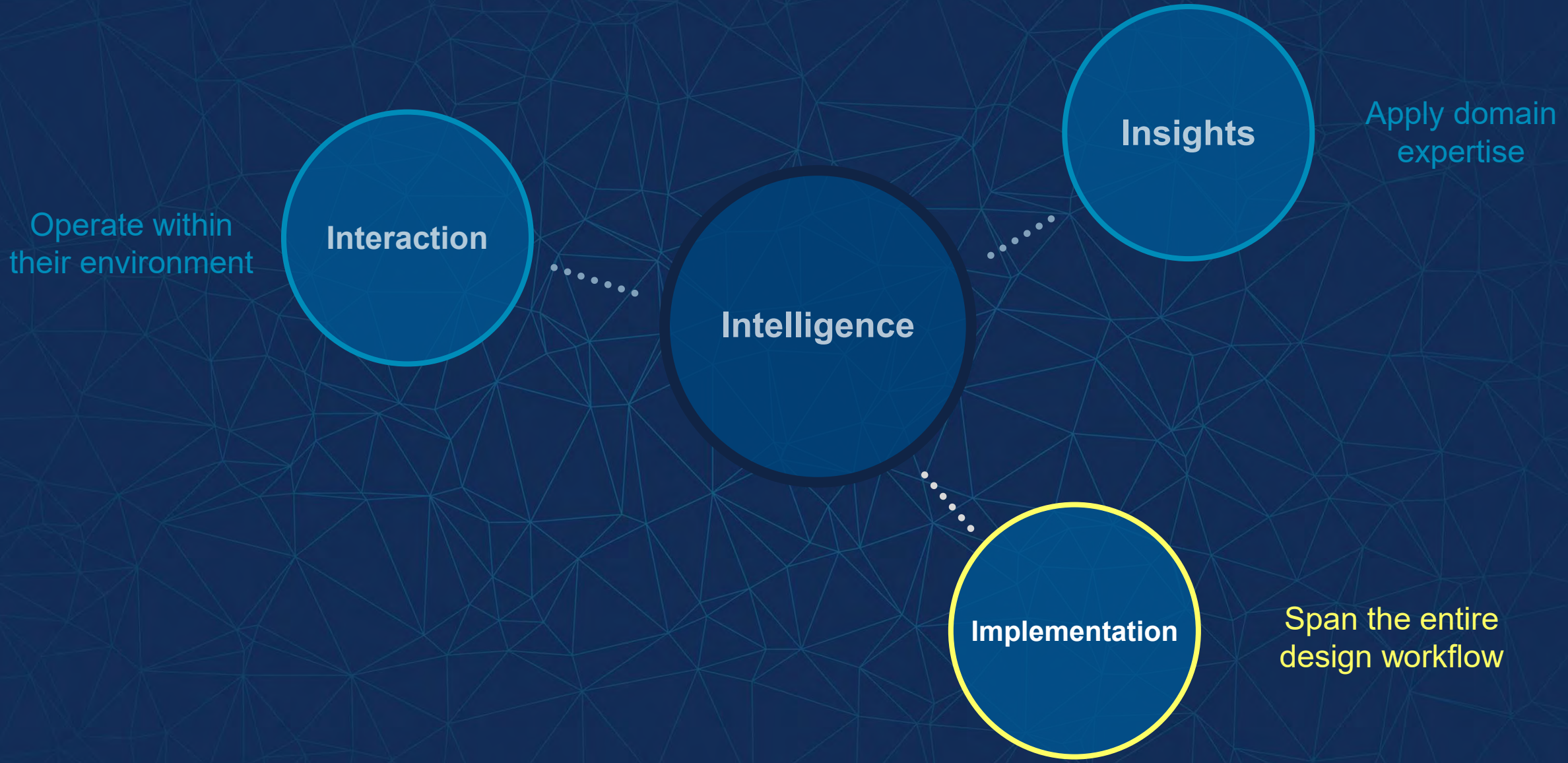
https://imgur.com/gallery/8B5Tx

To succeed with AI …

Combine AI model building
with scientific and engineering insights.

Use tools that span both
the science and engineering and the data science.


Insights
Apply domain expertise
Interaction
Operate within their environment
Intelligence
Implementation
Span the entire design workflow


Operate within their environment
Interaction
Intelligence
Insights
Apply domain expertise
Implementation
Span the entire design workflow

Implementation is about designing the solution

Research

Testing
Data analysis
Reporting

Manufacturing

Concept Development
Prototyping
Deployment

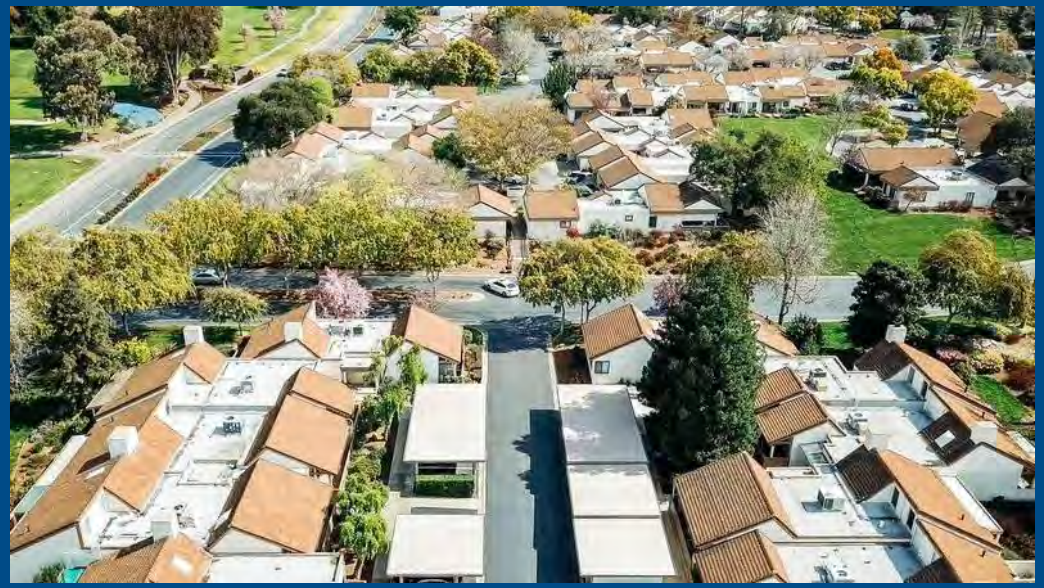
Autonomous System

Requirements building
Modeling & simulation
Verification & validation


“Deliver on the promise of self-driving cars today.”
VOYAGE

Voyage's goal was to quickly get to market

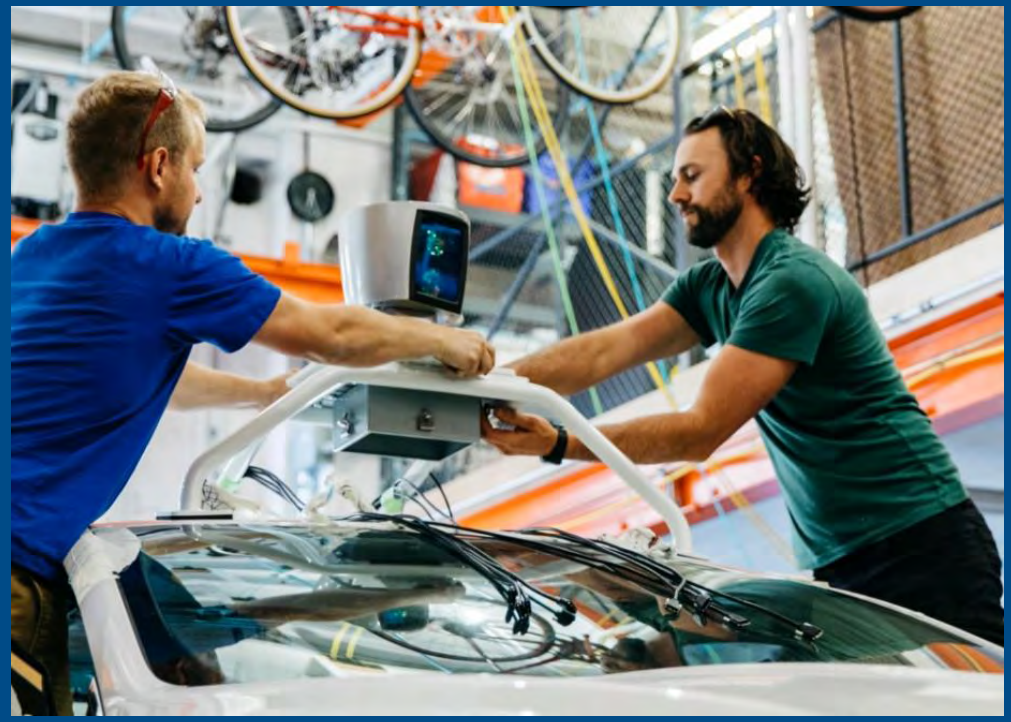
1. Target retirement communities



Voyage's goal was to quickly get to market

1. Target retirement communities

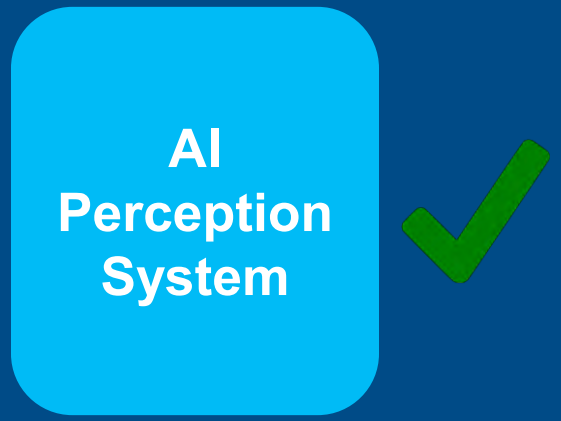
2. Use off-the-shelf components wherever possible



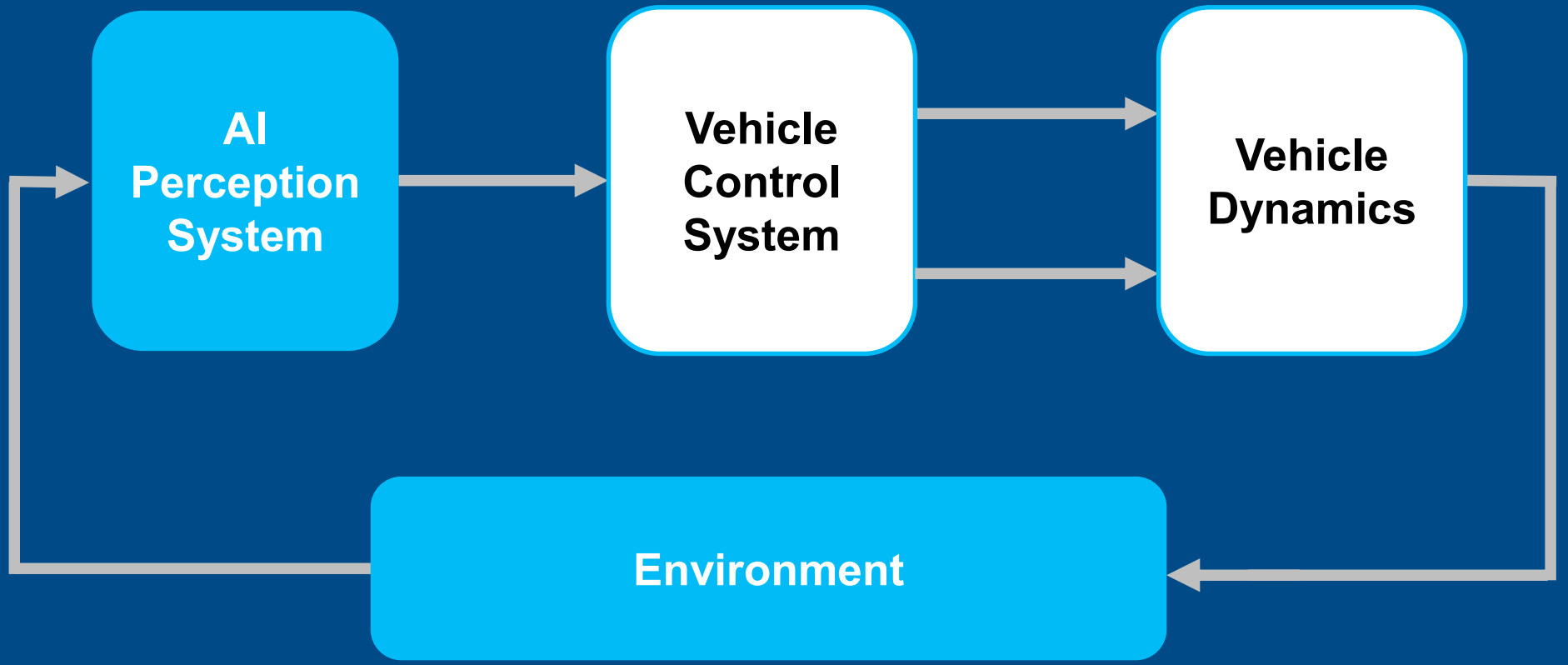
Voyage's goal was to quickly get to market

1. Target retirement communities
2. Use off-the-shelf components wherever possible
3. Bring in the right software tools across the entire workflow

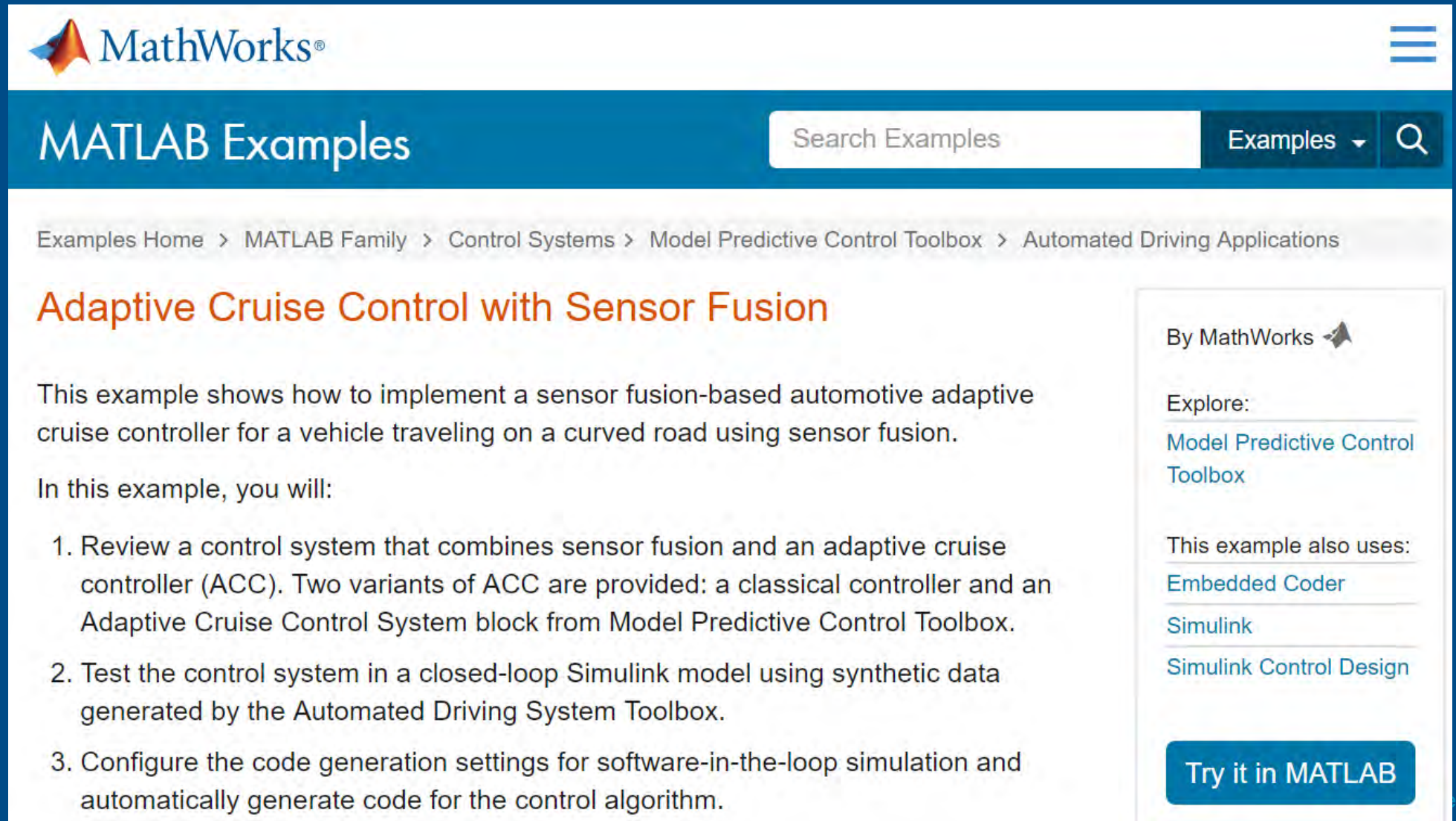
Voyage completed their AI system first



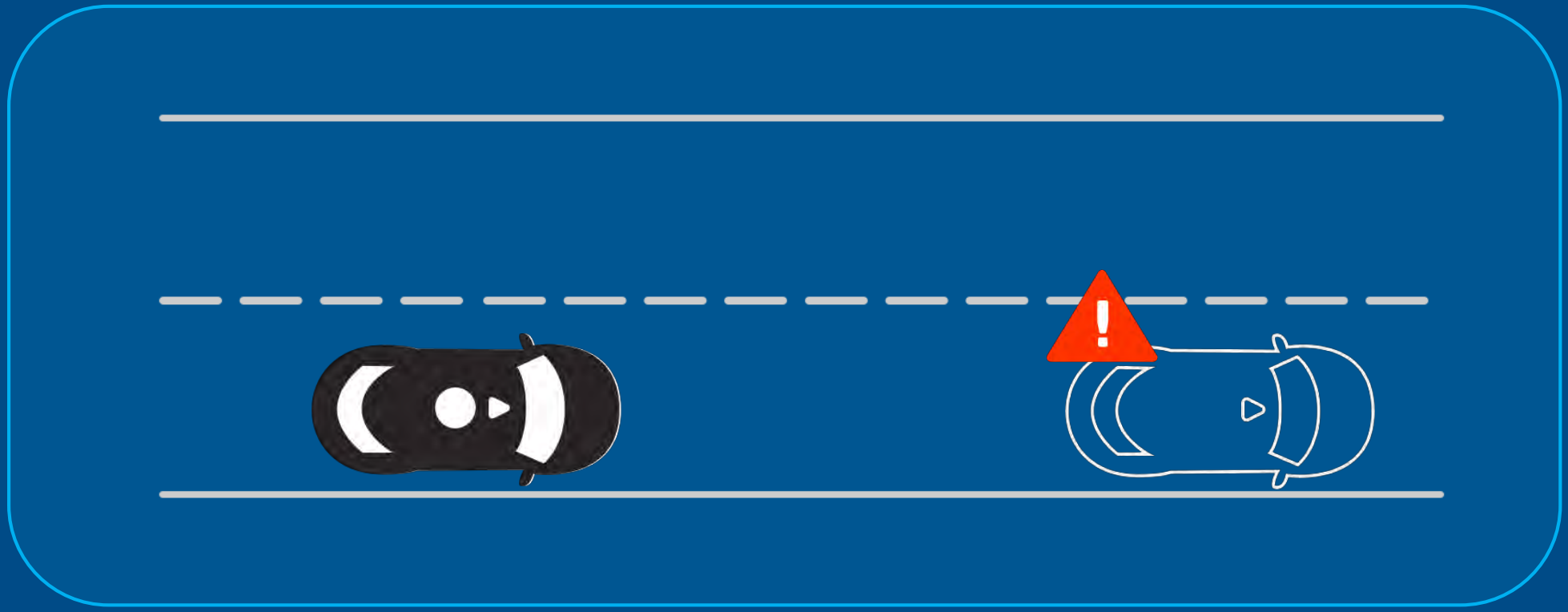
Connect the AI to the rest of the system



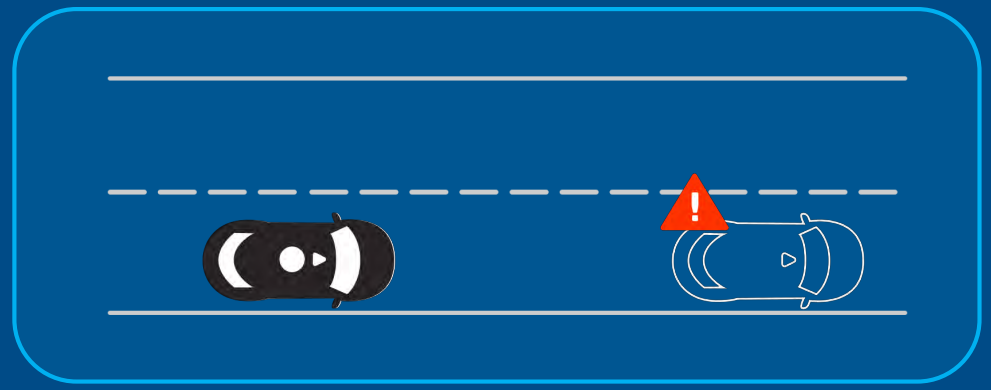
Started with Simulink example



Injected simulated vehicles to interact with while driving



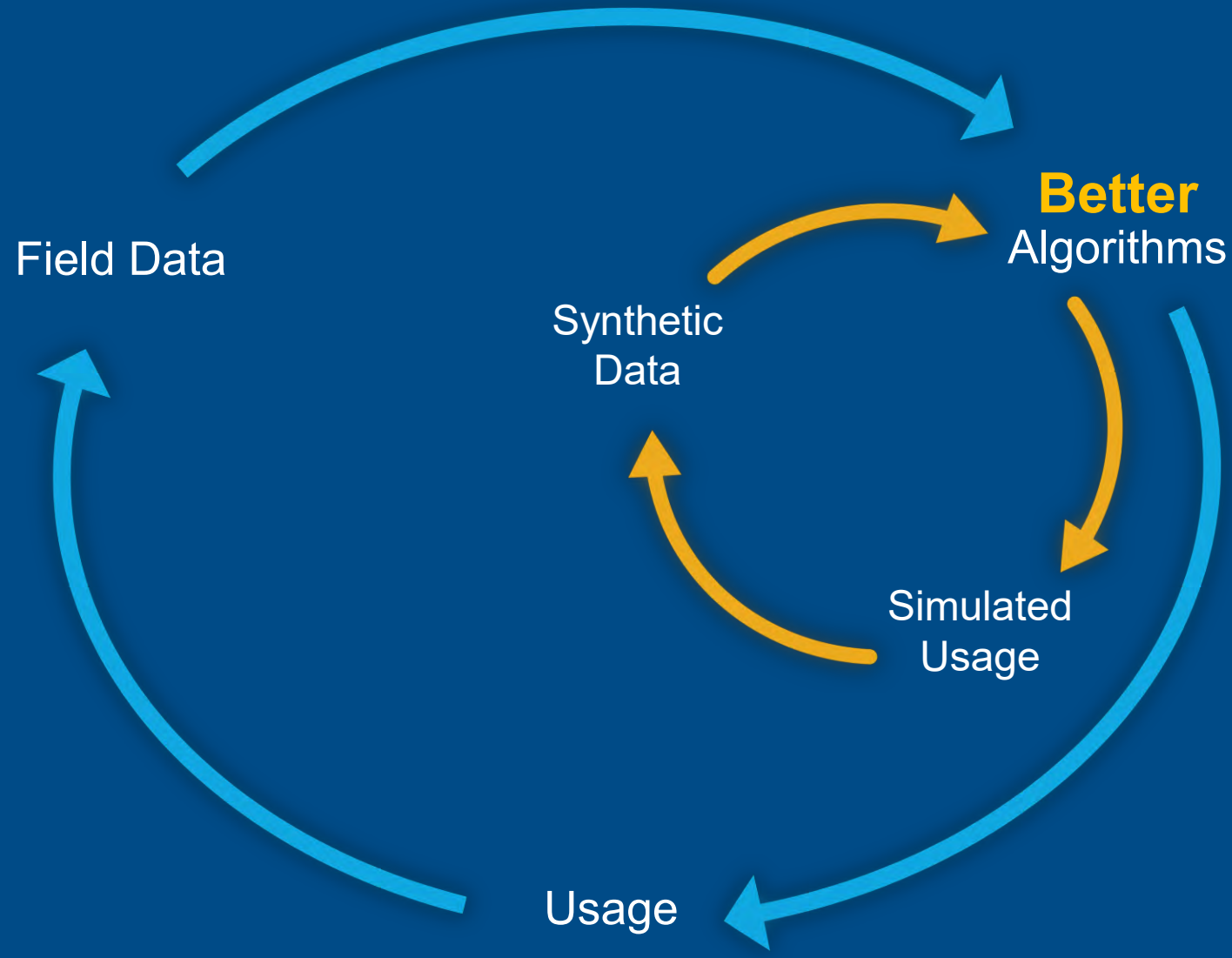
Deployed controller as ROS node and generated code



Robotics System Toolbox
Embedded Coder

ROS
Robot Operating System

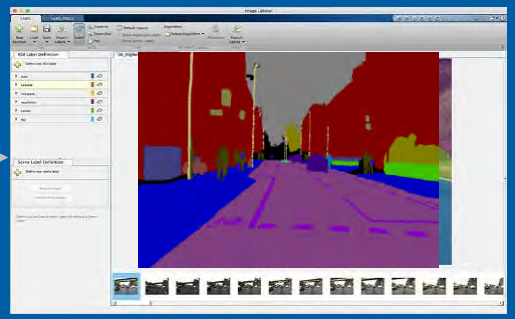
Train your AI faster with tight simulation loops



Use simulation for data synthesis

Traditional deep learning workflow

Record



Label

AI model

Simulation-based workflow

Simulate

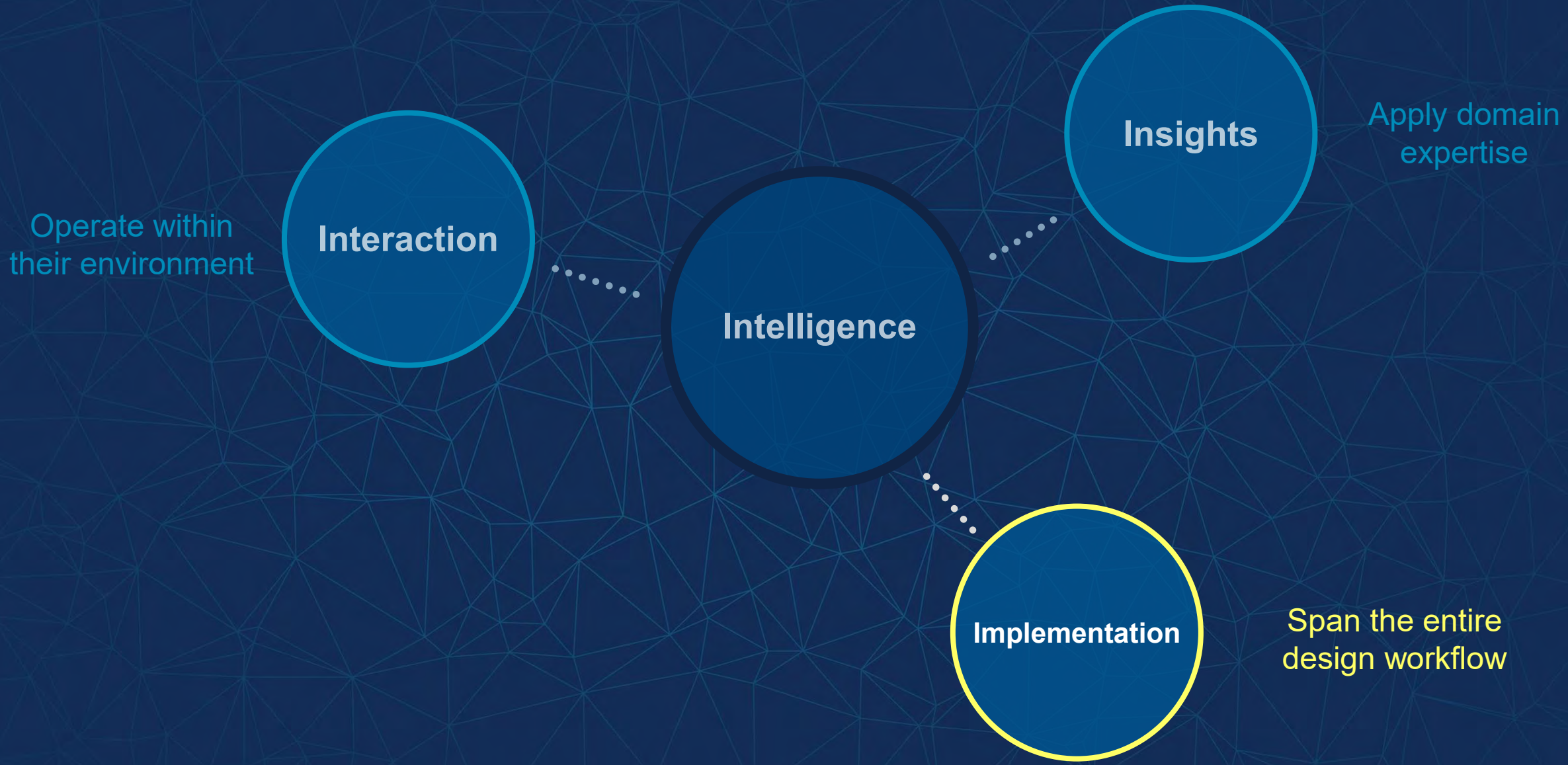
Auto-label

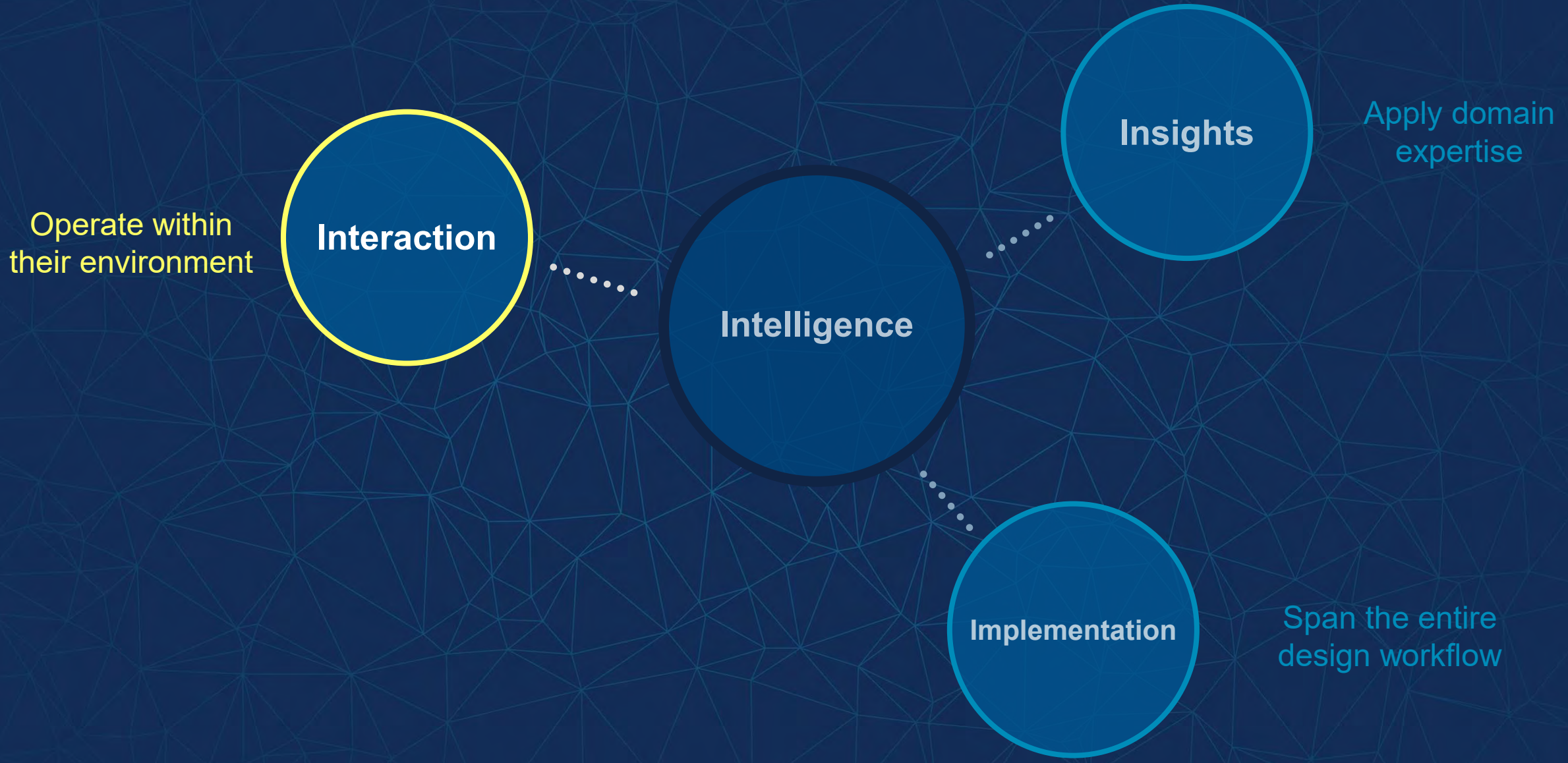
"Simulink + ROS allowed us to deploy a Level 3 autonomous vehicle in less than 3 months."

– Alan Mond, Voyage

To succeed with AI …

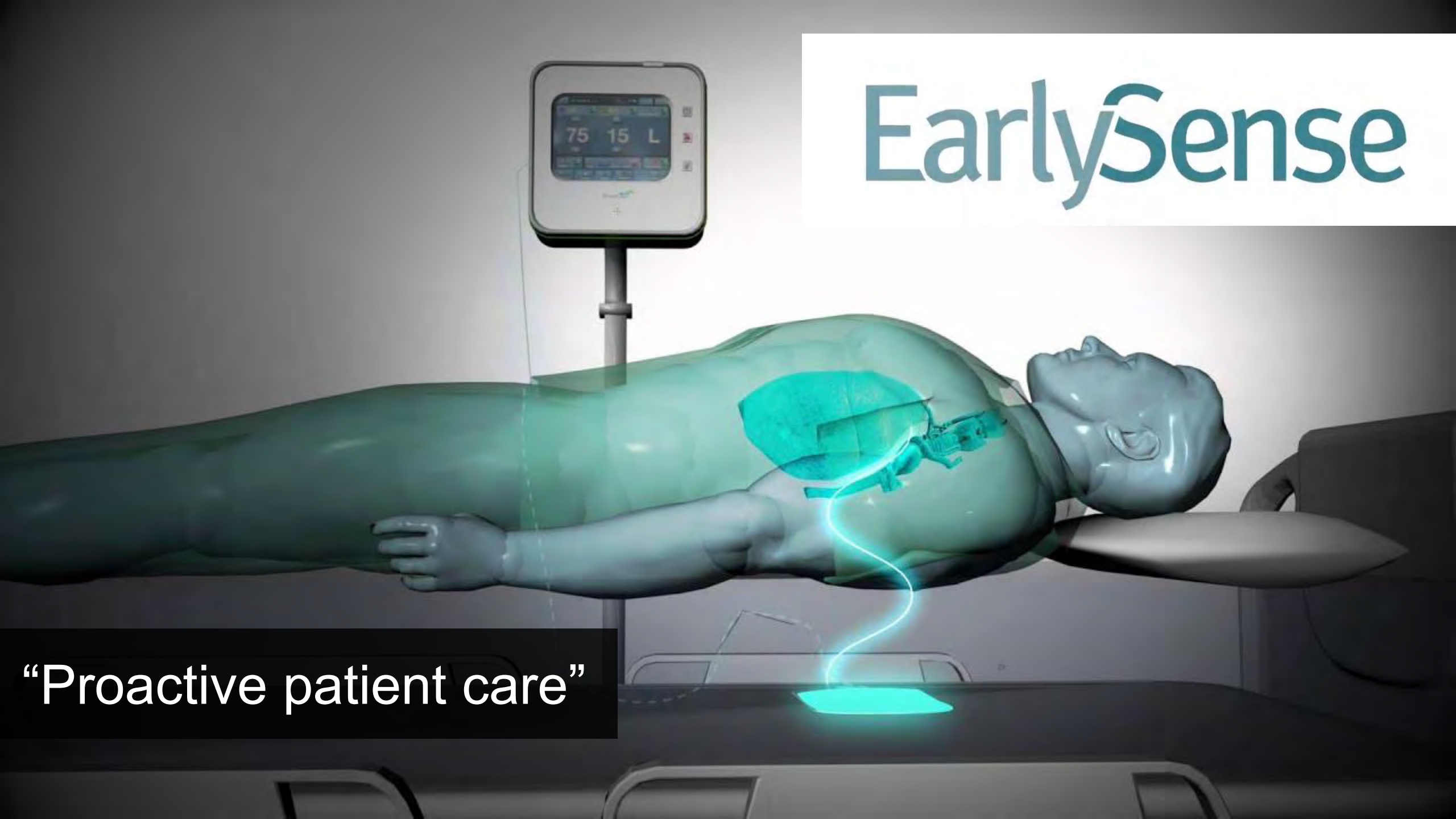
Use tool chains that span
the entire design workflow.

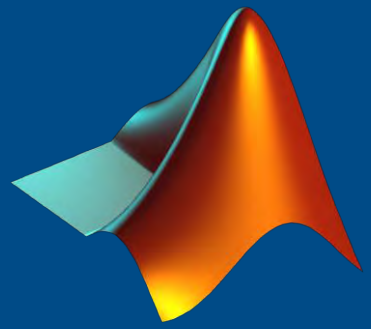

Insights
Apply domain expertise
Operate within their environment
Interaction
Intelligence
Implementation
Span the entire design workflow


Operate within their environment
Interaction
Intelligence
Insights
Apply domain expertise
Implementation
Span the entire design workflow

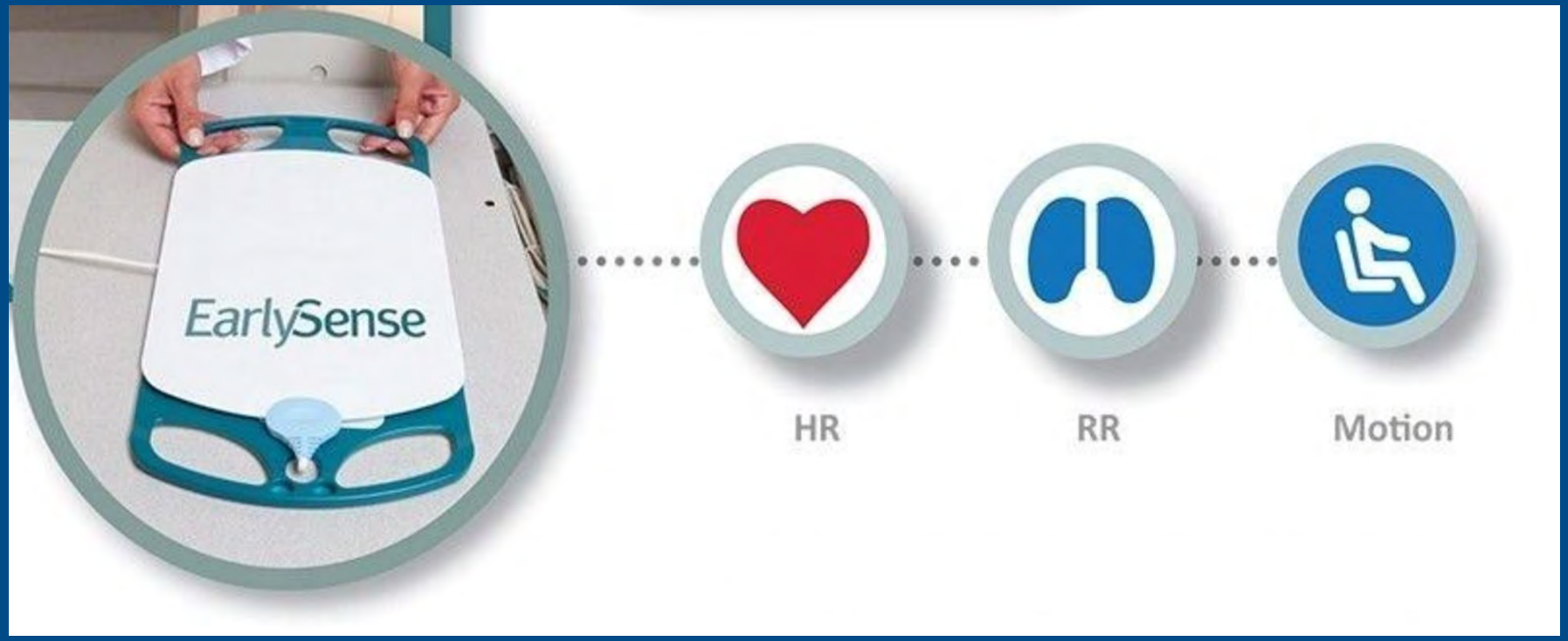
Interaction within complex environments

What was the larger system the vehicle had to operate in?

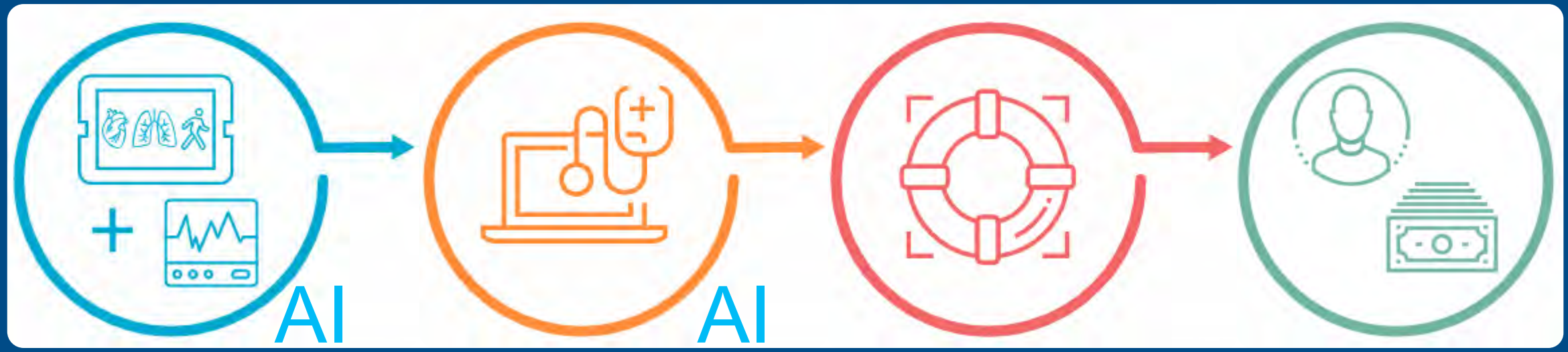

EarlySense
75 15 L
“Proactive patient care”



Statistics and Machine Learning Toolbox
Signal Processing Toolbox
MATLAB Coder
Embedded Coder



EarlySense's AI can predict critical events before they happen



Continuous Monitoring

Early Detection

Early Intervention

Better Outcomes

Dashboards at nurses’ stations and on hallway monitors

Alerts on hand-held devices carried by staff

EarlySense

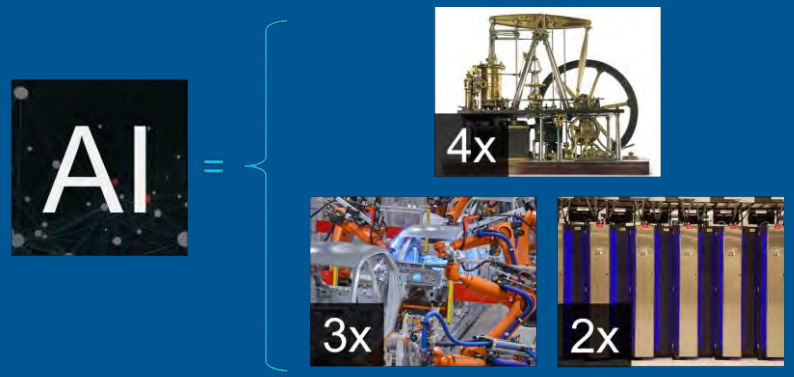

Address problems before they become emergencies

To succeed with AI …

Design how our systems will integrate and interact within their environment.

Success requires more than just intelligence

AI is a transformative technology



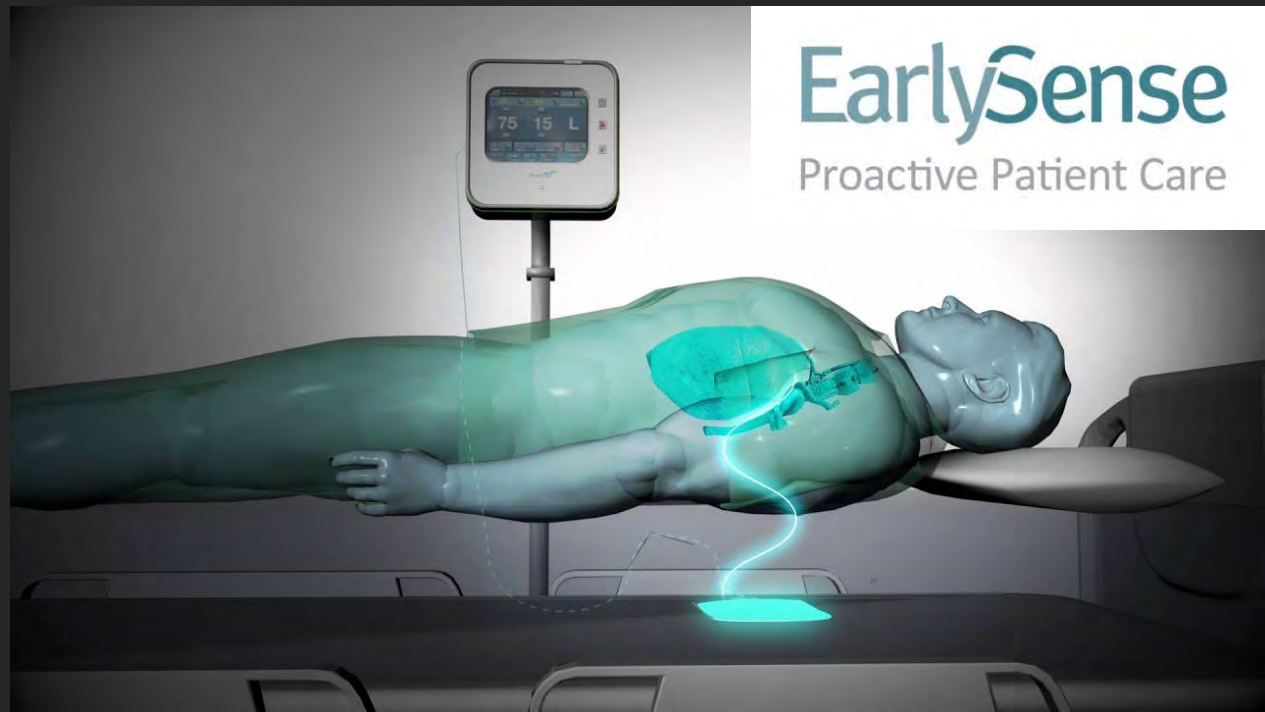
But AI projects can and do fail

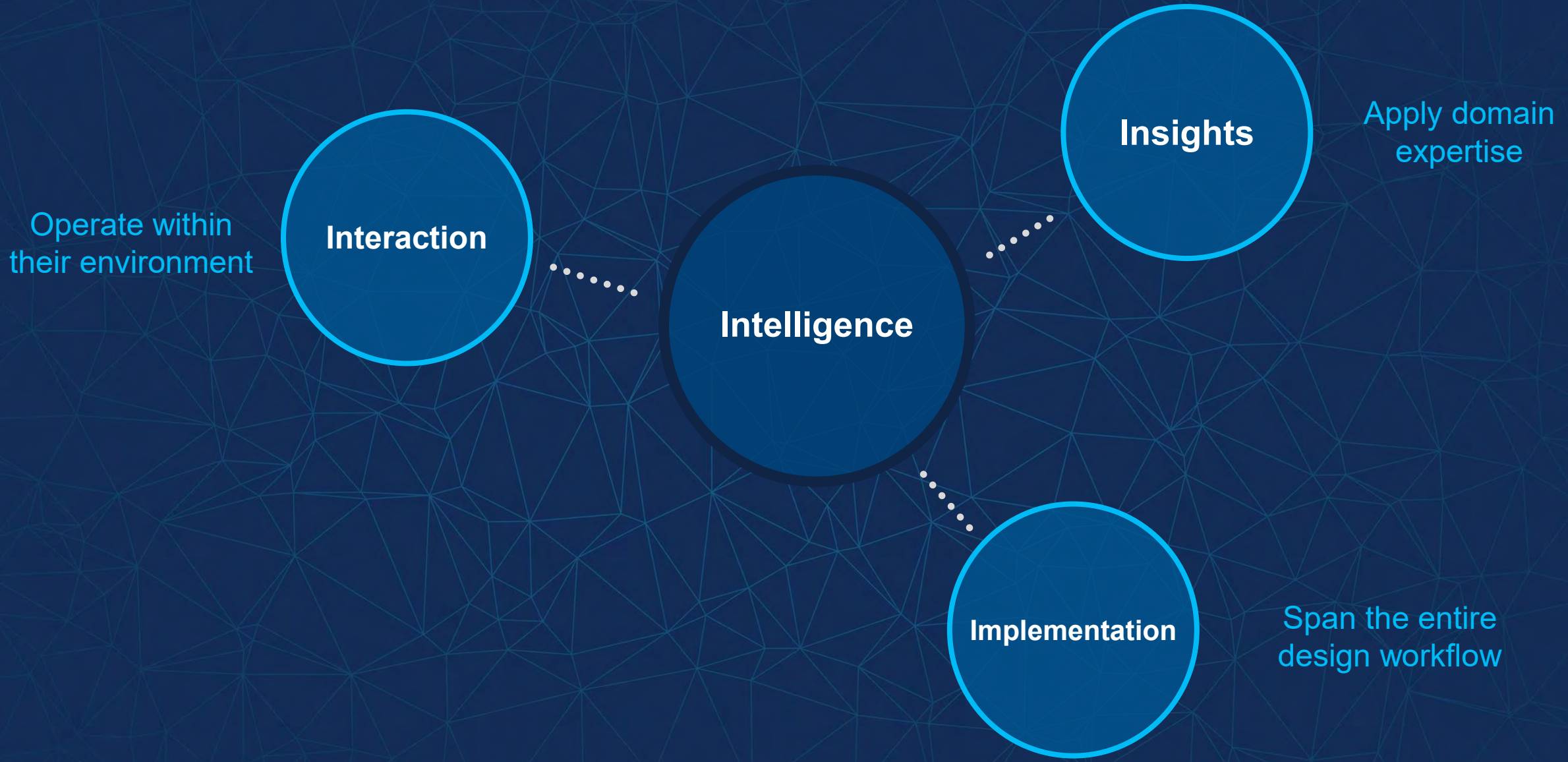
DigitalTonto
At the Crossroads of Media, Marketing and Technology
Most AI Projects Fail. Here's How to Make Yours Successful.
July, 2018

DataRobot
Why Most AI Projects Fail
Oct, 2017

CMS WiRE
3 Common Reasons Artificial Intelligence Projects Fail
May, 2018


VOYAGE


EarlySense
Proactive Patient Care


Operate within their environment
Interaction
Intelligence
Insights
Apply domain expertise
Implementation
Span the entire design workflow

How will you apply AI to your projects?

MATLAB® & SIMULINK®

MATLAB®
&SIMULINK®

Go Beyond the "I" in AI