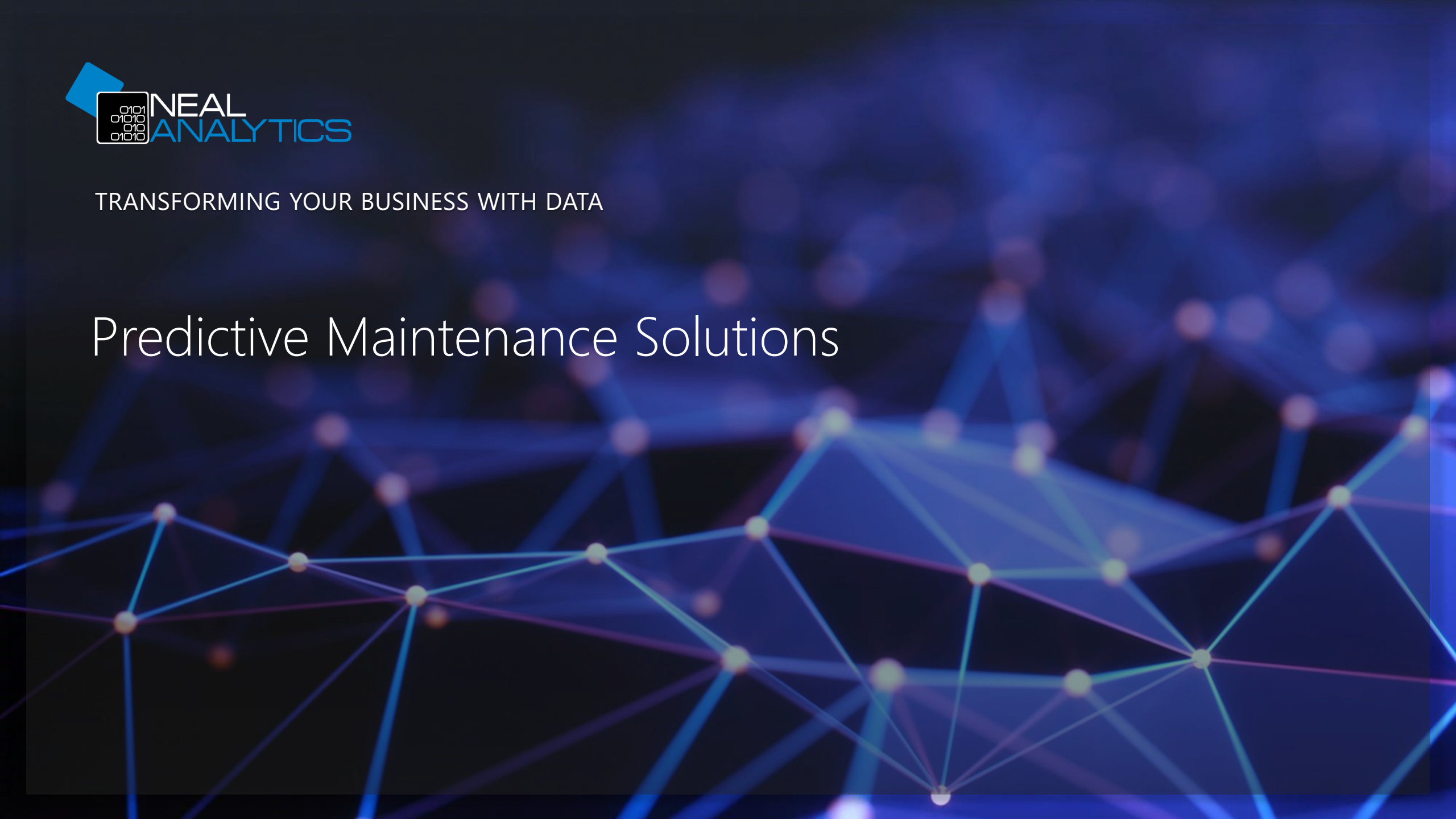
NEAL ANALYTICS

TRANSFORMING YOUR BUSINESS WITH DATA

Predictive Maintenance Solutions



Contents

Assessment

Solution Deployment

Ongoing Operations

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How Neal Meets Your Resourcing Needs

Talent Services

Right Resources, right now

Our services include sourcing, paid advertising, screening, interviewing, and reference checking. We partner with our clients to understand their core business objectives so that we can align the right resource plan.

Result:

Best resource delivered on time in the right model.

Time & Materials

Hourly resources staffed to resolve a problem with a time commitment and hourly rate.

Project-Based

Fixed deliverable schedule with resourcing determined by Neal Analytics to best fit the project.

Reserved Teams

Retained team of dedicated size with flexible skills sets available to adjust to workstreams.

Talent Focus

Technology Expertise

- Azure Developers & Architects
- Azure Data Scientists & Quants
- Business Analysts & PMs
- App Dev/Test
- BI and Reporting
- Cloud Marketers
- Tech Recruiters
- UI / UX Designers
- Systems Admins / Infosec

Non-Technology Expertise

- Project and Program Managers
- Management Consulting

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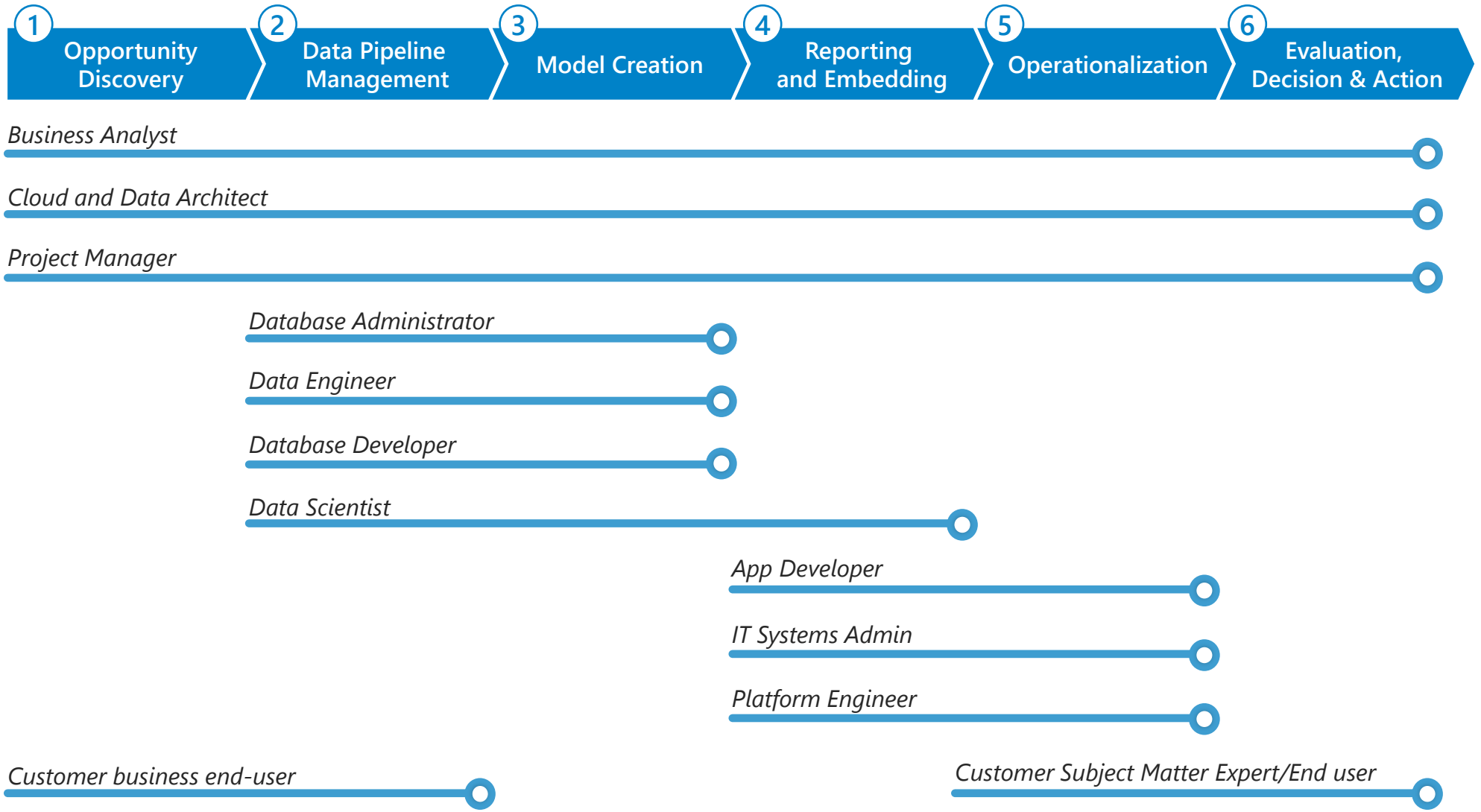
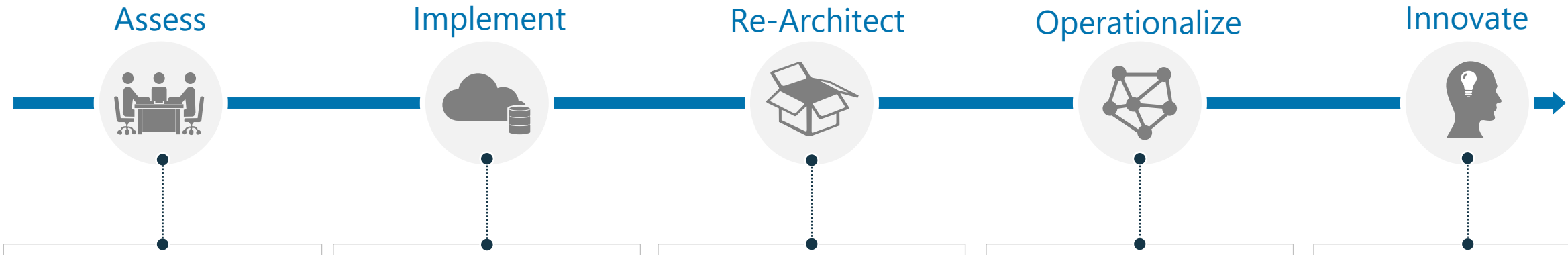
Value Chain for Delivering Analytics Insights and Automation



Data Estate Modernization



Data & Analytics Business Roadmap

- **Analyze** Capabilities, Data/App Landscape
- **Rationalize** Sources, App Lifecycle, Tools
- **Prioritize** Enterprise Architecture, Initiatives
- **Advise** on Best Practices, Resources & Budgets

Business Scenarios & Platform Deployment

- **Develop** Cloud App and Data Infrastructure
- **Deploy** Sandboxes for quick win Use Cases
- **Implement** Adjusted Workflows and Train
- **Iterate** as new Insights Influence the Roadmap

Elevate Services

- **Rehost** Workloads and Apps in the Cloud
- **Rearchitect** Services for Leaner Operation
- **Deprecate** defunct tools and processes
- **Validate** performance gains and test features

Operationalize

- **Leverage** data models built with analytics and data science in mind
- **Enhance** existing reporting capabilities
- **Manage** enterprise grade analytics with the support of experts

Apps, BI & AI

- **Accelerate** time to value with our leading analytics solutions
- **Automate** existing data flows with cognitive services and AI
- **Differentiate** from the competition

Enterprise Project Management Organization

Digital Transformation Management Consulting

Security and Data Governance Compliance

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Developing A Data Estate Modernization Roadmap

Assess → Implement → Re-Architect → Operationalize → Innovate

	PLAN	INVESTIGATE	DESIGN	PRESENT
Activities	**Application & Data Inventory** **Assessment** **Strategy**	**Analyze** • Portfolio Prioritization • Financial Justification • Benchmarking & Testing **Prioritize** • Remediation • Upgrade • Enhancement **Rationalize** • Risk Identification • Operational Process Mapping • Technology & Architecture **Advise** • Vendor Consolidation • Mergers & Acquisition • Outsourcing • Licensing	Upgrade Migrate Enhance Consolidate Remediate Re-Architect Operationalize Decommission IaaS PaaS SaaS On Prem.	Ops IT Finance Sales Business Case Deployment Roadmap
Deliverables	• Workshop with key stakeholders • Application portfolio • Data landscape inventory	• Application portfolio analysis and cloud assessment • Rationalization of priorities • Leveled per app / data source assessment	• Architectural Recommendations • Application & Data Service Roadmap V1 • Master Data Management, Data Governance, and Security Analysis	• Final roadmap & reference architecture • Business case justification & ROI for Deployments

Example PMO Assessment Deliverables

Onsite Workshop

Data Strategy Workshop

Day 1	Activity	Participants
	Morning Session: Digital Thought Leadership	
8:30 AM	Introductions and Setup	N/A
9:00 AM	Workshop Overview & Objective Setting Current State of Business	Client • Leadership • IT & Analytics Teams Neal Analytics SMEs
10:00 AM	Modern Data Estate Overview with Best Practices, DevOps	Client • Leadership • IT & Analytics Teams Neal Analytics SMEs
	11:00 AM Break	
11:10 AM	Cloud Technology & Reference Architectures	Client • Leadership • IT & Analytics Teams Neal Analytics SMEs
	12:30 PM Lunch	
	Afternoon Session: App & Data Inventory	
1:30 PM	Data Estate Inventory	Client • Analytics Team • IT Team Neal Analytics
	3:00 PM Break	
3:15 PM	Application Portfolio Assessment	Client • IT Team Neal Analytics
5:00 PM	Day 1 Wrap Up	All

Day 2	Activity	Participants
	Morning Session: Initiative Assessment	
8:30 AM	Introductions and Setup	N/A
9:00 AM	Defining Data Modernization Initiatives	Client • Leadership (Optional) • IT & Analytics Teams Neal Analytics SMEs
10:00 AM	Estimation of Effort, Cost, and Benefit	Client • IT & Analytics Teams Neal Analytics SMEs
	11:00 AM Break	
11:10 AM	Mapping out Core Infrastructure Pillars and Draft Architecture for the Defined Initiatives	Client • IT & Analytics Teams Neal Analytics SMEs
	12:30 PM Lunch	
	Afternoon Session: Prioritization & Roadmap	
1:30 PM	Scenario Evaluation and Prioritization	Client • Leadership • IT & Analytics Teams Neal Analytics
	3:00 PM Break	
3:15 PM	Roadmap Development	Client • All Neal Analytics
5:00 PM	Day 2 Wrap Up	All

You Need to Bring

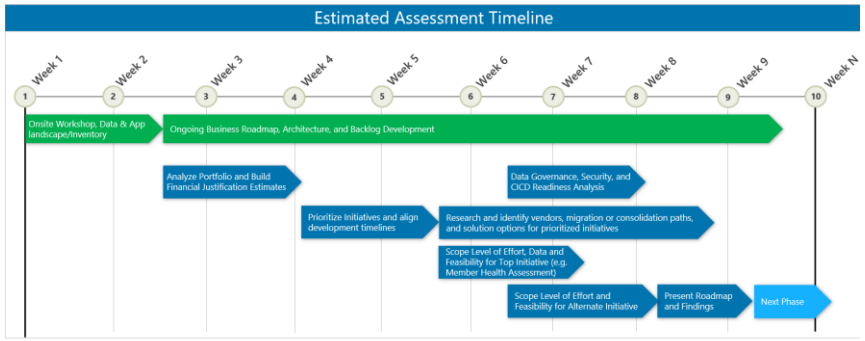
- **Business Stakeholders**
  - CXO Sponsors
  - VP & Director Roles
- **IT Leadership**
  - VP & Management
  - Data Expert
  - Application Expert
- **Analytics Leadership**
  - Analytics/BI Leads (if any)

Nice to Have

- **Data & Security Docs**
  - Existing Arch Diagram
  - Security Technologies
  - Data Governance Plan

Sprint Plan

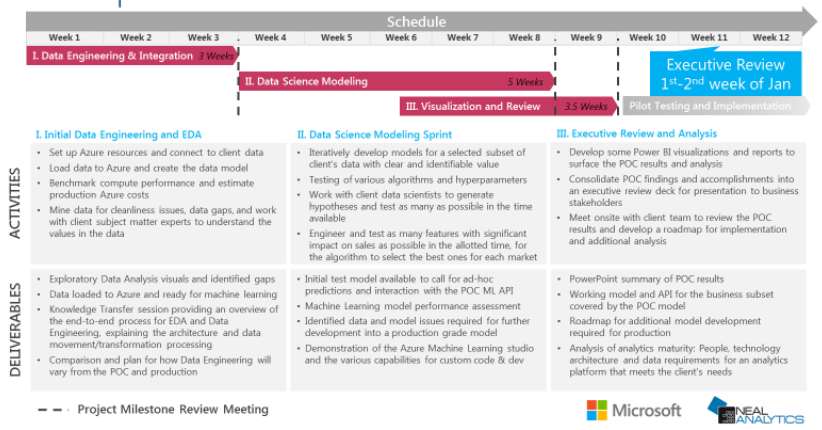
Reference Data Estate Modernization Assessment Sprints*



* Sprint length and arrangement are illustrative and are for informational purposes only. The actual sprint arrangement and length are functions of the Agile planning process and sprints will be planned 1-2 sprints ahead to remain agile. The overall timeline will vary depending on the effort required.

Infrastructure Development Roadmap

Development Timeline



Backlog Prioritization & Analysis

FP&A: Overall Opportunity Prioritization

Opportunities			
1	Risk analysis of common financial scenarios	12	Denied Party Screening and Exception Identification
2	Continuous Monitoring, Testing Automation	13	Service ticketing bot
3	External Audit Data Request Automation	14	Vendor Handling
4	Modern BI reporting for business analysis	15	ERP Report Data Export and Excel Import
5	Information matching for clearing of accounts	16	Modern BI reporting for business analysis
6	Self service portal to complete month end functions	17	Automate entry of onboarding, accruals, and payments
7	Reconciliation process automation	18	Standardize controller commentary process
8	Contract risk assessment and prioritization	19	Financial insights dashboard
9	Revenue recognition risk analysis of contracts	20	Risk analysis for compliance
10	Generate Q&A for contract reviews	21	Finance tools integration
11	Audit validation and exception identification	22	Automate review of contracts

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Description

- These deliverables are a combination of face to face consulting and completed business analysis and engagement design delivered in PowerPoint
- These deliverables are part of an overall framework but will vary from engagement to engagement depending on the needs of each customer

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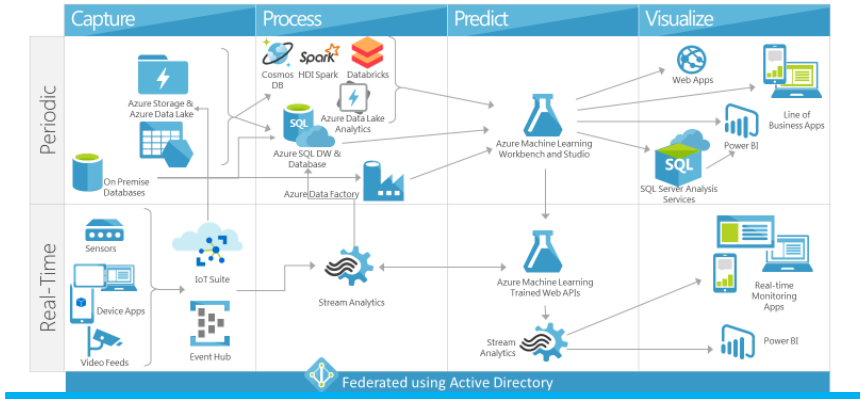
Example Technical Assessment Deliverables

Custom Designed Architectures

Azure Lambda Reference Architecture

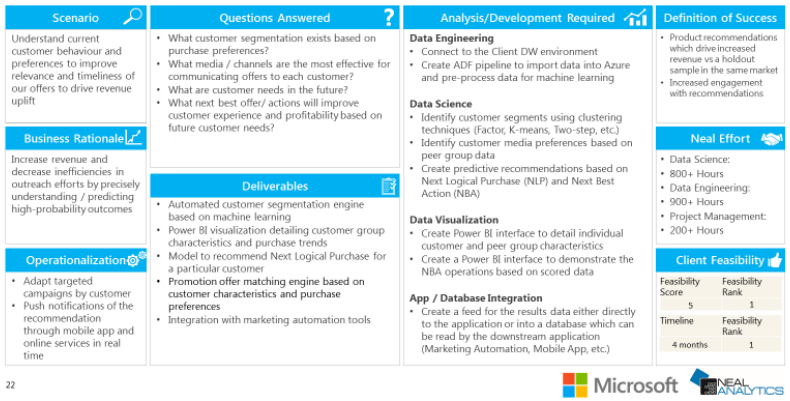


Data/App Inventory

Data Inventory and Mappings

Scenario Canvases

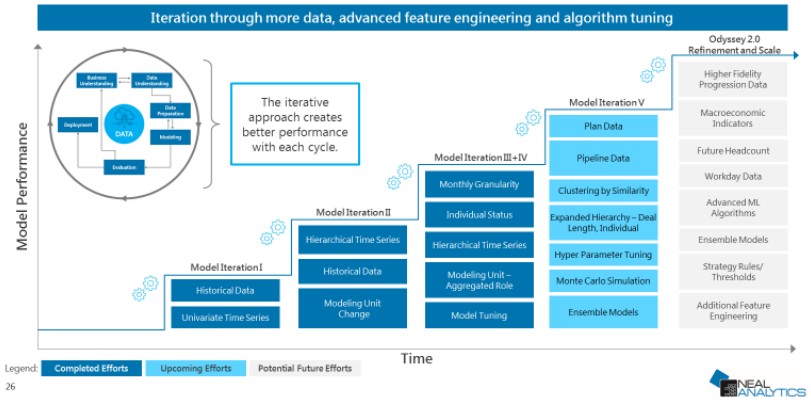
Scenario Canvas: Right Product Recommendations



Technical Development Plan

ML Models require an Iterative Development Approach

Each Cycle Provides Incremental Performance Growth



Description

- These deliverables are more involved and are developed following the workshop through collaboration with technical teams to analyze the deeper requirements of the business goals identified in the workshop
- The result is the formulation of an actionable scope of work to begin modernization around top priority use cases
- To summarize our technical approach in one sentence… we start by demonstrating the business value via a sandbox architecture which through iteration and expansion will serve as the foundation of the eventual production platform

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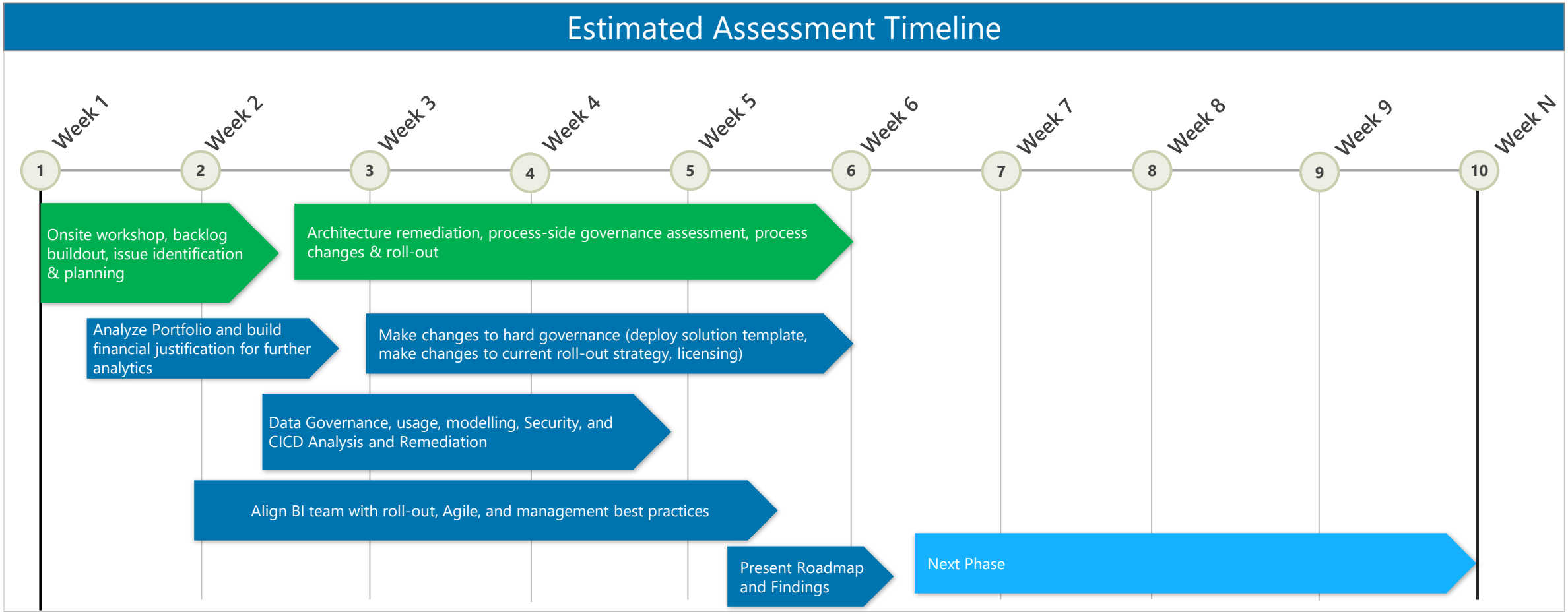
Reference Sprints for Assessment



Digital Consulting Activity

Data Modernization Activity

* Sprint length and arrangement are illustrative and are for informational purposes only. The actual sprint arrangement and length are functions of the Agile planning process and sprints will be planned 1-2 sprints ahead to remain agile. The overall timeline will vary depending on the effort required.

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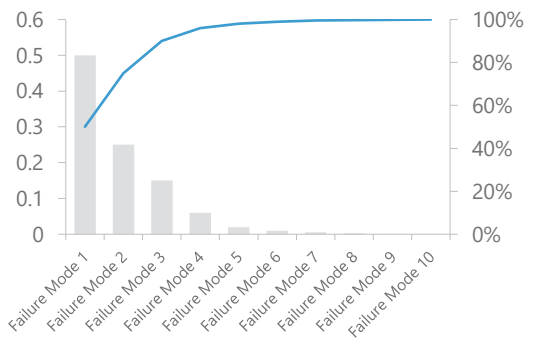
Predictive Maintenance Program Process

Understand Failure Modes

Identify common failure modes and impact on SLA metrics:

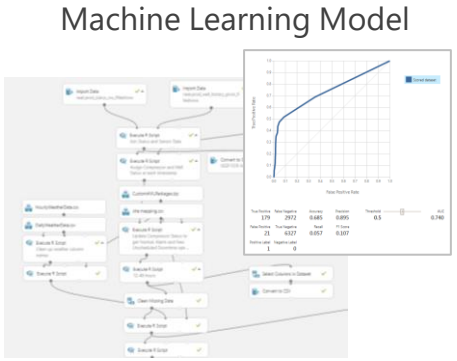
- Failure modes
- Frequency of failure
- Location of failures
- *Impact on SLA*



Review Existing Models

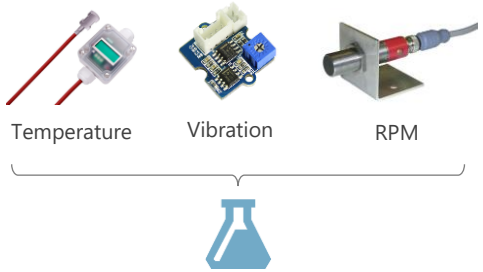
Evaluate existing predictive maintenance models and applicability:

- Evaluate Variables
- Identify Edge Cases
- Improve Model Performance



Map to Sensors

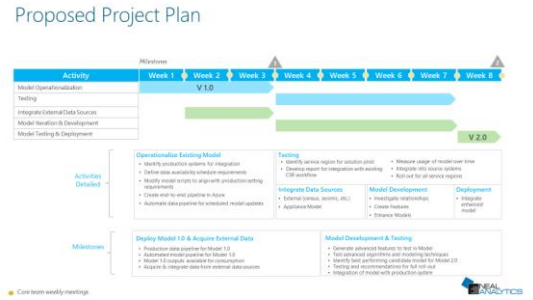
Identify potential sensor types for identifying pre-failure conditions on TVM devices. (ex. Temperature, vibration, RPM)



Recommendations

Create recommendations for next steps based on discovery period

- Data collection redesign
- Instrumentation approach
- Next best step to improve & iterate



X/XX — X/XX — X/XX — X/XX

AI Enhanced Field Operations

Remote Diagnostics

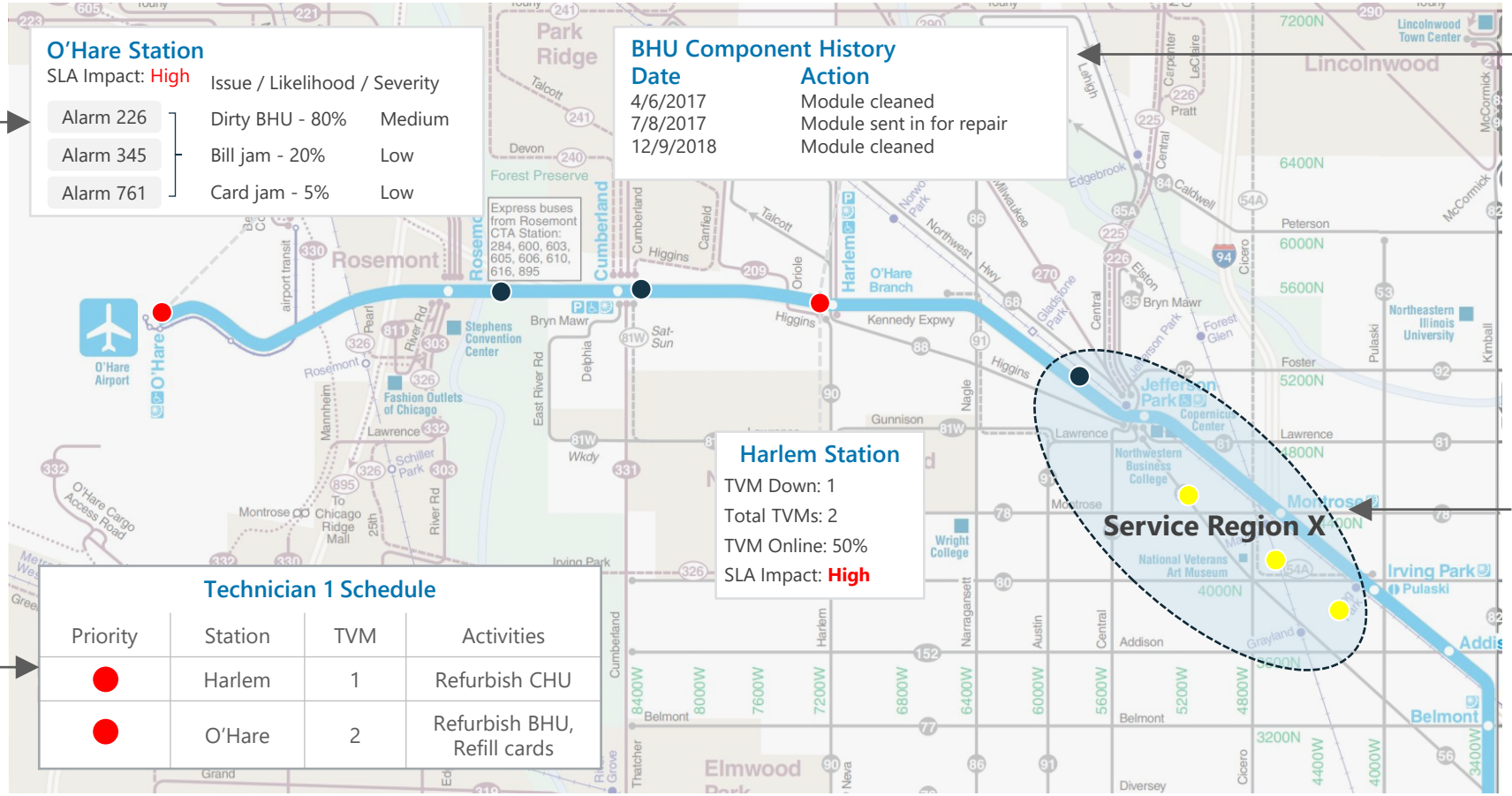
Algorithms diagnose potential issues automatically

- Likelihood
- Severity
- Corrective actions

Advanced Resource Allocation

Technician Schedules are optimized based on SLA penalties.

- Identify and prioritize high-risk locations for penalties, account for travel time
- Combine scheduled and non-scheduled tasks



Module Lifecycle Management

System tracks full lifecycle of modules

- Service history (time, transactions, where installed)
- Repairs

Advanced Planning

Service Regions drawn dynamically based on:

- Historical failures
- Repair times
- TVM location
- SLA penalty matrix

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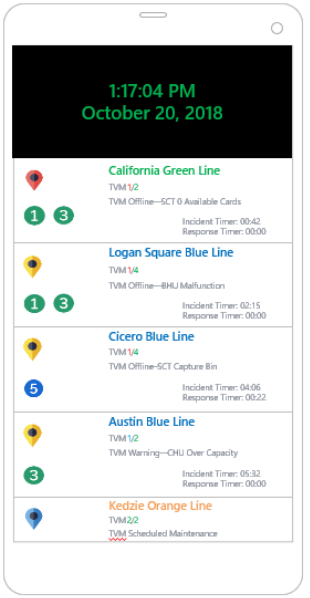
AI Enhanced Condition Based Field Maintenance

Real Time Telemetry

Historical Telemetry

Maintenance Records



Automated Condition Diagnostics

- Issue / Cause
- Likelihood

Impact Estimation

- SLA Impact
- Risk Adjusted Impact

Service Region Optimization

- Failure Frequency Forecasted Issues

Maintenance Evaluation

- Preventative & Scheduled Maintenance
- Corrective
- Predictive

Automated Task Scheduling

- People Assignments
- Task Prioritization

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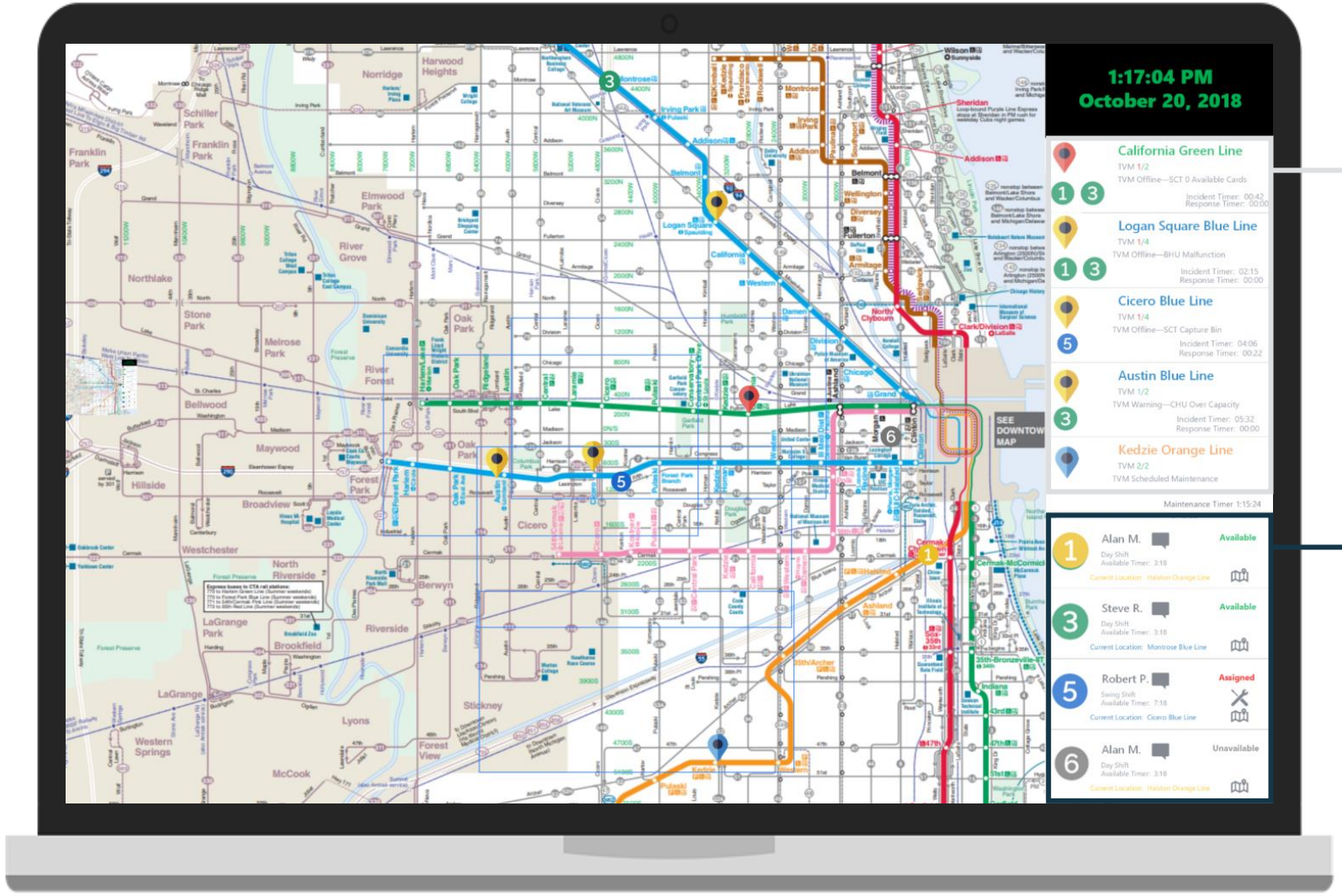
User Interface Desktop:
Real time incident response and location based technician dispatch

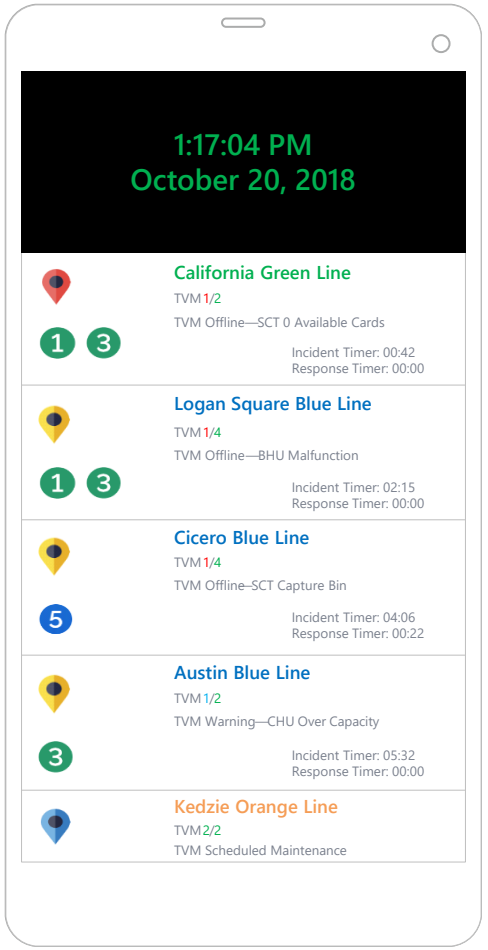


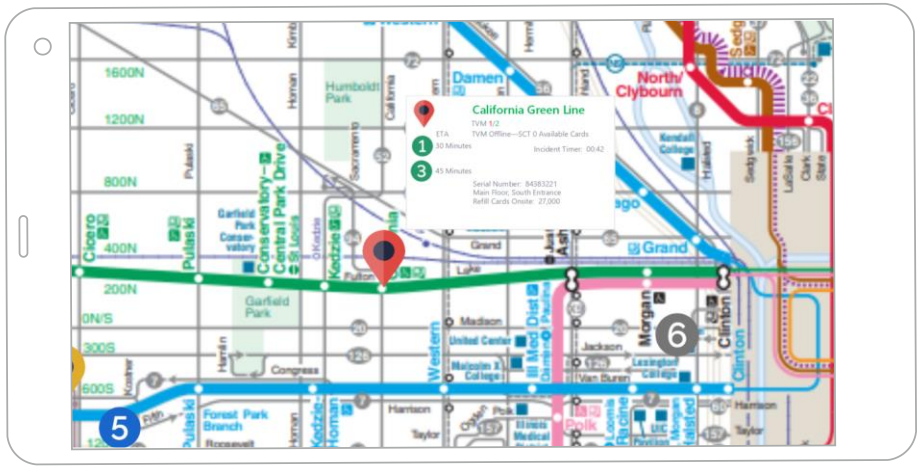
Incident identification and tracking

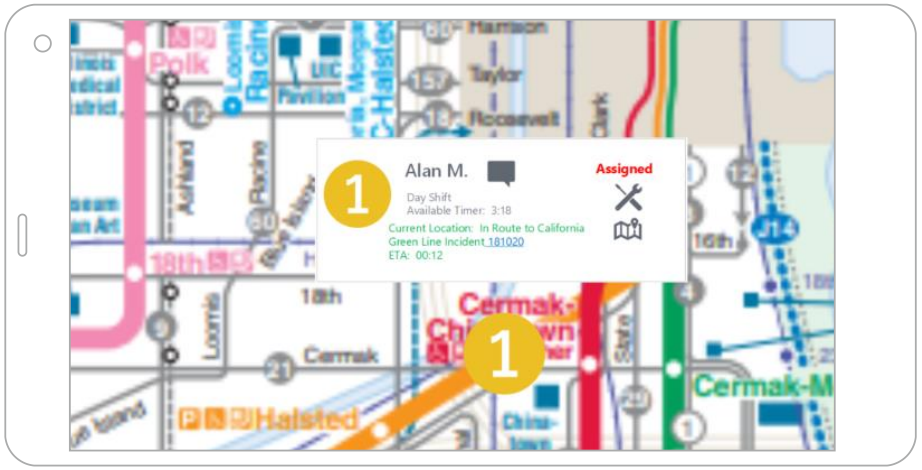
- Highlight basic failure and risk statistics for field equipment (TVMs)
- Realtime monitoring of equipment conditions
- Incident identification
- System map

Technician real-time status and communication

User Interface Mobile:
Responsive UI for mobile technicians







- Mobile based first response
- Real time technician assignments and dispatch communication
- Service history tracking and visualization
- Technician advanced field communications (location, notifications, messaging)
- Machine learning enhanced diagnostics based on event codes

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Common Scenarios for Oil & Gas

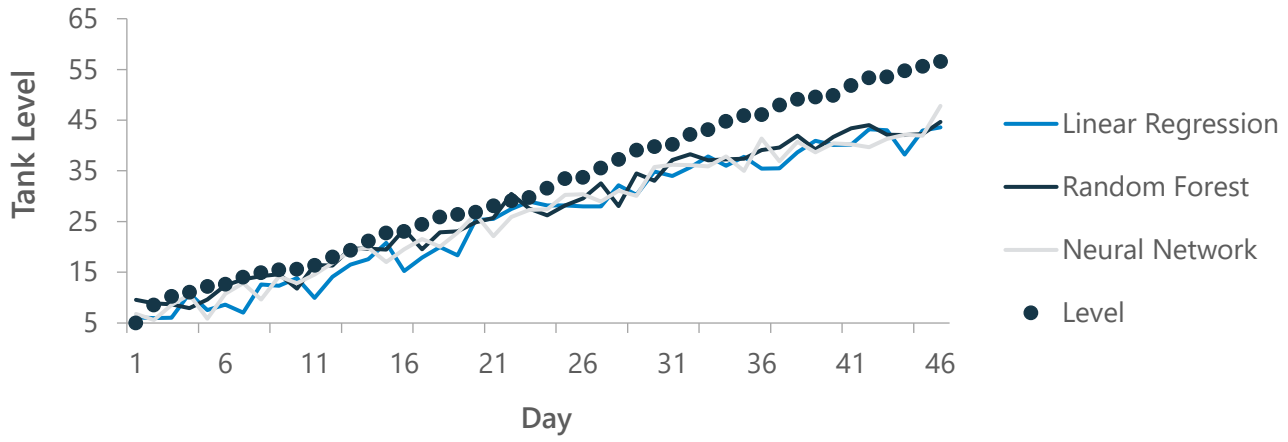
Scenarios

Drilling Operations Planning	• Downhole Dynamometer Analysis • Downhole Temperature Prediction • Drilling optimization & automation
Production Forecasting & Optimization	• Hydraulic Fracturing Optimization • Production Optimization • Production Predictions
Predictive Maintenance & Risk Management	• Equipment Failure Prediction • PDC Bit Wear Predictions • Well-work Evaluation Tracking System • Equipment Risk Assessments • Frac-hit risk assessment

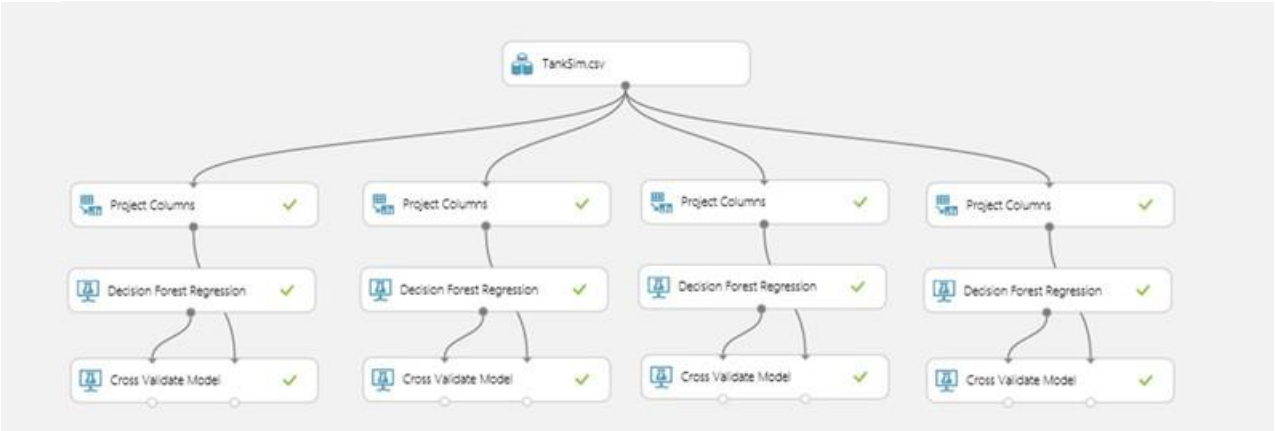
Common Scenarios: Tank Level Forecasting

Machine Learning Can be Used to Forecast and Schedule Oil Tank Pickups

Multiple Algorithm Evaluation



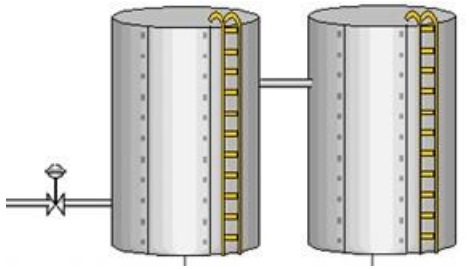
Parallel Feature Testing



Tank Forecast Development

- Machine learning used to forecast tank levels using onsite sensor reading and historical data
- Tank forecasts used to schedule tank pickups and minimize downtime at site
- Parallel model development in Azure ML allows for rapid solution testing and development
- Advanced machine learning algorithms (Neural Network Regression, Poisson Regression, Decision Forest Regression) enable accurate prediction

Forecast Horizons



Forecast	Accuracy	Impact
1 hour	High	Truck Route
1 day	High	Schedule
1 week	Medium	Schedule

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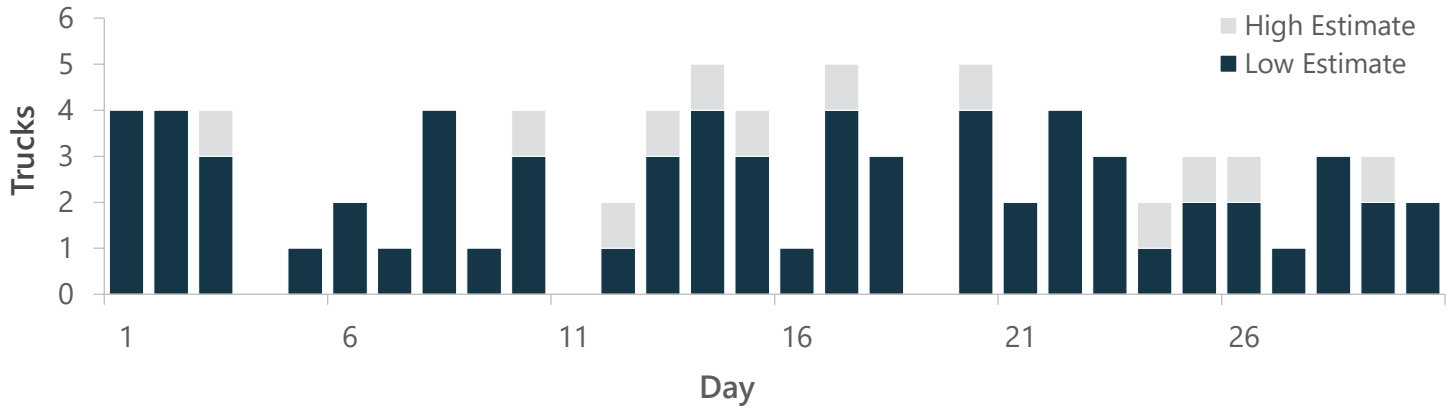
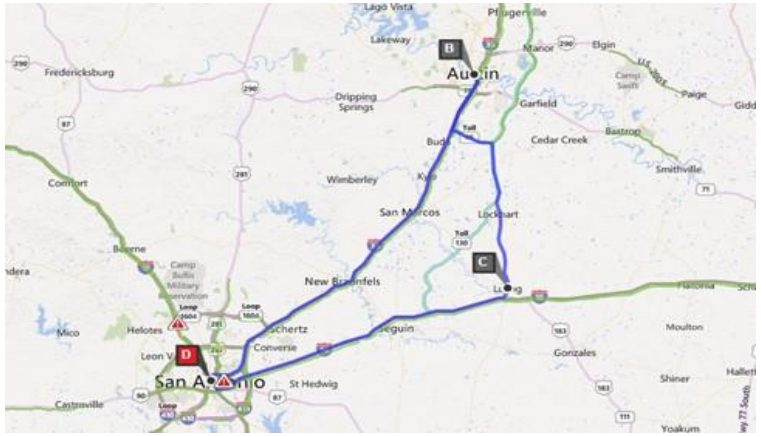
Common Scenarios: Truck Optimization

Stochastic Optimization Used to Increase Return on Assets



Optimized Route Planning



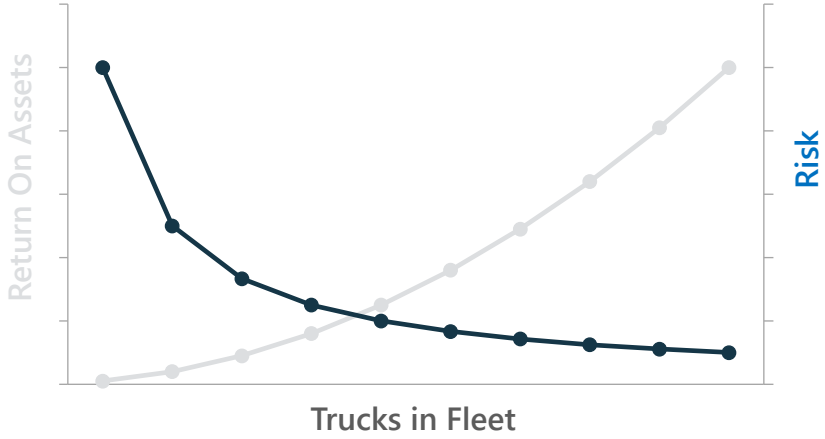
GPS

Truck

Asset Optimization Development

- Right sizing fleet of trucks requires careful balance of risk and return on assets
- Stochastic optimization used to explore potential solutions and give optimized recommendation for truck scheduling
- Dynamic route optimization enabled by GPS and Bing Maps for in-route path and destination adjustments

Risk & Return on Assets



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Successful Analytics Services are Agile

Our ample experience delivering data projects over the last several years has shown us that there is simply no way to fully spec out the required data, activities, and outcomes completely in the pre sales process to account for all changes and customer requests. Analytics maturity is an iterative journey which constantly evolves along with our customers.

Our Approach:

Write the Business Story

Work with Stakeholders to craft a roadmap to digital maturity

- Identify critical issues/needs
- Reconcile solution feasibility vs data
- Prioritize & scope efforts

Iterative Development Sprints

Build MVP solutions, evaluate, & improve until production ready

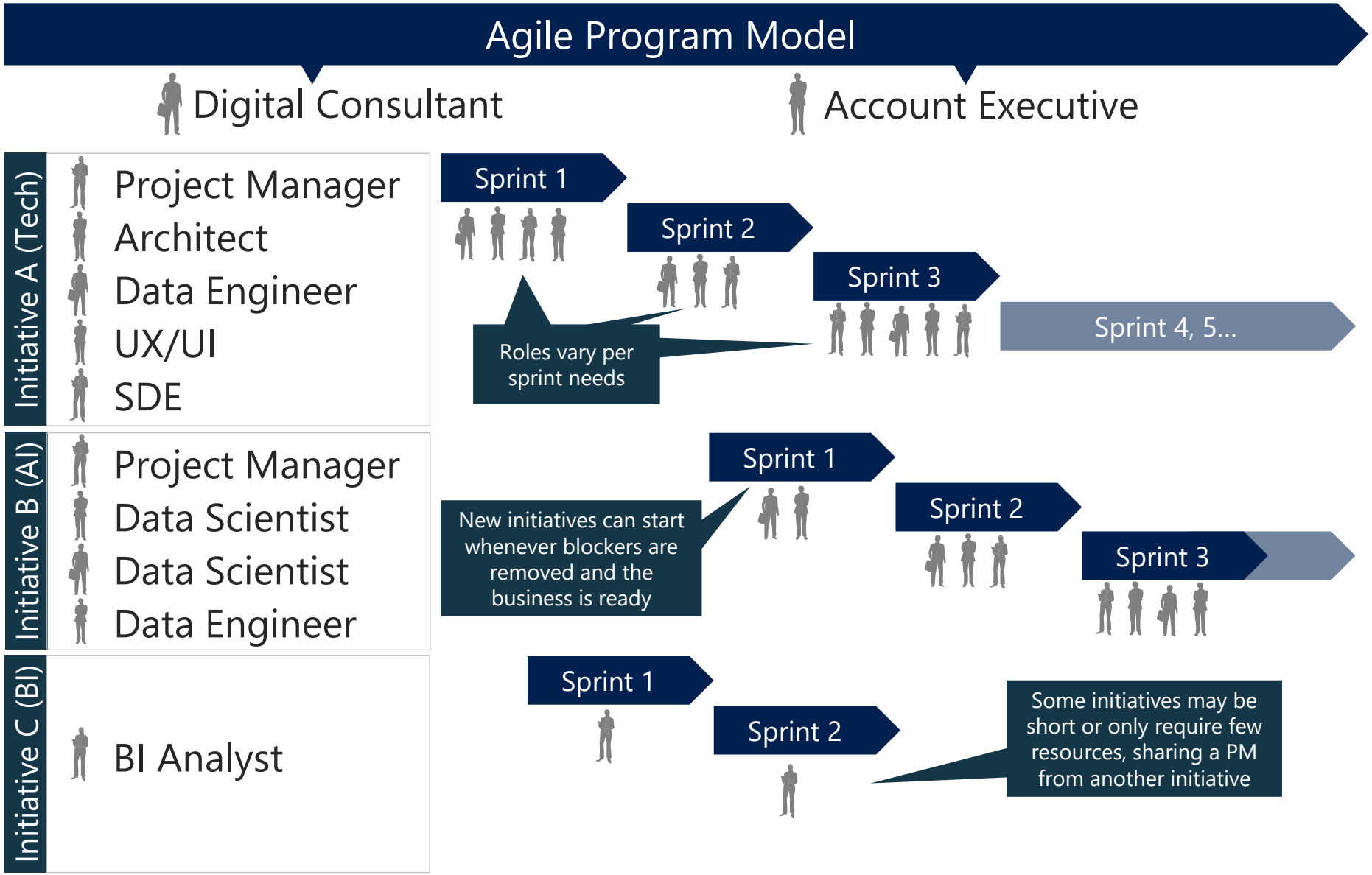
- Train models on immediately available data, adding more as it comes available
- Adjust development as needed to run at the pace of the business, instead of some arbitrary timeline

Incremental Value Crafting

Without a fixed endpoint, deliver value at each milestone

- Define objectives & key results for each sprint
- Measure progress and value with respect to the business need, not named performance thresholds

Agile Program Model Breakdown



Definitions

Program- The master engagement model. AEs & DCs work with you on your long term roadmap

Initiatives- Distinct efforts to drive a business outcome. One or many initiatives can be run at a time to tackle various IT, analysis, & business goals

Sprints- 2-4 week short term task groupings to accomplish an initiative goal. Sprints are sequential and not concurrent.

Roles- Individual contributors are classified by their function on the delivery team and will vary in their permanence in the program

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Neal Analytics' Agile Program Model for Predictive Maintenance

Engagement Model

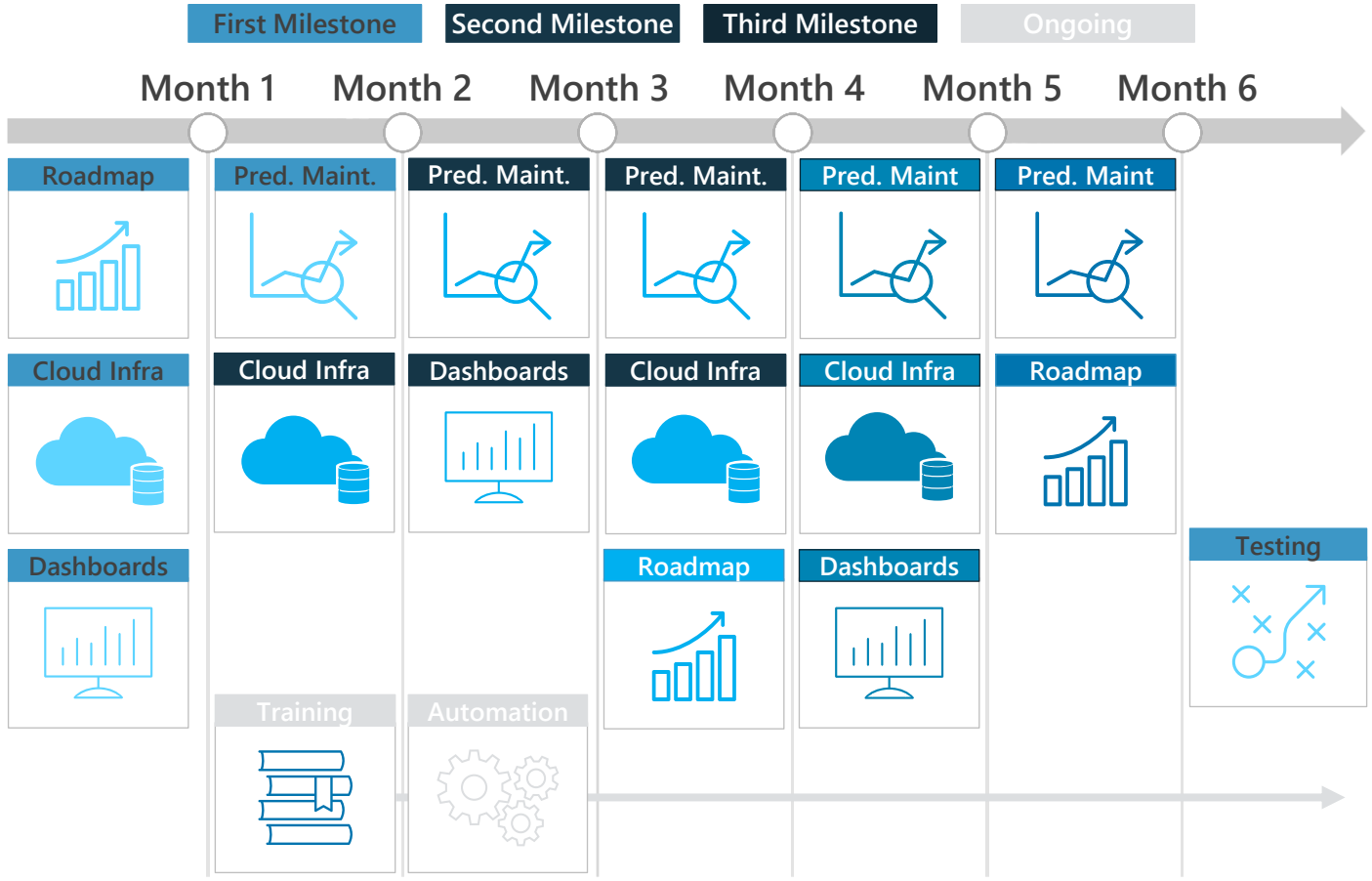
Flexible, Balanced Team

Retainer-based

Description:

- Leverages Agile Methodology
- Adjustable Team Size (Scale Up/Down)
- Balanced Team with multiple skills:
  - MC, PM, DS, DE, Arch, PBI, etc.
- Flexibility to pivot as workstream demands
- Phased, stage-gate delivery approach
- Establish a foundation for repeatable analytics

Illustrative Timeline and Deliverables*



*Estimates are subject to change based on gained realities and engagement's evolution over time

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