

# Next Generation Analytics For Warehouse Operations

Presented by:

Andrew Southgate

Justin Ritter



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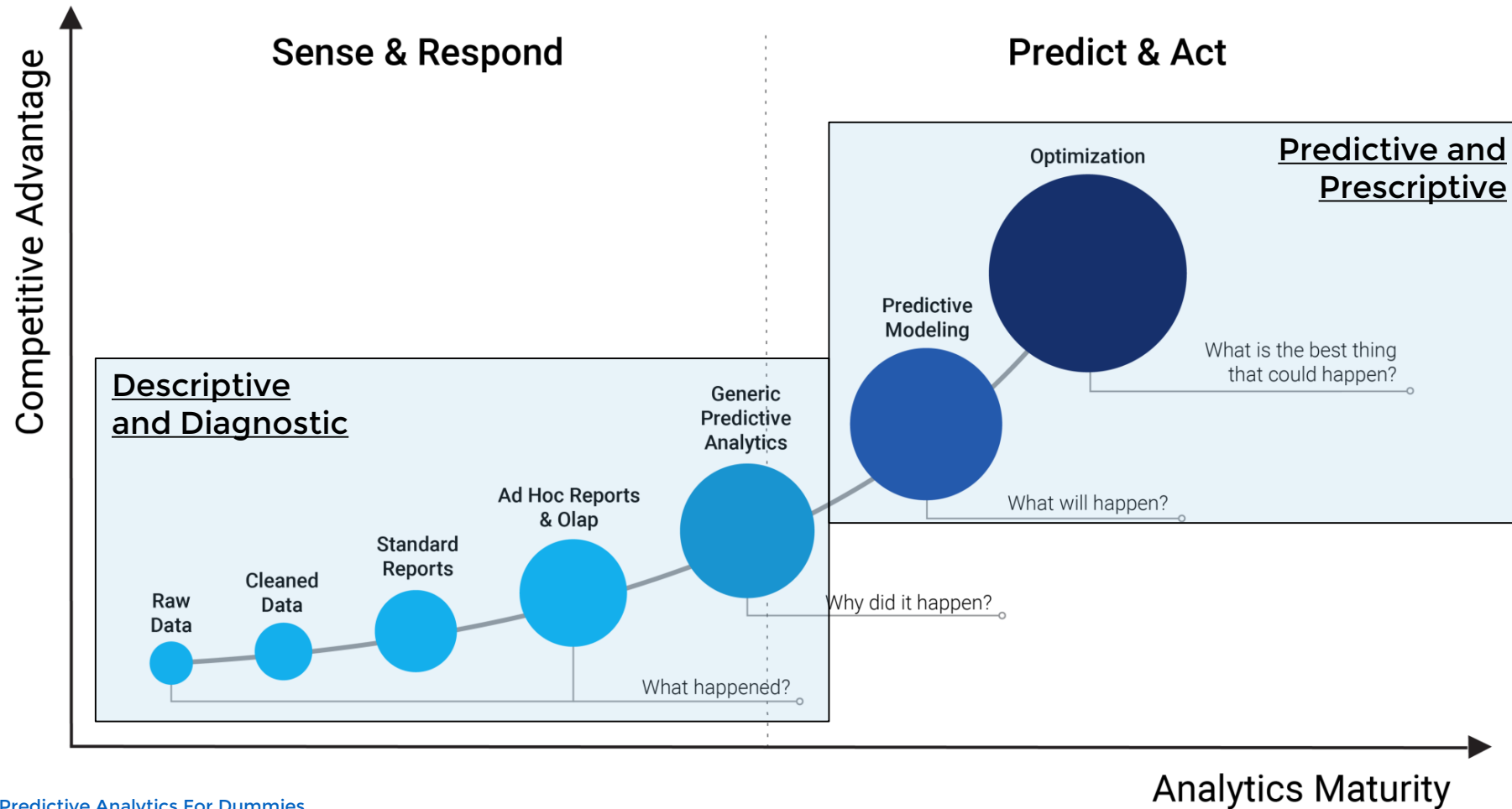


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# What You Will Learn

- Analytics is more than reporting
- Descriptive and diagnostic analytics
  - Use data from multiple operational/execution systems
  - Insights from historical and real-time data
  - Multi-site trends and comparisons
- Next-gen predictive analytics
  - Leverage IoT data and machine learning

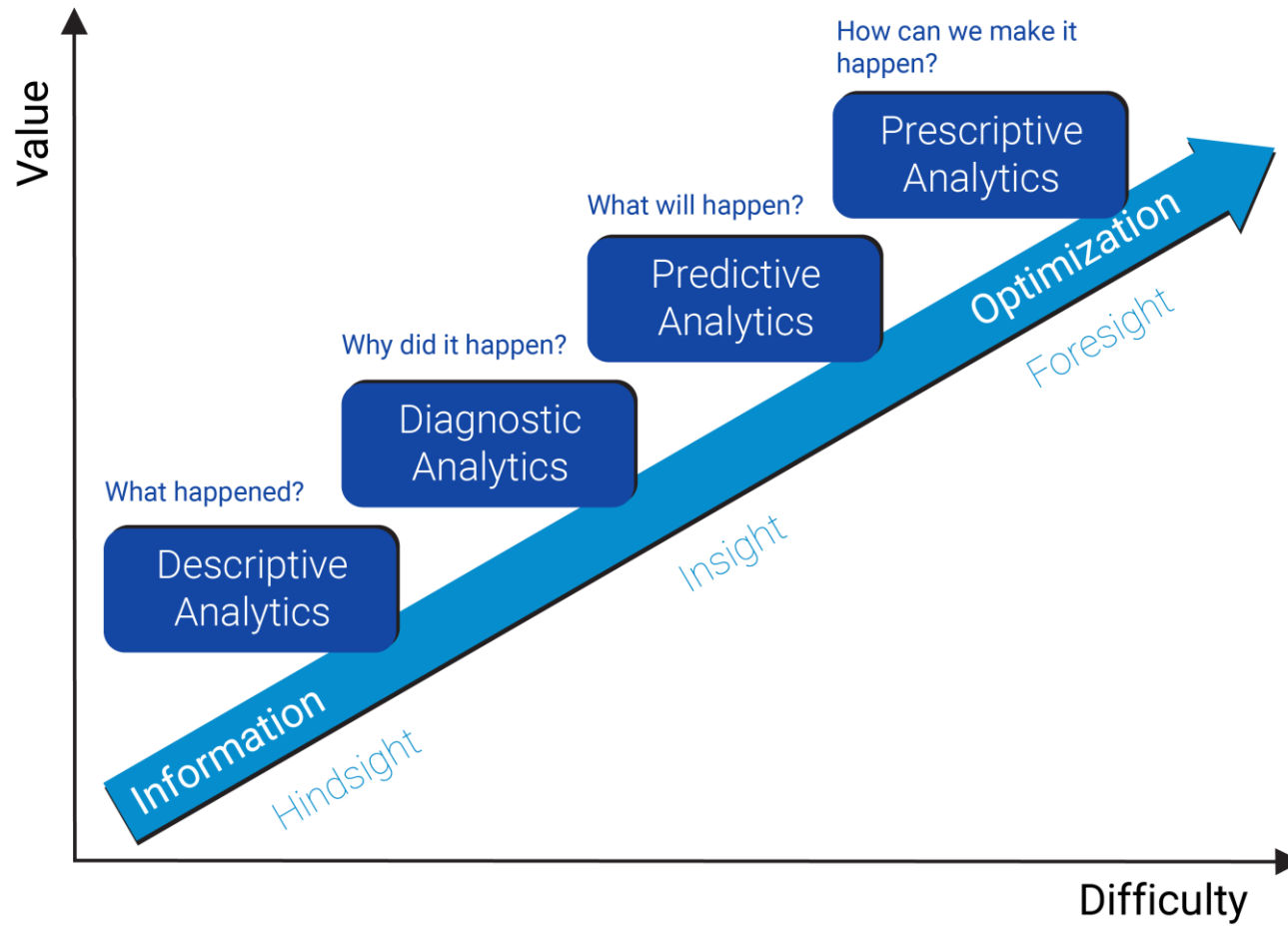
# Data, Reporting and Analytics



Source: [Predictive Analytics For Dummies](#)

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# Analytics For The DC



Source: Gartner, Inc.

- Descriptive
  - What are my productivity trends? Are we falling behind?
- Diagnostic
  - Why did fill rates decline? How does volume affect productivity?
- Predictive
  - Will we ship on time? What if I move workers mid-shift?
- Prescriptive
  - How many temps do I need to complete orders on time?

# DC Analytics Is Hard

- Operational systems are designed for operations, not analytics
- Multiple sources of data: ERP, WMS, WCS, mobile apps, etc.
- Data volumes are growing: IoT, "Big Data"
- Different audiences to serve
  - DC managers
  - Regional directors
  - Supply Chain executives



# Technology For Next Gen Analytics

- Data storage (in the cloud or on-site)
- More processing power (in the cloud or on-site)
- Web reporting and visualization tools
- AI/Machine learning algorithms

# Multi-Site Visibility And Analysis



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# Multi-Site Visibility And Analysis

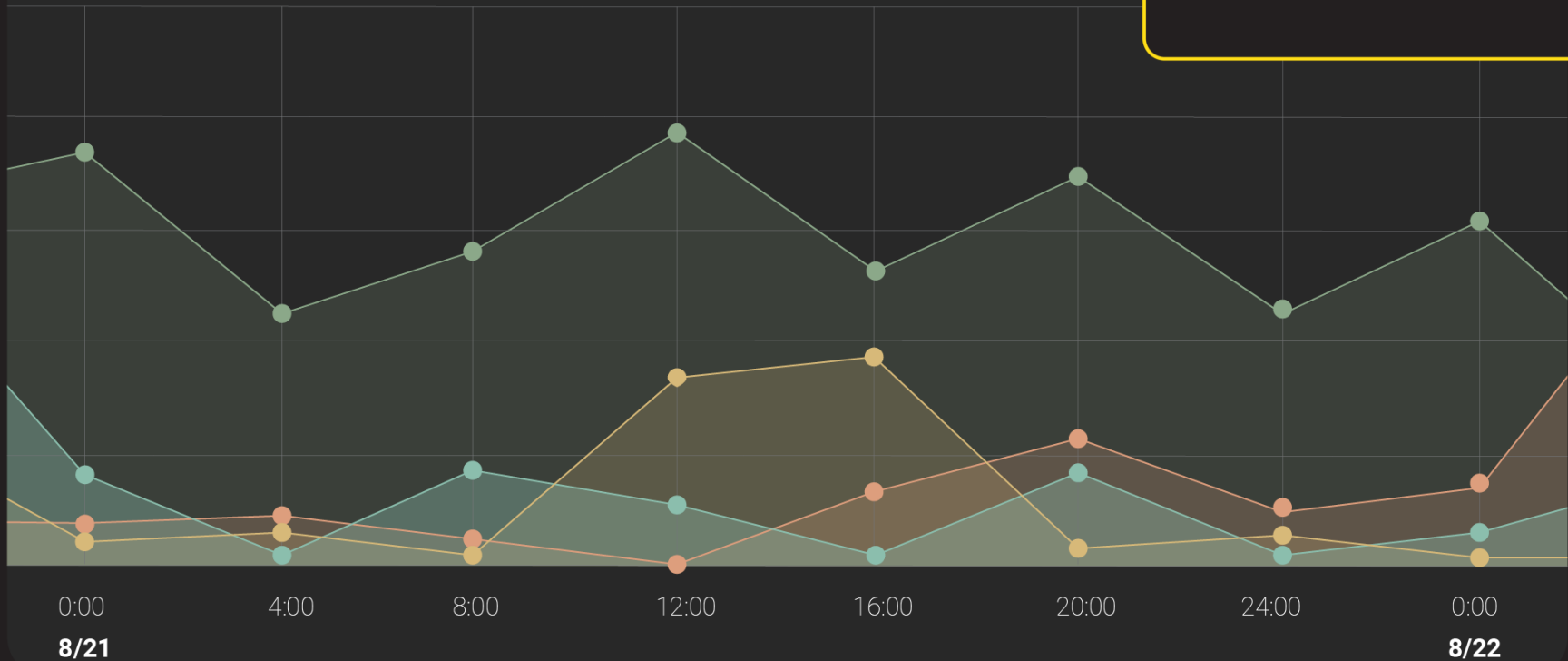




Location Work Style Work Style (Productivity)

Pickline Volumes by Site

Pickline Volumes by Site



		Average	Total
	PHILADELPHIA	1640	93.433 K
	LOS ANGELES	252	5.345 K
	CHICAGO	580	10.345 K
	AUSTIN	730	35.435 K

- PHILADELPHIA
- LOS ANGELES
- CHICAGO
- AUSTIN

Enterp

Search

Location

Location

Work Style

Work Area

Work Type

Product Name

Product Code

Total

20

11

8

5

1

Total

119

106

72

21

19

12

8

8

7

7

7

7

7

7

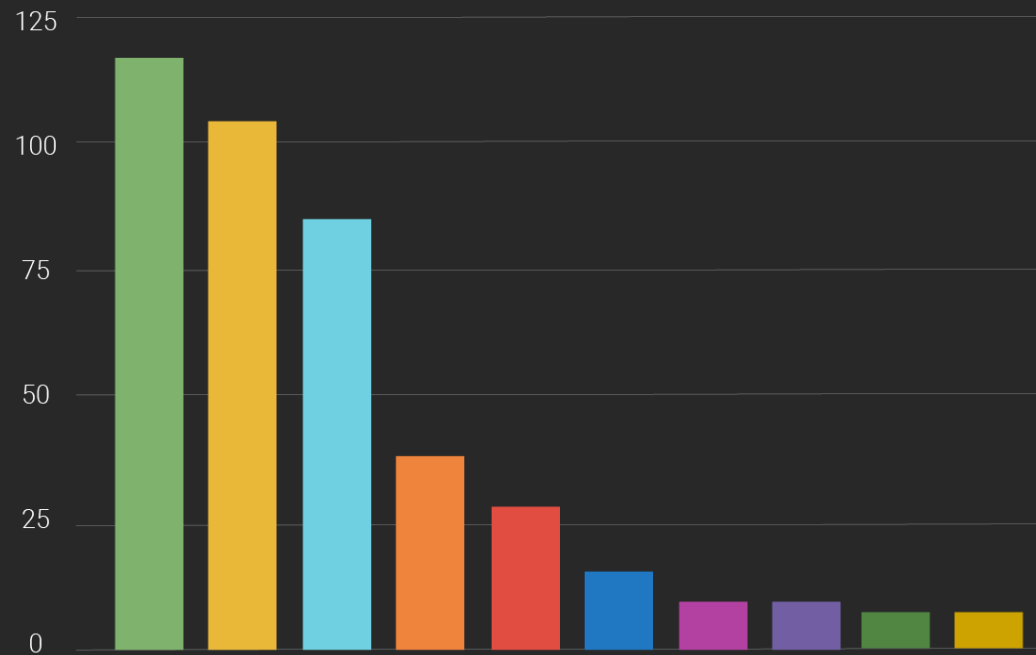
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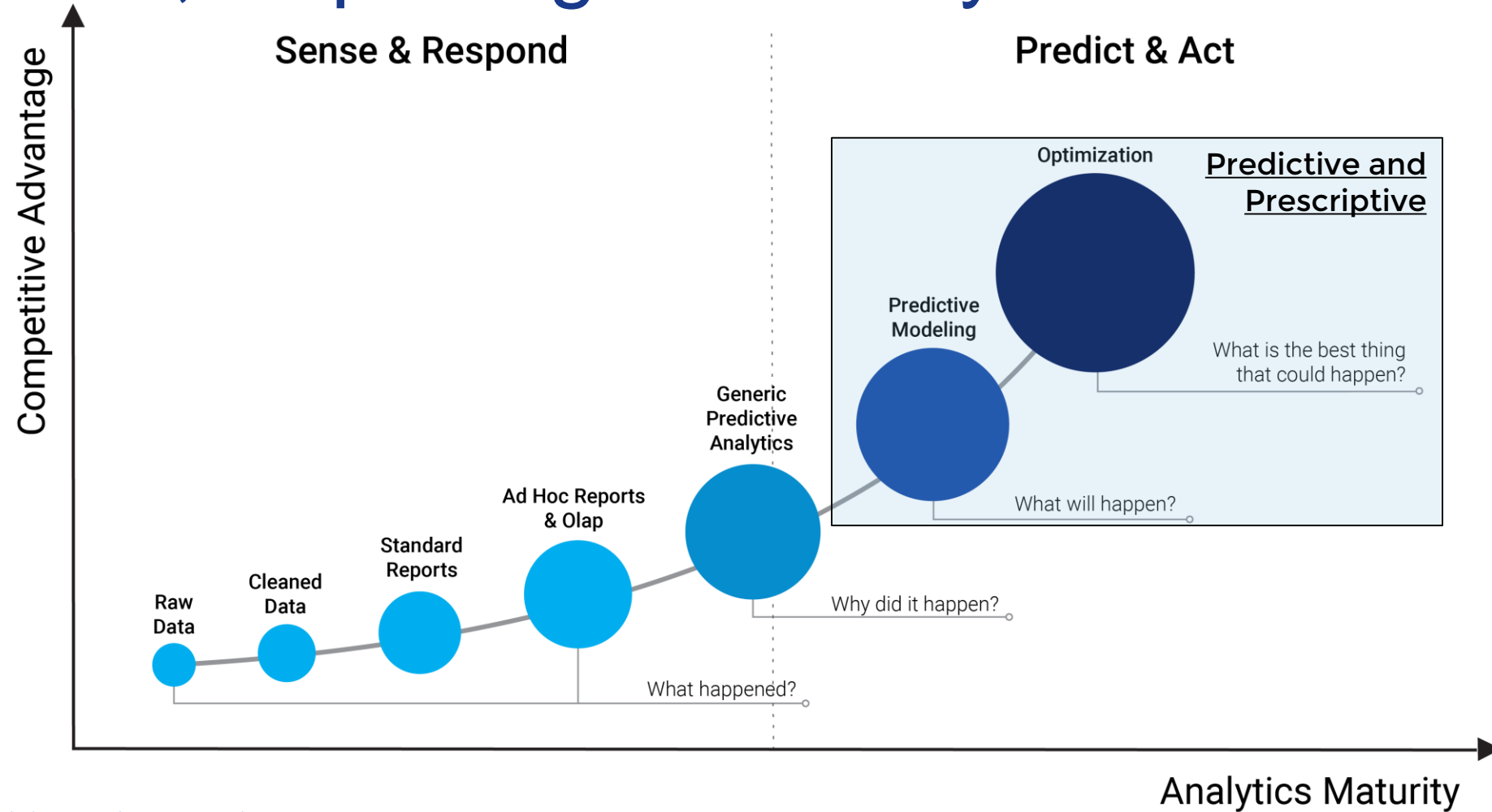
### Top Requested Products (Chicago)



	Total
129405	119
123456	106
436763	83
321455	38
214325	27
121675	12
438954	8
234672	8
123478	7
949563	7

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# Data, Reporting and Analytics



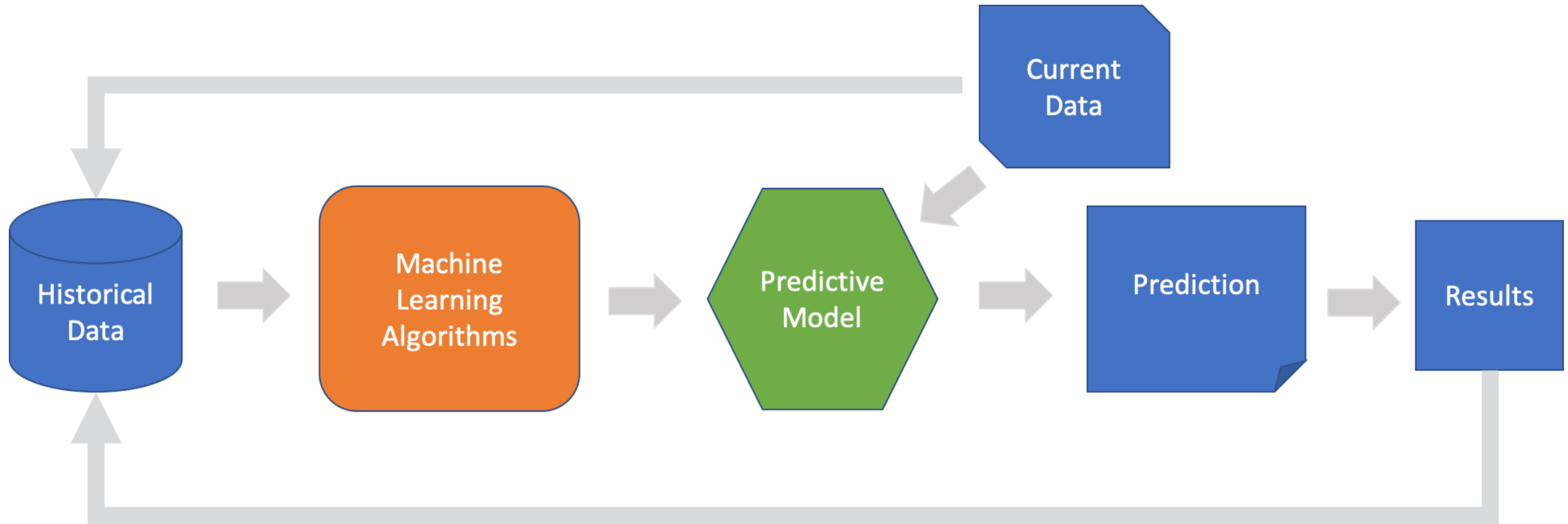
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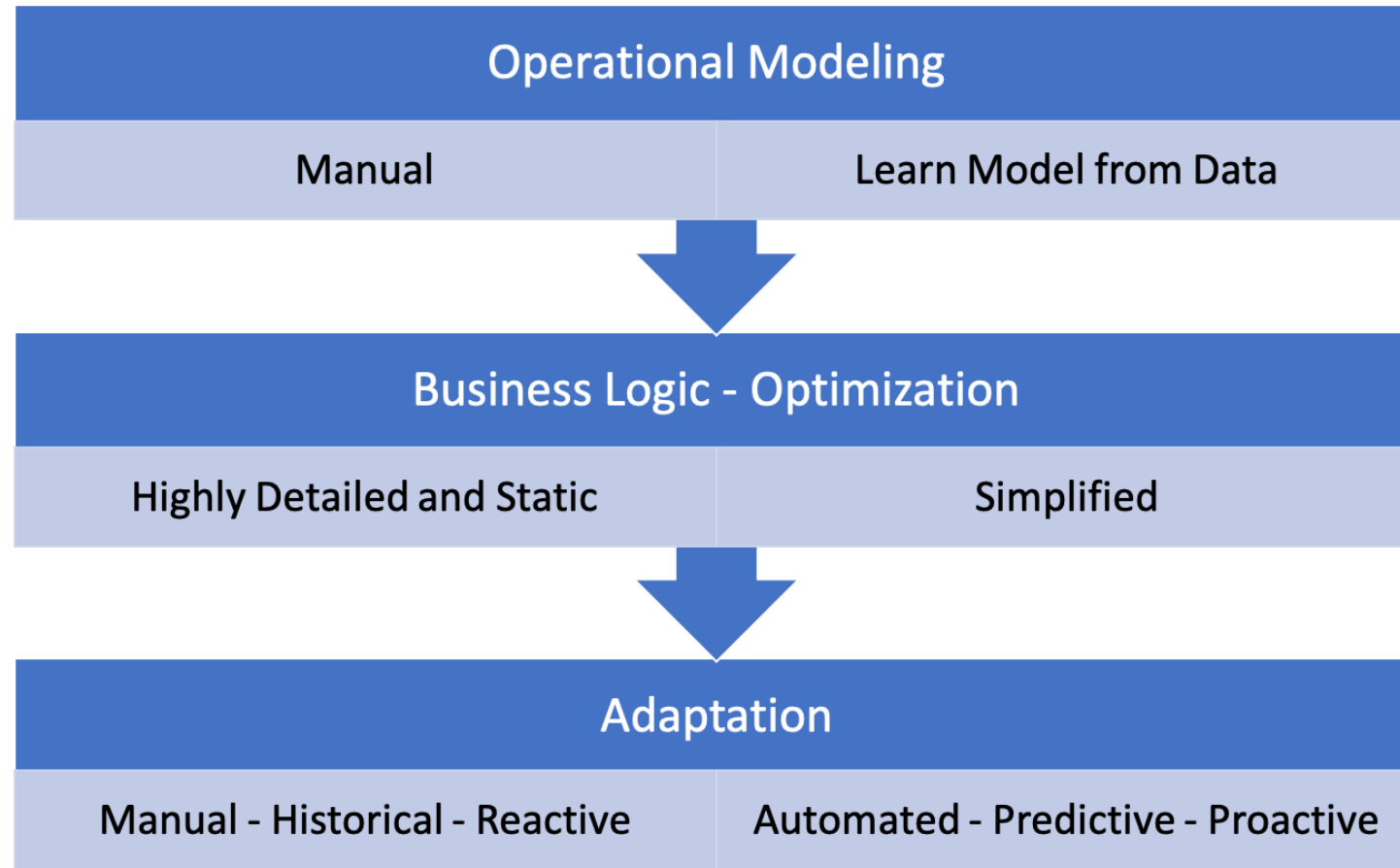
# Predictive Analytics With Machine Learning

- Apply machine learning algorithms to large sets of data to create a predictive model
- The model continually adapts and predictions improve over time
- Machine learning can be an alternative to manual and static engineered approaches to optimization for things like:
  - Dynamic slotting
  - Workforce planning and management

# Machine Learning Approach



# Engineered Approach vs. Machine Learning





# Why Predictive Analytics?

- Great potential to improve planning and operations
  - Adapt to differences across locations and other factors that may not be apparent
  - More accurate than static models and historical averages
- Costs are reasonable, even for smaller operations
  - Lower-cost to implement and maintain
  - Machine learning models are dynamic – self-tuning vs. static

# Summary

- Analytics help managers improve KPIs
- Descriptive and diagnostic tools
  - Combine current and historical data to analyze trends
  - Provide multi-site visibility and insight
- Predictive analytics is the next big thing
  - Machine learning makes it available to all DCs, big and small
  - Improves day-to-day operations and planning

*For more information:*

southgate@lucasware.com

jennifer@lucasware.com

www.lucasware.com

Or visit MODEX Booth 9619

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