CS 4440 - Dr. Sham Navathe
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Analytics - Digital Transformation

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Ex, Deloitte, BIAS, and Oracle

Agenda

Analytics – Current Trends

Digital Transformation – How It's Driving Analytics

Drivers for Analytics – Examples

Evolving Frameworks

Impact of AI and ML

Analytics - Current Trends

Analytics - Current Trends

More Real-Time Analysis

- End users are seeking higher access to more granular real-time information from multiple source systems

- They are looking for "enriched" real-time information, not just raw information from a single source

Self-Serve – Enable end users

Democratize Data

- Provide end-users with direct access to data and systems instead of "cooked information" - Let them build their own reports and visualizations

- IT is primarily data custodian and governs systems

AI and ML

Intelligent Automation

- **Integrated Decision-Making -** Output of reports and analysis is integrated with downstream systems to drive automated decision-making – In critical cases, includes human interactions and confirmations

- Heavy data management and governance needed - Higher data volumes and accuracy goals – "garbage in, garbage out"

Digital Transformation – How It's Driving Enterprise Analytics

Digital Transformation – How Analytics Fits in

How Digital Transformation is affecting end users
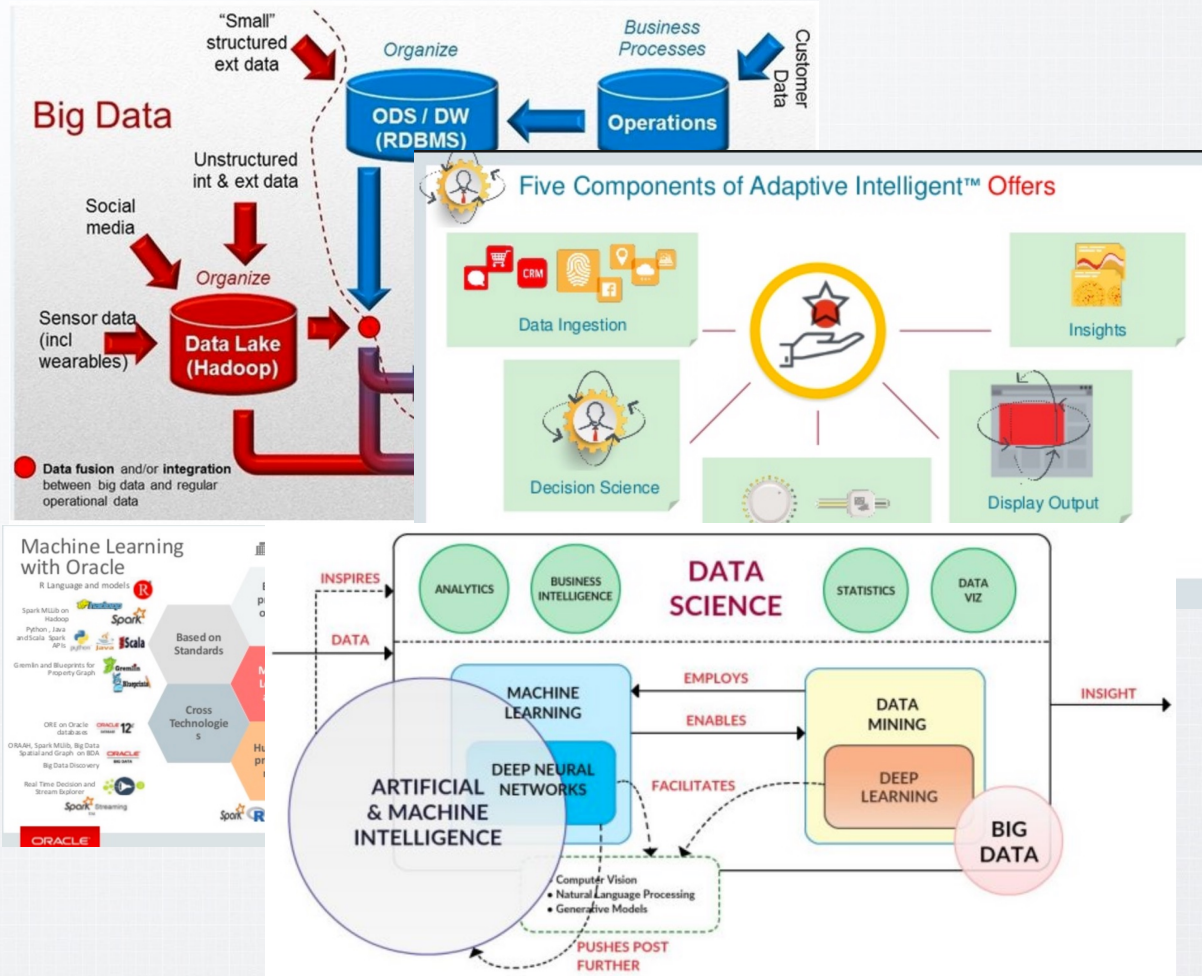
Manual manipulation is becoming even more cumbersome than before

Systems and clouds proliferation and tighter security requirements

Data is scattered not only across disparate systems, but multiple clouds

More complex data life-cycle management

Analytics tools proliferation – proprietary clouds, applications, capabilities
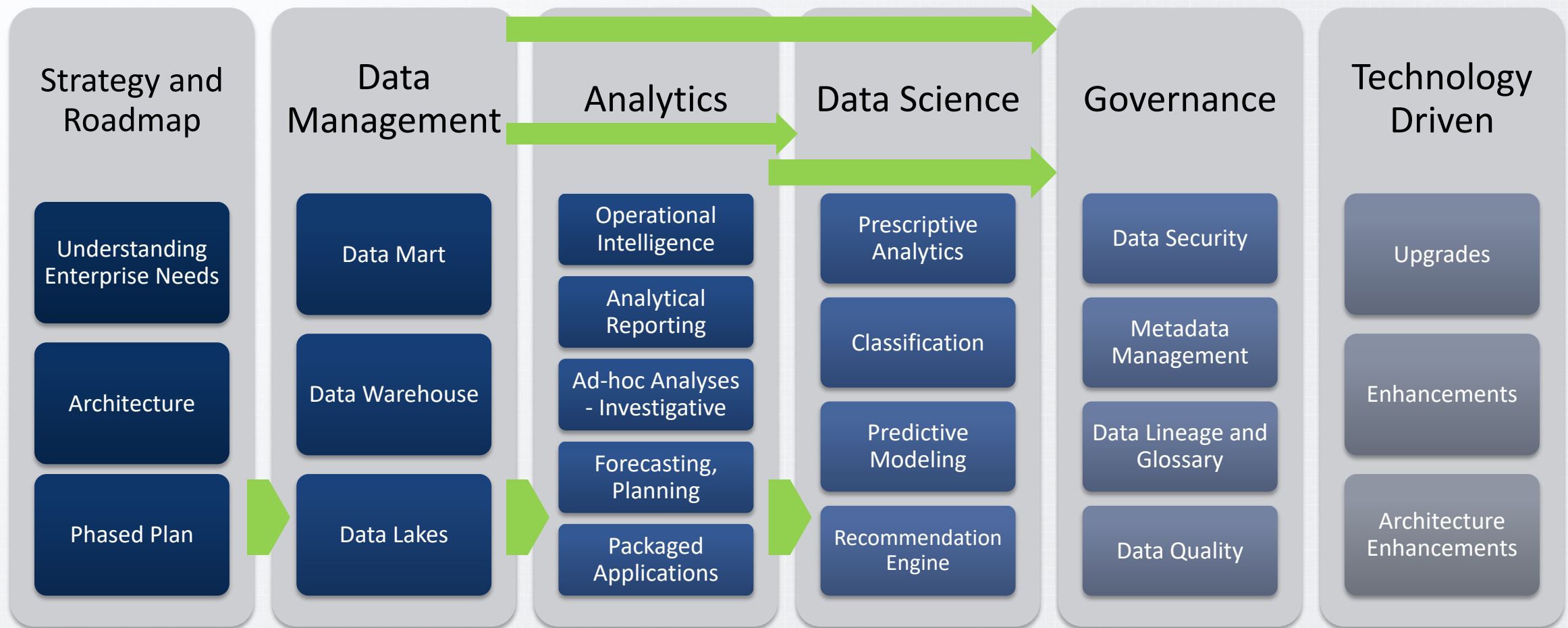
System embedded reporting is usually too basic

Governance – Security, Quality, and Consistency

Master Data Management (MDM) is key for reliability of data

Enterprise Analytics Life Cycle and Initiative Drivers

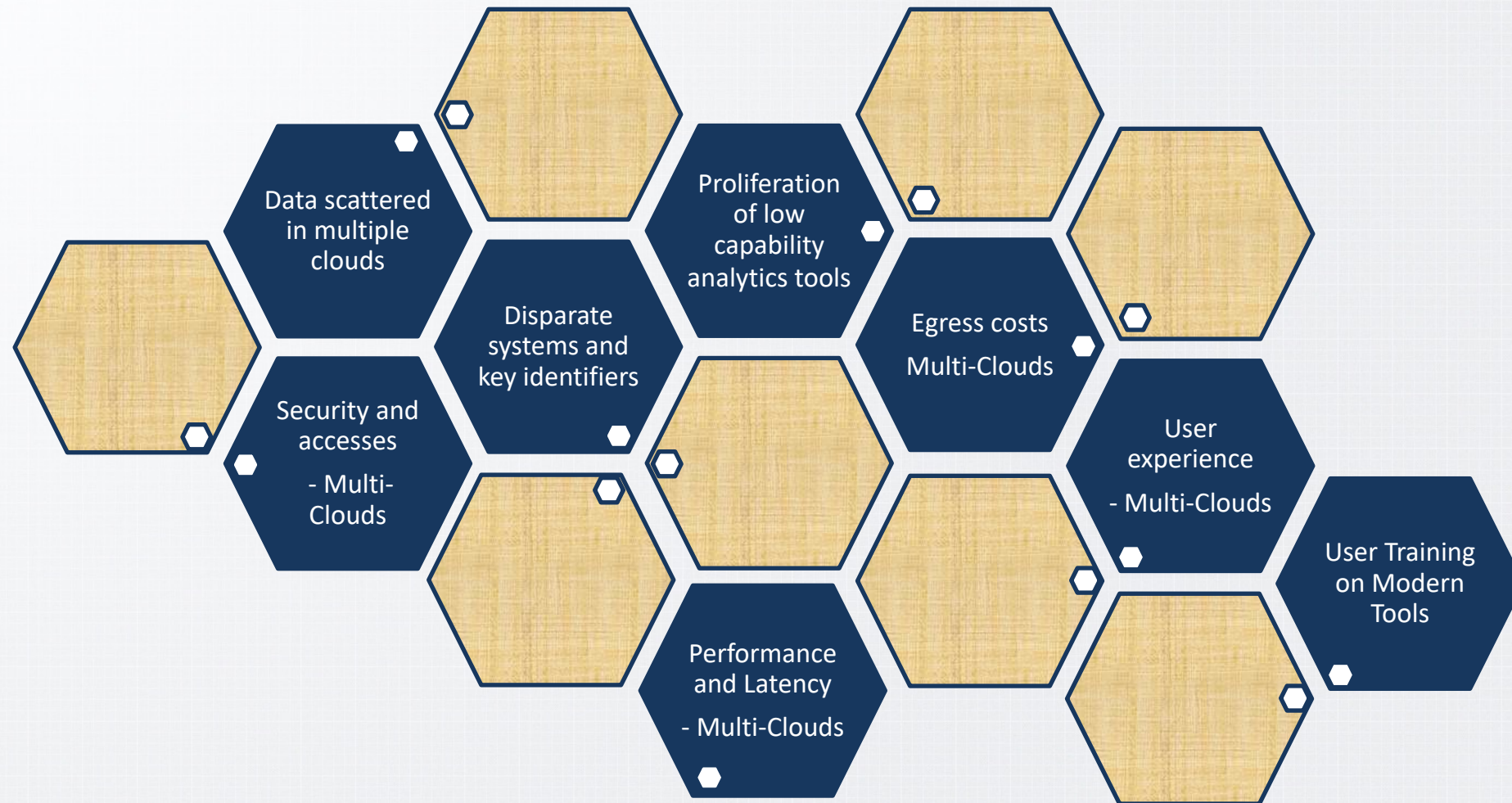| Strategy and Roadmap	Data Management	Analytics	Data Science	Governance	Technology Driven
Understanding Enterprise Needs	Data Mart	Operational Intelligence	Prescriptive Analytics	Data Security	Upgrades
Architecture	Data Warehouse	Analytical Reporting	Classification	Metadata Management	Enhancements
Phased Plan	Data Lakes	Ad-hoc Analyses - Investigative	Predictive Modeling	Data Lineage and Glossary	Architecture Enhancements
		Forecasting, Planning	Recommendation Engine	Data Quality	
		Packaged Applications			

Drivers for Analytics - Examples

Challenges in Focus

Challenges posed by digital transformation in organization

Data scattered in multiple clouds

Proliferation of low capability analytics tools

Disparate systems and key identifiers

Egress costs Multi-Clouds

Security and accesses
- Multi-Clouds

User experience
- Multi-Clouds

User Training on Modern Tools

Performance and Latency
- Multi-Clouds

Large Financial Services Organization

Example - Modernizing the Analytics Capabilities to provide enhanced capabilities to users

Challenges	**How they were solved**
Very old unsupported Systems - Security and Compliance Risks	Applications were upgraded to a higher version
Outdated Capabilities for end users – Multiple tools with similar capabilities adding to user training needs. Additional systems as part of digital transformation also posed analytics needs	Upgraded versions provided richer user experience and an opportunity to consolidate multiple analytics tools, thereby reducing complex user training needs
Limited by hardware in being able to perform advanced analytics – low agility and unable to capitalize on data growth	Updated architecture to enable the data management on cloud – higher agility, scalability, flexibility, and ability to handle large data growth with minimal downtime
Systems were intertwined – simultaneous upgrades needed - ERP and underlying DB upgrades were pending due to archaic analytics systems	Multiple tracks were upgraded in a closely woven path and migrated to cloud enabling ERP systems and DB upgrades
Data center and hardware lease extensions were looming large	Migration to cloud avoided need to extend data center and hardware leases
Old architecture was unable to meet real-time data demands of users	Cloud architecture baked in the real-time integration framework that enables availability of more real-time data

Medium Scale Manufacturing Organization

Example - Streamlining the Analytics needs with organizational growth strategy

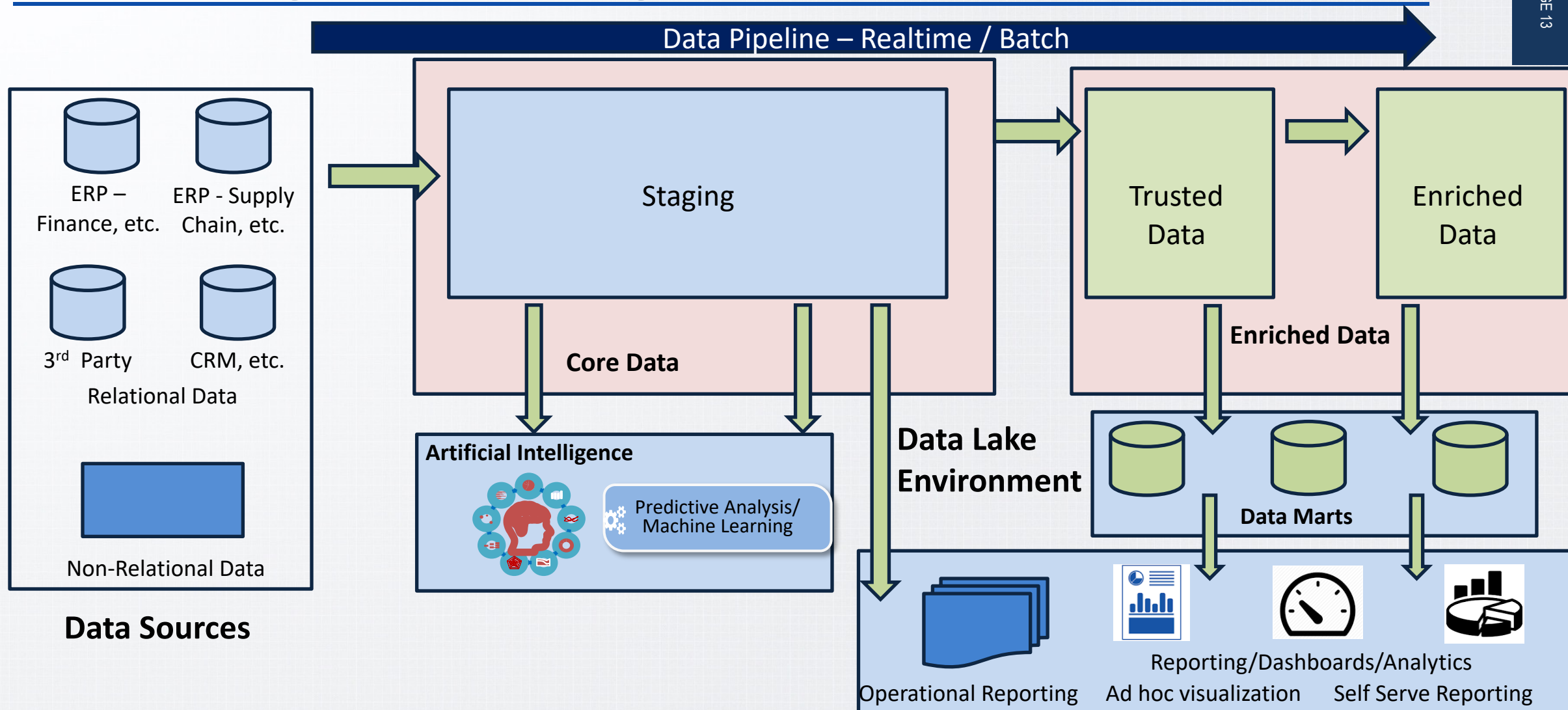| **Challenges**	**How they were solved**
Organizational growth strategy of acquisitions and divestures led to too many reporting tools that users needed to adopt, IT needed to maintain, and which were limited in their scope and capabilities	Enterprise analytics strategy and roadmap was designed to determine a common go-forward strategy across all business units and functions
Laborious manual manipulation of data across various business functions and plants for day-to-day operations while users were getting "reports" (nee "data") delivered to them daily	Analytics and Planning systems were implemented as part of digital transformation that was focused on eliminating the need for manual manipulation and directly using tools
Arcane systems with obsolete interface and data limitations	Modernized analytics systems on cloud provided richer user experience and a continuous path to upgraded capabilities and removed data limitations
Shadow IT across organization where one or two "power users" were leveraging non-standard tools to perform one-off analysis	Modern capabilities avoided the need for "shadow IT", and allowed users to focus on performing the analysis instead of maintaining systems
Organizational Leadership was keen on "self-serve" model of analytics, but end users, especially the plant users, were not quite ready and lacked critical skillsets	Spawned multiple training sessions each focused on different user group accounting for their specific training needs. Training to continue through multiple phases

Evolving Frameworks

Data Management Strategy

Data Pipeline – Realtime / Batch

Staging

Core Data

Artificial Intelligence

Predictive Analysis/ Machine Learning

Trusted Data

Enriched Data

Enriched Data

Data Lake Environment

Data Marts

ERP – Finance, etc.

ERP - Supply Chain, etc.

3rd Party

CRM, etc.

Relational Data

Non-Relational Data

Data Sources

Reporting/Dashboards/Analytics

Operational Reporting

Ad hoc visualization

Self Serve Reporting

Cloud Transformation

Pros	Cons:

• Rapid availability of environments based on pre-defined standards
• Saving of time
   • Pre-defined architecture
   • Pre-defined system integration points
   • Services operating at defined SLAs
• Flexibility in compute and storage resources
• Increase investment only as needed
• Managed patching and updates
• Cost advantages if public cloud is acceptable
	• Loss of control on the environments
	• Can force testing and upgrade cycles that may be undesirable
	• May introduce latency
	• Cost benefits may disappear or reduce if needed to invest in private cloud or dedicated network infrastructure due to security or latency issues
	• May result in vendor lock if not developed smartly
	• Multi-cloud architectures are complex, although becoming manageable

Technology Considerations

Vast and ever-growing landscape– Most enterprise software companies have a foot in each door

- Process Focused (Data Management processes) – Engineering, Management, Storage, and Analytics, Data Science - AI & ML

- Business Function focused – Sales, Marketing, Finance, Supply Chain, etc…

- Industry Focused – Auto, Finance (Banking, Investments, Insurance, etc.), Retail, Consumer Packaged goods, Social Media

- Best of Breed – Vendor agnostic, Performance focused, Niche Requirements

- Pre-Packaged Solutions – Aligned with ERP systems, Common Applications – Sales Force, etc.

- Integration, Security, and Training Challenges – Applications, Technologies, and Users

Implementation Approaches

Waterfall

- Phases identified
- Full design first
- Implementation life cycle – full scope for each phase delivered all at once
- Lower initial cost
- Lower initial risk
- Longer phases increase risk of missing user expectations – business requirements change overtime
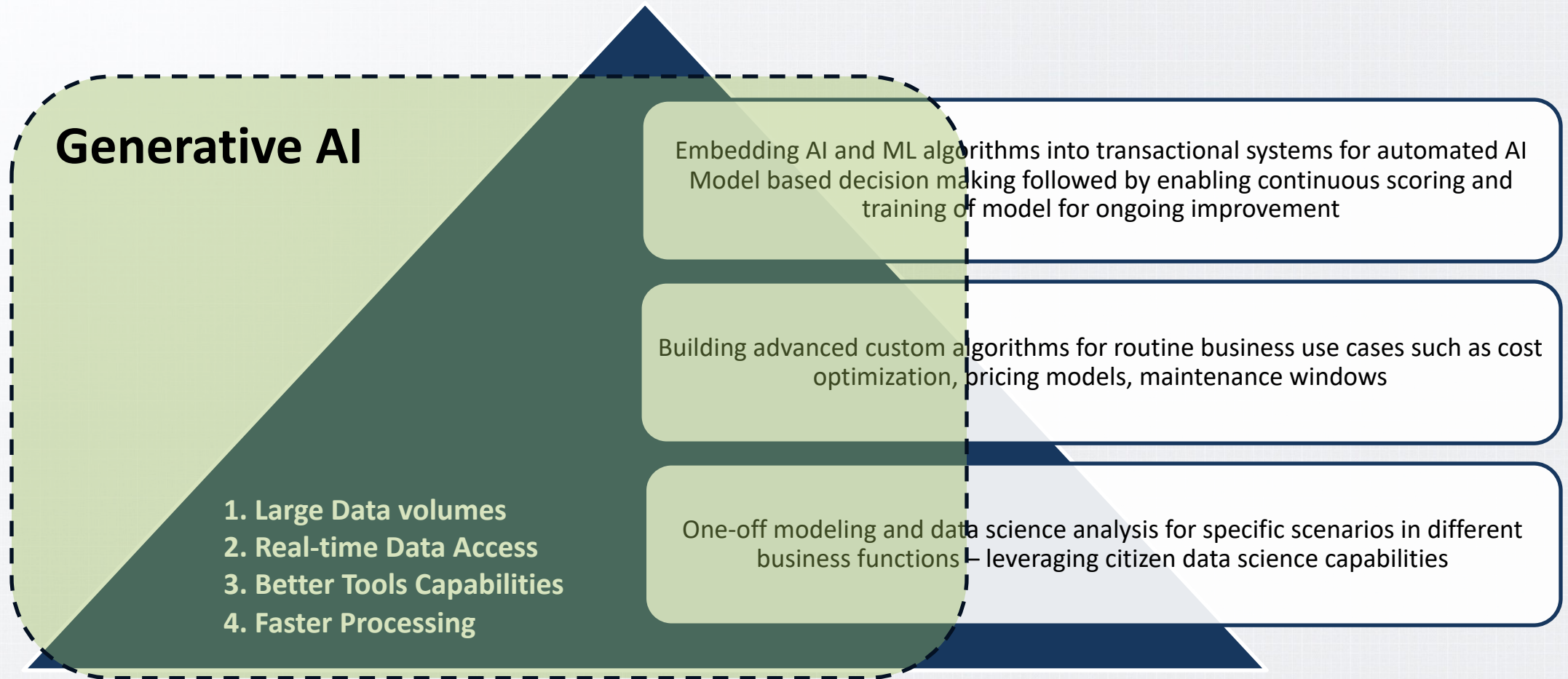- Low ability to turn ship quickly

Agile

- Overall scope defined
- Phases loosely defined
- First – only high-level design
- Iterative development within each phase
- Quicker deployments - rapid ROI
- Higher learning from each deployment
- Low risk of missing user expectations
- Higher cost – reworks and overheads
- Longer overall time to completion
- Takes time to build rhythm

Hybrid

- Most common scenario
- Best of both worlds
- More risky areas tackled in Waterfall manner and less risky delivery handled in Agile manner
- Waterfall techniques within intermediate phases when multiple business functions are affected to manage delivery seamlessly
- Allows rapid ROI in most cases
- Better adaptability to changing business and technological environments

Impact of AI and ML

Impact of AI and ML

Generative AI

1. Large Data volumes
2. Real-time Data Access
3. Better Tools Capabilities
4. Faster Processing

Embedding AI and ML algorithms into transactional systems for automated AI Model based decision making followed by enabling continuous scoring and training of model for ongoing improvement

Building advanced custom algorithms for routine business use cases such as cost optimization, pricing models, maintenance windows

One-off modeling and data science analysis for specific scenarios in different business functions – leveraging citizen data science capabilities

Questions

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