8 STEPS TOWARD AN AI-DRIVEN MANUFACTURING ORGANIZATION

February 16, 2023

BDO DIGITAL

Welcome

The Key Business Challenges in Manufacturing

Data and AI Solutions in Manufacturing Today

How to Get Started

⚠ ▶ This webinar is being recorded.
▶ CPE credit is not available for this webinar.

WITH YOU TODAY

VAL LAUFENBERG
Partner, Management
Advisory Services
BDO Digital

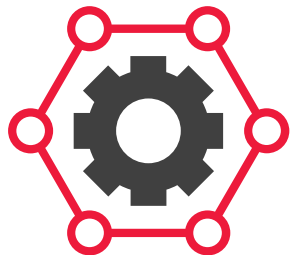**GANESH RAJAMANI**
Director, Data & AI
BDO Digital

SEAN AHMADINEJAD
Managing Director, Data & AI
BDO Digital

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Key Business Challenges in Manufacturing

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Manufacturing at a Glance

70% say supply chain disruption will pose **some risk or a significant risk** in 2023.

36% will pursue **Industry 4.0** investments.

68% will **expand** U.S. operations.

38% will pursue **M&A** in response to **higher cost of goods sold (COGS)**.

The **2023 BDO Manufacturing CFO Outlook Survey** polled **125 manufacturing CFOs** with revenues ranging from $250 million to over $3 billion in October 2022. The survey was conducted by Rabin Research Company, an independent marketing research firm, using Op4G's panel of executives.

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The New Manufacturing Resilience Agenda

Manufacturers are **cautious** of headwinds, including **rising interest rates**, **higher costs** and **economic volatility**. Manufacturing CFOs project that a downturn would lead to significant financial issues.

Fortunately, manufacturers have learned from previous downturns and are taking **proactive measures** to <u>increase resilience</u>.

TOP PROFITABILITY/LIQUIDITY ISSUES

Manufacturers are anticipating the following profitability and liquidity issues in the next 12 months:

49%	Increasing payables beyond historic terms in total amount and/or aging in days
42%	Significant decreases in revenue or deteriorating profit margins
39%	Insufficient cash on hand or the need to delay expenditures

2023 RESILIENCE STRATEGIES

48%	Taking advantage of clean energy incentives in the Inflation Reduction Act
39%	Cost optimization/reduction
36%	Digital transformation
25%	Restructuring or reorganizing
21%	Understanding tax implications of strategic business decisions

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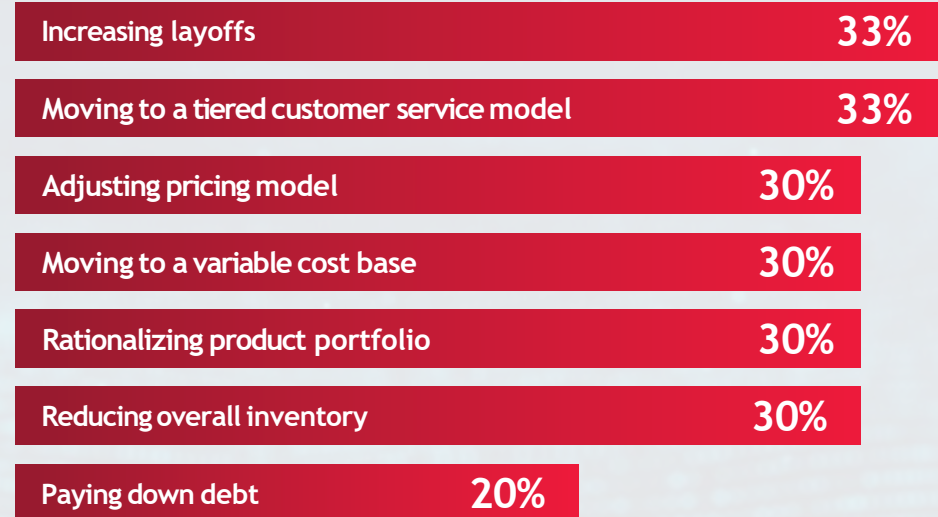
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2023 BDO Manufacturing Outlook Survey

It's been proven that more digitally mature companies have an edge during a downturn.

▶ Manufacturers who maintain or increase Industry 4.0 investment will be better positioned to adapt to disruption and capture new opportunities.

▶ Implementing automation technology can improve efficiency in operations and increase profitability.

▶ Look to improve data visibility throughout their own supply chain, but also share data with customers and vendors.; build a digital thread, which creates end-to-end supply chain visibility and enables closer collaboration across the supply chain.

Tax planning will be another key component of manufacturers' resilience strategies for 2023.

▶ The Inflation Reduction Act (IRA) created and expanded tax incentives that manufacturers are pursuing to reduce their total tax liability.

PIVOT PLANS IN A DOWNTURN

Increasing layoffs	33%
Moving to a tiered customer service model	33%
Adjusting pricing model	30%
Moving to a variable cost base	30%
Rationalizing product portfolio	30%
Reducing overall inventory	30%
Paying down debt	20%

Manufacturers have learned that a crisis is a smart time to pivot, and a quarter of CFOs plan to restructure or reorganize their businesses.
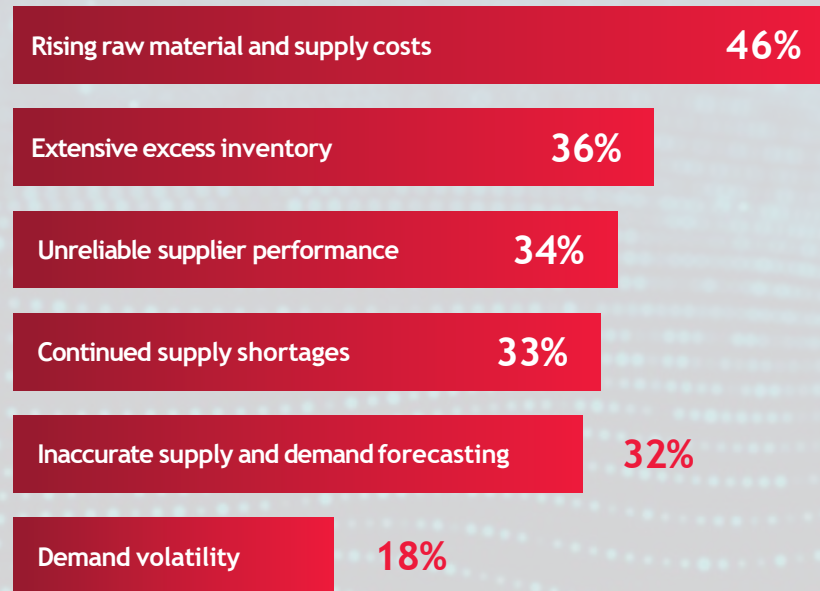
▶ Changing their business model from B2B to B2C
▶ Enhancing e-commerce capabilities
▶ Overhauling their product portfolio
▶ Tiered customer support model

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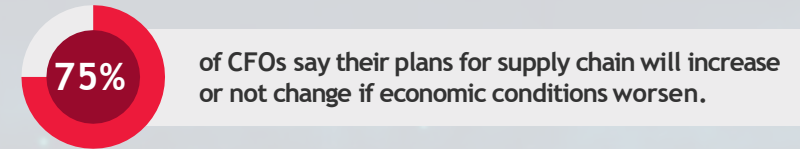# Building a Future-Focused Supply Chain

2023 BDO MANUFACTURING CFO OUTLOOK SURVEY

Over the last few years, manufacturers have considered making significant changes to their network footprints in response to global disruption. Now, they are prepared to put those plans into action and alter the shape of global supply chains.
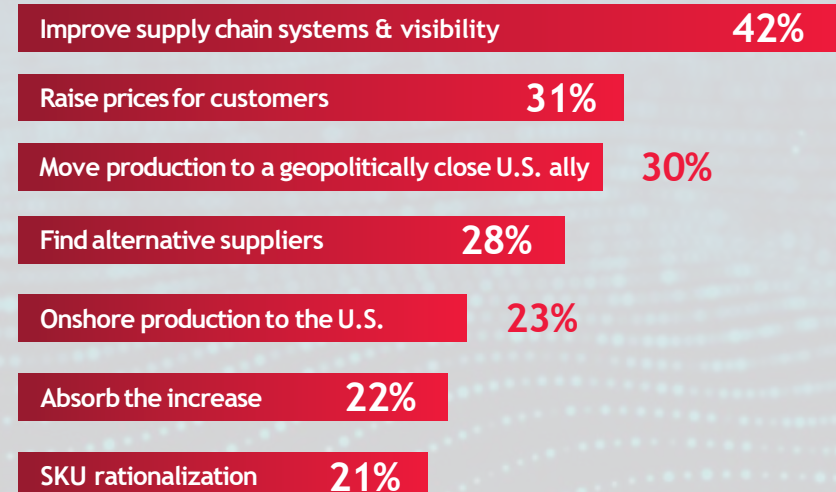
Expected Inventory Issues for 2023

Rising raw material and supply costs	46%
Extensive excess inventory	36%
Unreliable supplier performance	34%
Continued supply shortages	33%
Inaccurate supply and demand forecasting	32%
Demand volatility	18%

Even an economic downturn will not stop them:

75% of CFOs say their plans for supply chain will increase or not change if economic conditions worsen.

Planned Responses to Higher COGS

Here are the actions manufacturers plan to take in the next 12 months in response to higher cost of goods sold (COGS):

Improve supply chain systems & visibility	42%
Raise prices for customers	31%
Move production to a geopolitically close U.S. ally	30%
Find alternative suppliers	28%
Onshore production to the U.S.	23%
Absorb the increase	22%
SKU rationalization	21%

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Supply Chain Visibility

2023 BDO MANUFACTURING CFO OUTLOOK SURVEY

Increasing supply chain visibility will also help manufacturers meet environmental, social and governance (ESG) goals, which will continue to increase in importance due to evolving expectations from customers, investors and governments.

Access to deeper insights about plant and supplier operations will help in particularly with supporting reporting for manufacturers' sustainability strategies.

The Uyghur Forced Labor Prevention Act (UFLPA), which went into effect in June 2022, bans imports of products into the U.S. produced with forced labor from the Xinjiang region of China. Companies must meet a burden of proof that their products were sourced with ethical labor, which requires data from their suppliers.

Looking ahead, there will be additional legislation with requirements around ethical labor and sustainability, which will require collaboration across the supply chain to provide data on production and labor practices.
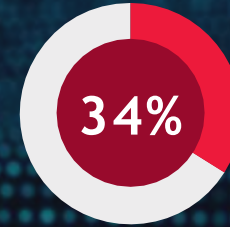
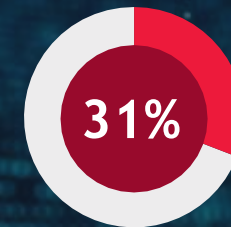## Where Manufacturers are Moving
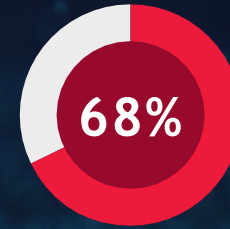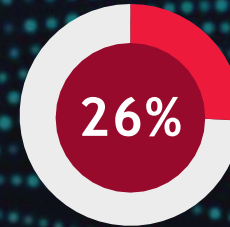
68% will expand operations in the U.S.
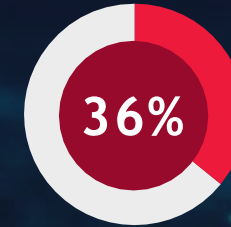
36% will expand in North America (non-U.S.)

34% will expand in Asia-Pacific (non-China or India)

31% will expand in South America

26% will expand in China
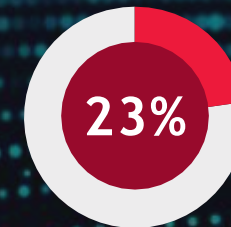
23% will expand in India

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Looking Ahead

To succeed in the future, manufacturers must rethink their businesses. Success means going beyond adapting to changing stakeholder expectations, and instead proactively creating products and services to fill their needs. Competition amongst the highest-growth manufacturers will be intense — **and organizations who can adapt and capture opportunities fastest will be the most successful.**

> The role of the CFO is changing dramatically. My top priority is brainstorming solutions to customer needs and thinking through my company's vision. Manufacturing CFOs need more than financial acumen to succeed – they need a deep understanding of their entire business and must collaborate to innovate.

Chuck Beto
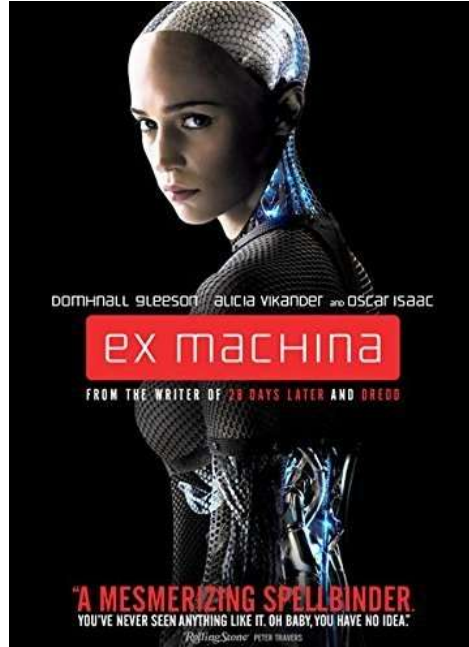Chief Financial Officer, KSR International Inc.

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Data and AI Solutions in Manufacturing Today

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What Some People Think When They Hear 'Data & AI'

THE TERMINATOR
© Skydance Media, LLC

AVA – EX MACHINA
© Universal City Studios LLC

C3PO – STAR WARS
© The Walt Disney Company

BISHOP - ALIENS
© 20th Century Studios

DATA – STAR TREK
© CBS Studios Inc.

Beyond the Buzzword

Data Analytics Definition

The process of examining datasets to draw conclusions about the information they contain.

Data analytic techniques enable you to take raw data and uncover patterns to extract valuable insights from it.

A.I. Definition

A.I. is a broad topic with a rich set of sub-disciplines, methods, and tools that bring together areas such as **speech recognition, computer vision, machine translation, reasoning, attention and memory, robotics and control.**

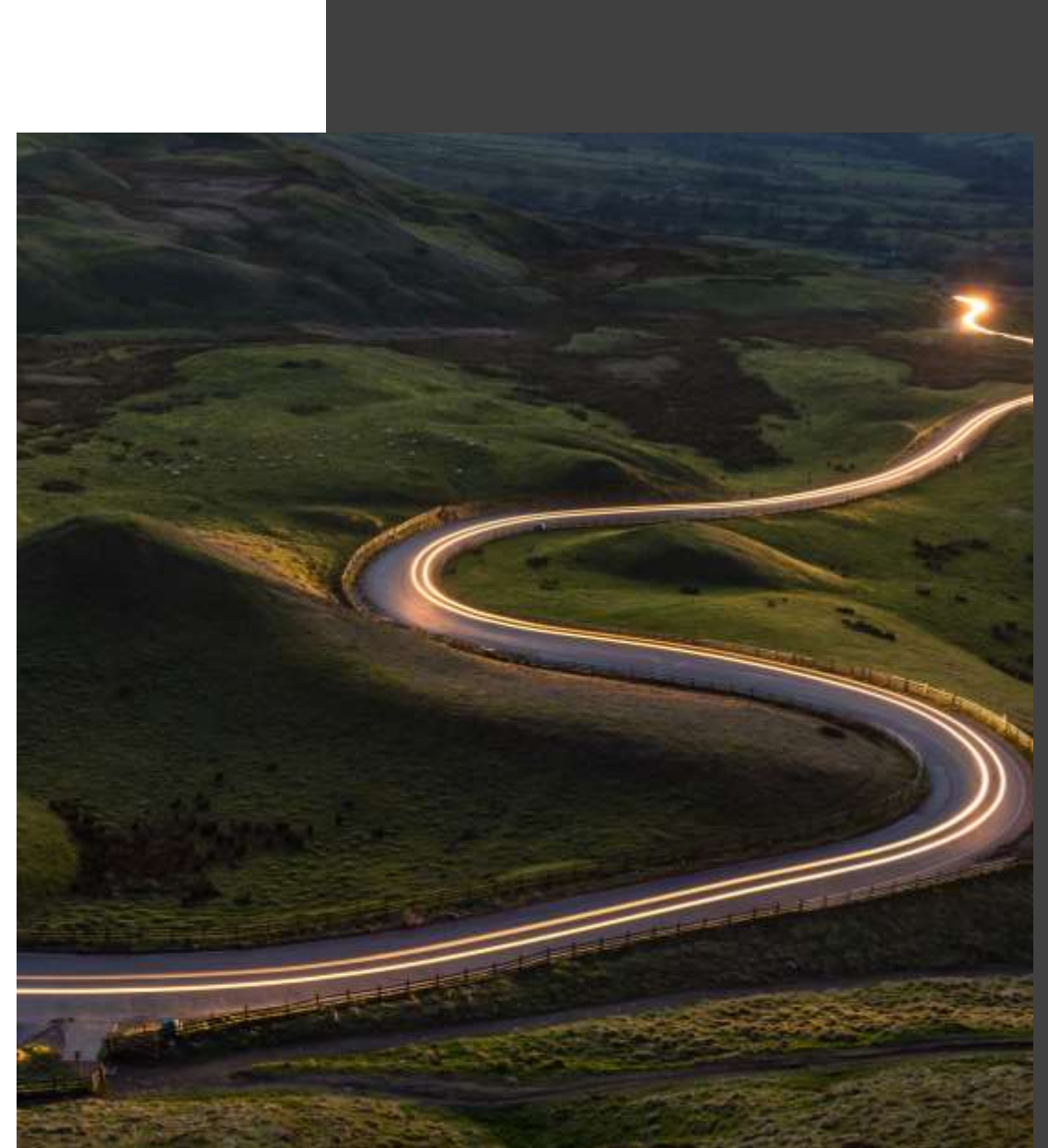**A.I.** mimics "learning" and "problem-solving" through advanced algorithms and machine learning.

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Poll Question 1

Where are you in the AI journey?

Responses –

▶ Not started yet

▶ Exploring use cases to see where AI would fit

▶ Have a thought or idea of an AI roadmap

▶ Currently implementing an AI roadmap

Data Analytics & AI Use Cases

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Data & A.I. in Manufacturing
USE CASES ACROSS THE ENTERPRISE

	PROTECTING YOUR WORKFORCE (People)	MANAGING YOUR BUSINESS (Strategy & Operations)	MITIGATING RISK (Risk)	UNDERSTANDING THE ECONOMIC IMPACTS (Financials)	EVOLVING REGULATION, LEGISLATION & COMPLIANCE (Regulation)
Persevere	Employee Health & Safety	Crisis Management & Customer Retention	Supply Chain Continuity	Liquidity & Cash Flow	Regulatory Response & Policy Development
Maintain	Workforce Planning & Productivity	Recession Proofing	Supply Chain Optimization	Cost Optimization	Regulatory Compliance
Recover	Strategic Hiring	Customer Acquisition	Supply Chain Capacity	Financial Hardening	Compliance Effectiveness
Thrive	Talent Acquisition & Retention	Performance Improvement & Innovation	Resiliency Engineering	Growth Financing	Intelligent Compliance

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Visualizing Data for Insights

▶ Auto parts company

▶ Track current and projected cost and sales
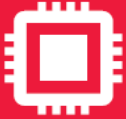
▶ Microsoft Power BI dashboard

Machine Learning AI

- Predictive Forecasting
- Predictive Churn
- Predictive Quality
- Network Optimization and Simulation
- Machine Utilization and Predictive Maintenance

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How to Get Started

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AI in Manufacturing Forecast

The global AI in manufacturing market is anticipated to attain a CAGR of ~25% over the forecast period, i.e., 2022 – 2030.

Research by Nesters [Article](#) Manufacturers and Distributors (M&D) want to capitalize on this growth by leveraging AI however do not know where to start.

In order to capitalize on this opportunity and leverage AI implies investment from the business.

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Difference with the AI Supported Decisions vs Forecasting

Forecast

- Estimating based on past data and analysis as basis
- Definitive statement
- Scientific and unaffected by personal bias
- Based on patterns that are thrown ahead
- Errors can be identified
- Repeatable
- In business, forecasts the level of demand

Prediction

- Predicting based on events that could occur
- Probabilistic Statement
- Inherent bias as it is based on intuition
- Based on random data to say what is ahead
- Nearly impossible to identify errors
- Depends on the data & the representation
- In business, predicts whether a change may or may not create demand

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Common Challenges with AI in Manufacturing

GETTING STARTED QUICKLY
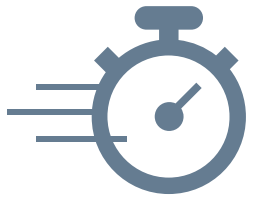
Your organization wants to use AI and get value out of it, but you don't know which 'low hanging fruit' use cases to start with for your industry.

LIMITED RESOURCES

Finding and hiring data scientists is challenging. Joblist.com currently has 1.3M job openings in the U.S.

BUSINESS IMPACT

Even if organizations do invest, most fail to get beyond experiments with only 15% creating value for the business.

TOOLS & TECHNOLOGY

Most organizations don't have the tools and technology to maintain their models - only 1% of models are kept up to date once operationalized.

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Poll Question 2

What are your concerns of using AI in your organization?

Responses –
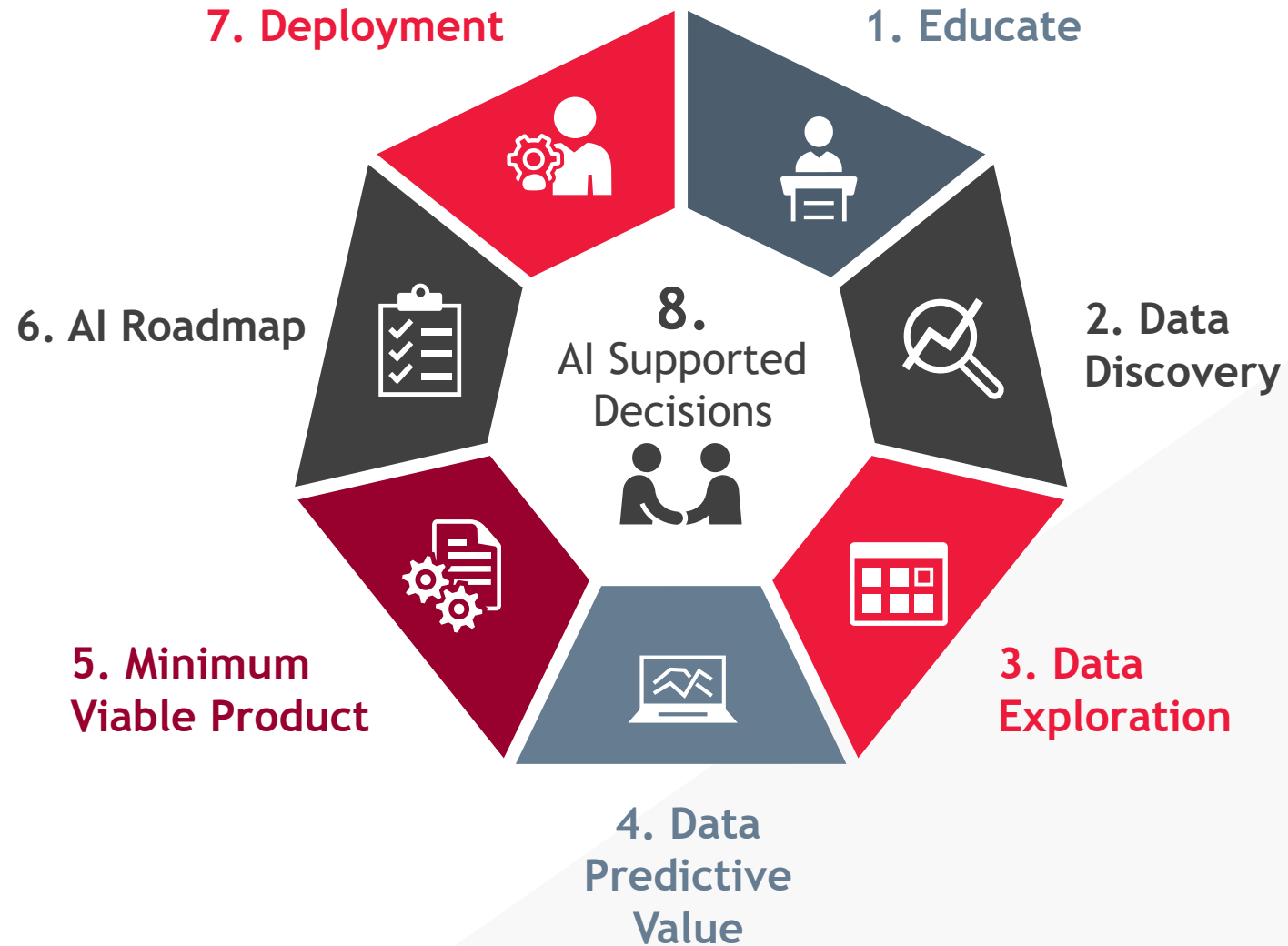
▶ Not sure of business case

▶ Too much uncertainty about AI

▶ Not sure where to start

▶ Not enough resources/budget

▶ No concerns, I'm all in!

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Goals

▶ Where to start on the AI journey?

▶ Education and understanding AI and its impact on the business

▶ Understanding the ROI brought by AI

▶ You could easily operationalize AI into production, workflows, business strategies and processes

▶ Evaluate success of AI supported decisions

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8-Steps To AI-Driven Manufacturing Organization

7. Deployment

1. Educate

6. AI Roadmap

8.
AI Supported
Decisions

2. Data Discovery

5. Minimum Viable Product

3. Data Exploration

4. Data Predictive Value

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Use Case – Optimize Time to Results

- ▶ Controller wastes nine hours every week
- ▶ Huge spreadsheet with multiple calculations
- ▶ Job run time/labor vs estimate
- ▶ Job ingredients used vs expected
- ▶ Data reviewed too late to create efficiencies
- ▶ Months later that we realized there was a problem
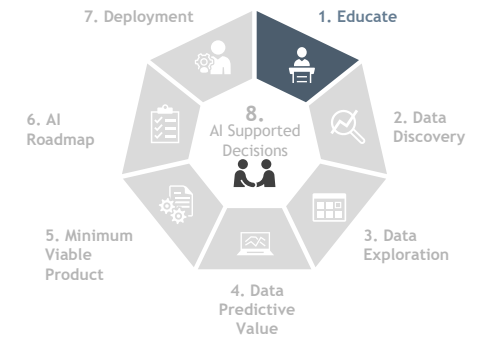
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Poll Question 3

Do you have dedicated resources to AI?

Responses –

▶ We are exploring

▶ We have a Data Science team

▶ We are hiring

▶ We have outsourced AI resources

8 STEPS TOWARD AN AI-DRIVEN MANUFACTURING ORGANIZATION

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1. Education

7. Deployment 1. Educate

6. AI Roadmap

8. AI Supported Decisions

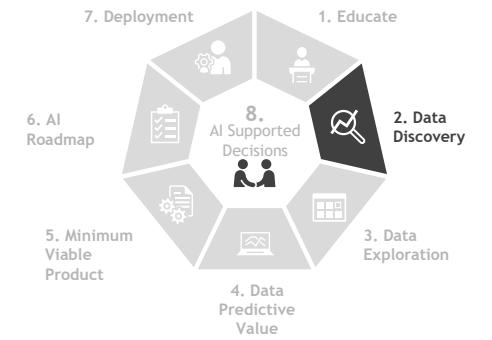2. Data Discovery

5. Minimum Viable Product

3. Data Exploration

4. Data Predictive Value

▶ Where to use AI?

▶ Why to use AI?

▶ What AI is and is not?
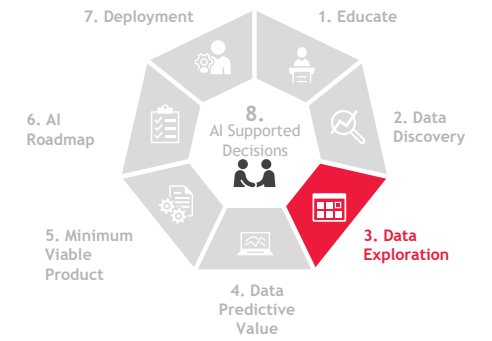
▶ How to use AI?

▶ What do you need to succeed with AI?

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2. Data Discovery

7. Deployment
1. Educate
6. AI Roadmap
8. AI Supported Decisions
2. Data Discovery
5. Minimum Viable Product
3. Data Exploration
4. Data Predictive Value

Data -

▶ In silos in different systems and geographies

▶ Democratizing

▶ Availability to use

8 STEPS TOWARD AN AI-DRIVEN MANUFACTURING ORGANIZATION

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3. Data Exploration

7. Deployment
1. Educate
6. AI Roadmap
8. AI Supported Decisions
2. Data Discovery
5. Minimum Viable Product
3. Data Exploration
4. Data Predictive Value

Evaluate the data for:

▶ Quality

  ▶ Accuracy

  ▶ Consistency

▶ Preparation

  ▶ Cleansing

  ▶ Normalizing

  ▶ Translation

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4. Data Predictive Value

7. Deployment
1. Educate
6. AI Roadmap
8. AI Supported Decisions
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5. Minimum Viable Product
3. Data Exploration
4. Data Predictive Value
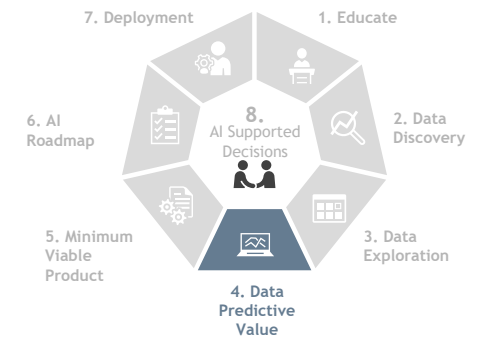
Data's predictive value can be categorized as

▶ Strategic

▶ Operational

8 STEPS TOWARD AN AI-DRIVEN MANUFACTURING ORGANIZATION
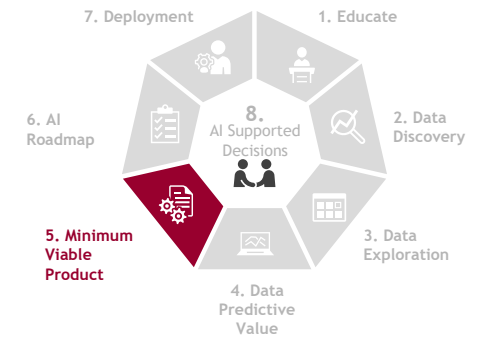
Use Case – Production Schedule Optimization

▶ Products manufactured but not picked up

▶ Delay in revenue recognition

▶ Lot space unavailability

8 STEPS TOWARD AN AI-DRIVEN MANUFACTURING ORGANIZATION

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5. Minimum Viable Product (MVP)

7. Deployment
1. Educate
6. AI Roadmap
8. AI Supported Decisions
2. Data Discovery
5. Minimum Viable Product
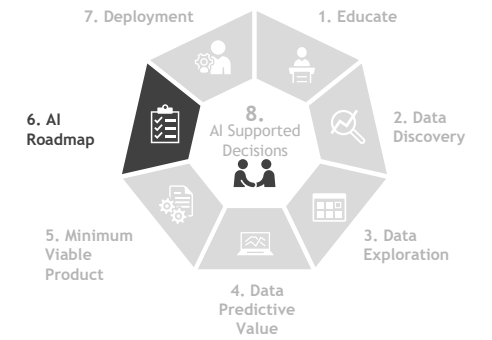3. Data Exploration
4. Data Predictive Value

Identify use cases that can be used to evaluate whether AI is the correct tool based on
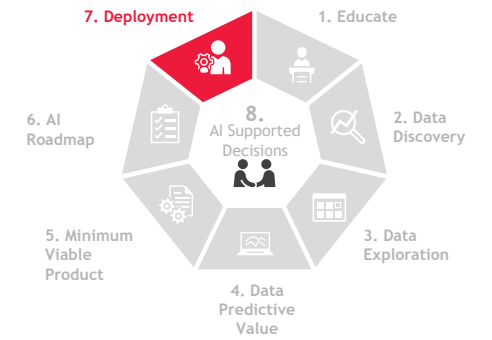
▶ Data availability

▶ Sufficient ROI

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6. AI Roadmap

A roadmap on developing and integrating AI into the business processes based on -

▶ Use Cases

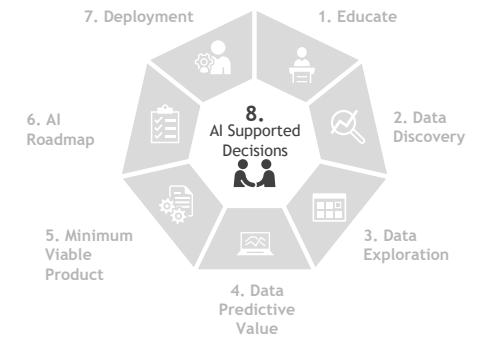▶ Data Availability

▶ Deployment

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7. Deployment

Once AI is productionized

▶ Integrated with business processes

▶ Training on usage

▶ Monitoring for changes in performance

▶ Additional training for AI

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8. AI Supported Decisions

7. Deployment
1. Educate
6. AI Roadmap
8. AI Supported Decisions
2. Data Discovery
5. Minimum Viable Product
3. Data Exploration
4. Data Predictive Value

Using AI in supporting decisions. Evaluated for -

▶ AI prediction based on outcome

▶ Improvement opportunities

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Use Case – Employee Churn Model

- **Talent Turnover**
  - Significant on-boarding effort, time, & cost to backfill
  - Loss of revenue
- **Needed to understand why and when a turnover is possible**
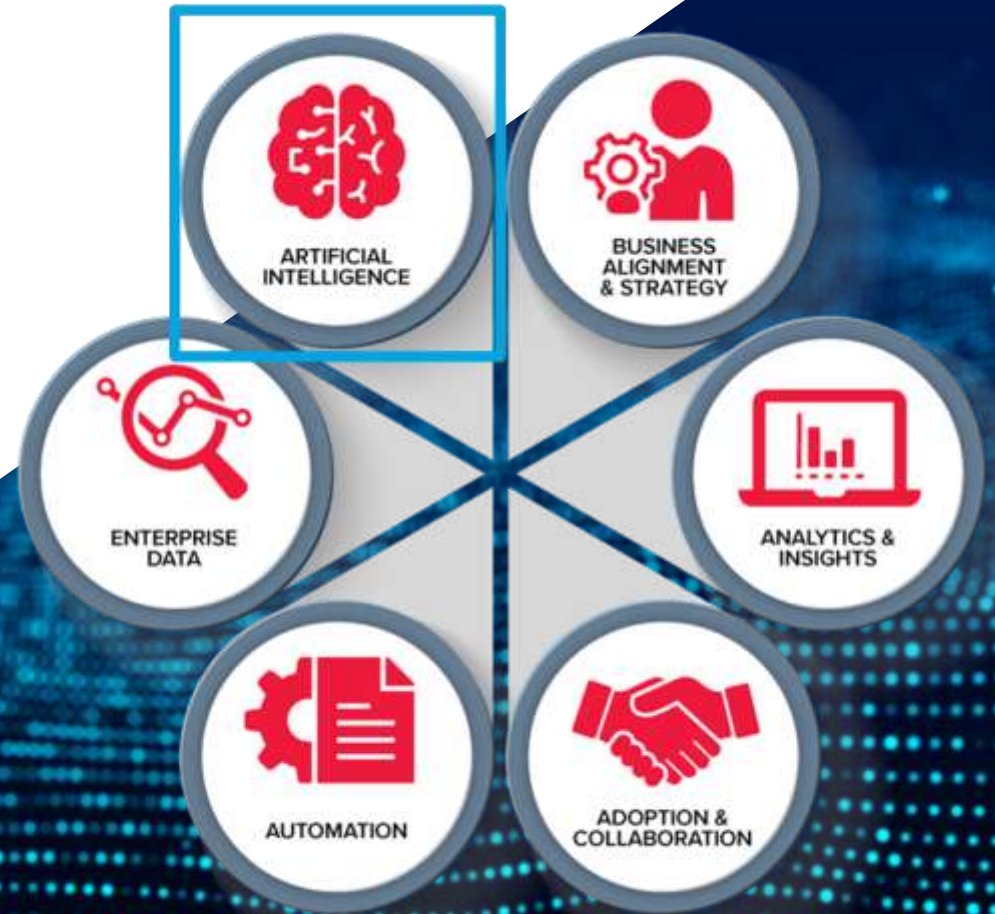
BDO Digital AI Approach
GENESIS

8 STEPS TOWARD AN AI-DRIVEN MANUFACTURING ORGANIZATION
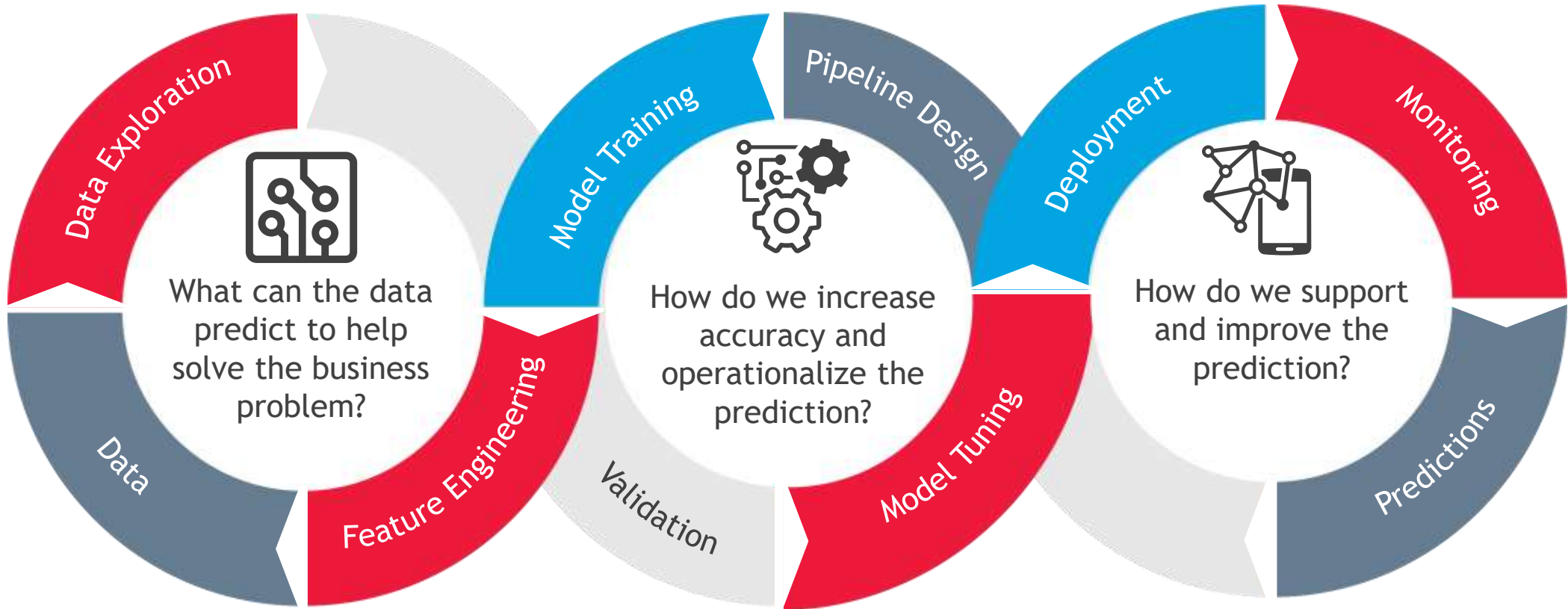
Decision Intelligence Framework

Decision Intelligence (DI) is transforming the way modern organizations utilize data insights.

At BDO, we offer a holistic approach, by working on multiple elements of the framework, from analytics, automation, to artificial intelligence, and beyond.

BDO Digital GENESIS

Help improve your top and bottom-line with AIaaS

Data Exploration

Data

Feature Engineering

What can the data predict to help solve the business problem?

Model Training

Pipeline Design

Validation

Model Tuning

How do we increase accuracy and operationalize the prediction?

Deployment

Monitoring

Predictions

How do we support and improve the prediction?

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The AI Platform as a Service – Subscription Based Service

FAST
- ▶ Rapid Insights and ROI
- ▶ Industry Focused Solutions
- ▶ Quickly Scalable

CONSISTENT
- ▶ Leading Data Science Practices
- ▶ Integrates with current tools and process

TRUSTED
- ▶ Open and Explainable
- ▶ Reduced Risk in using AI
- ▶ Increased Business Impact

**New Way
BDO Digital
Genesis**

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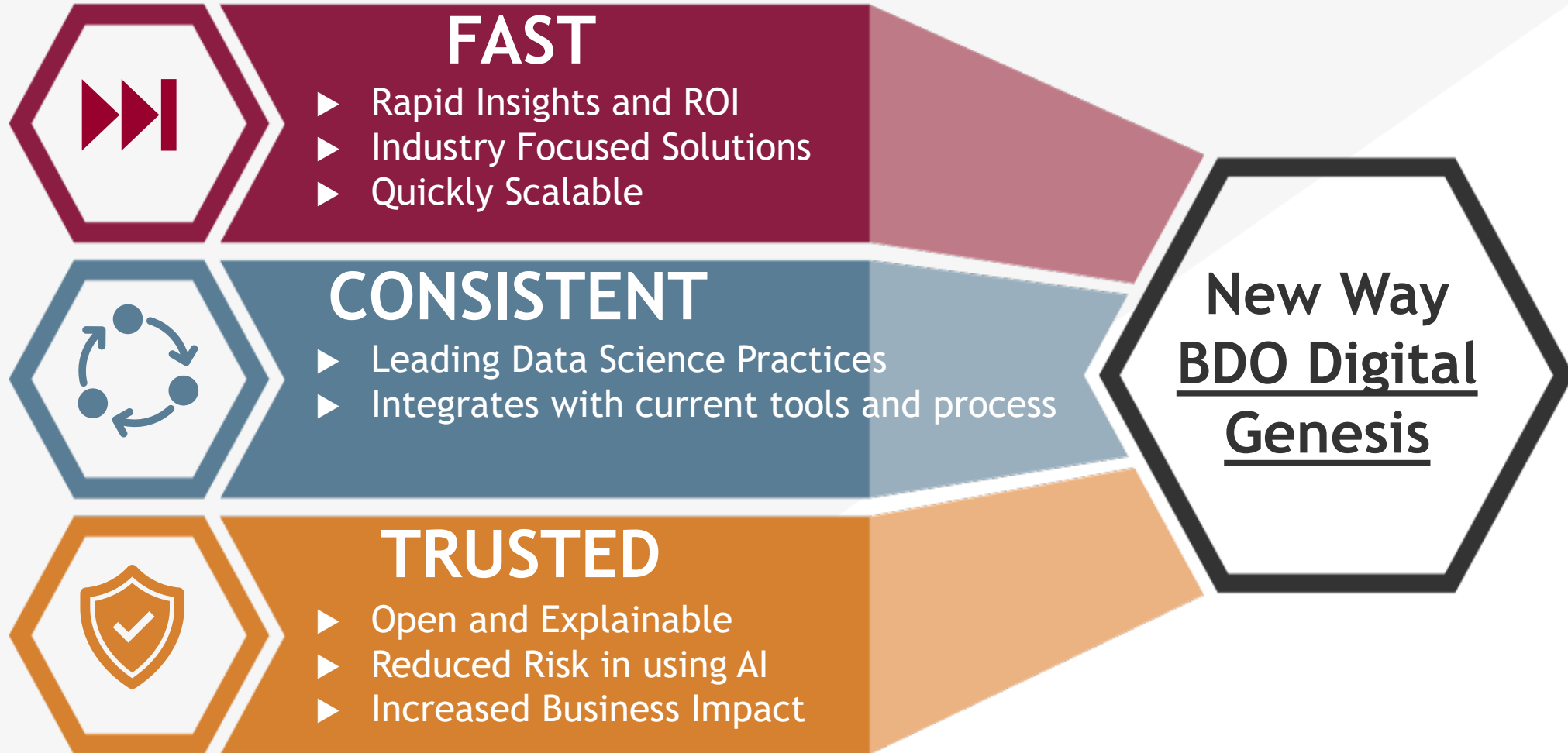
Poll Question 4

If you could use AI today, where would you focus?

Responses –

▶ Predict sales

▶ Predict employee turnover

▶ Predict operational issues

▶ Predict customer churn

▶ Predict cash flow

Q&A

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Thank You

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At BDO, our purpose is helping people thrive, every day. Together, we are focused on delivering exceptional and sustainable outcomes — for our people, our clients and our communities. Across the U.S., and in over 160 countries through our global organization, BDO professionals provide assurance, tax and advisory services for a diverse range of clients.

BDO is the brand name for the BDO network and for each of the BDO Member Firms. BDO USA, LLP, a Delaware limited liability partnership, is the U.S. member of BDO International Limited, a UK company limited by guarantee, and forms part of the international BDO network of independent member firms.

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