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NCSL AI Discussion

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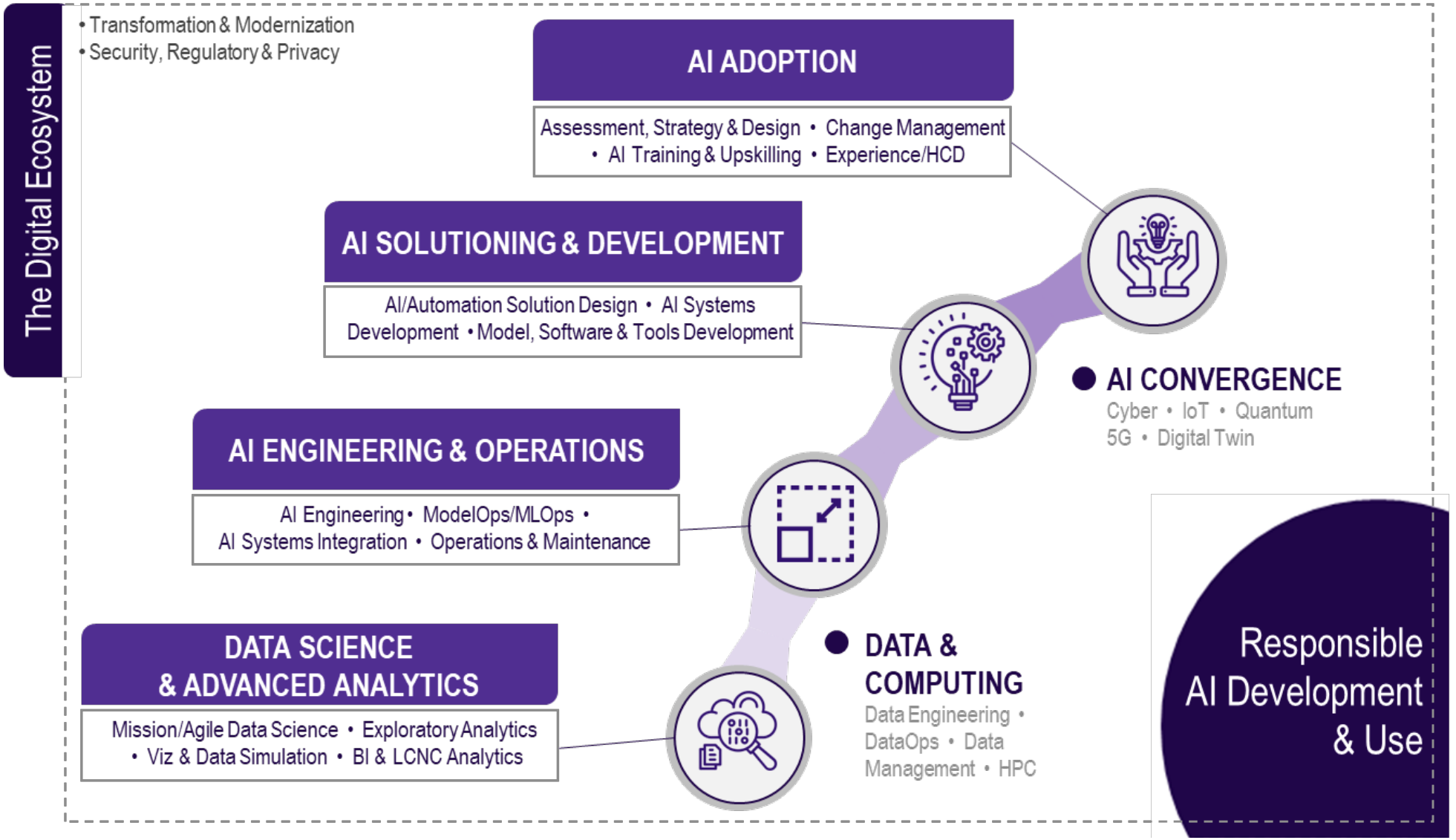
Spanning the AI/Advanced Analytics Lifecycle



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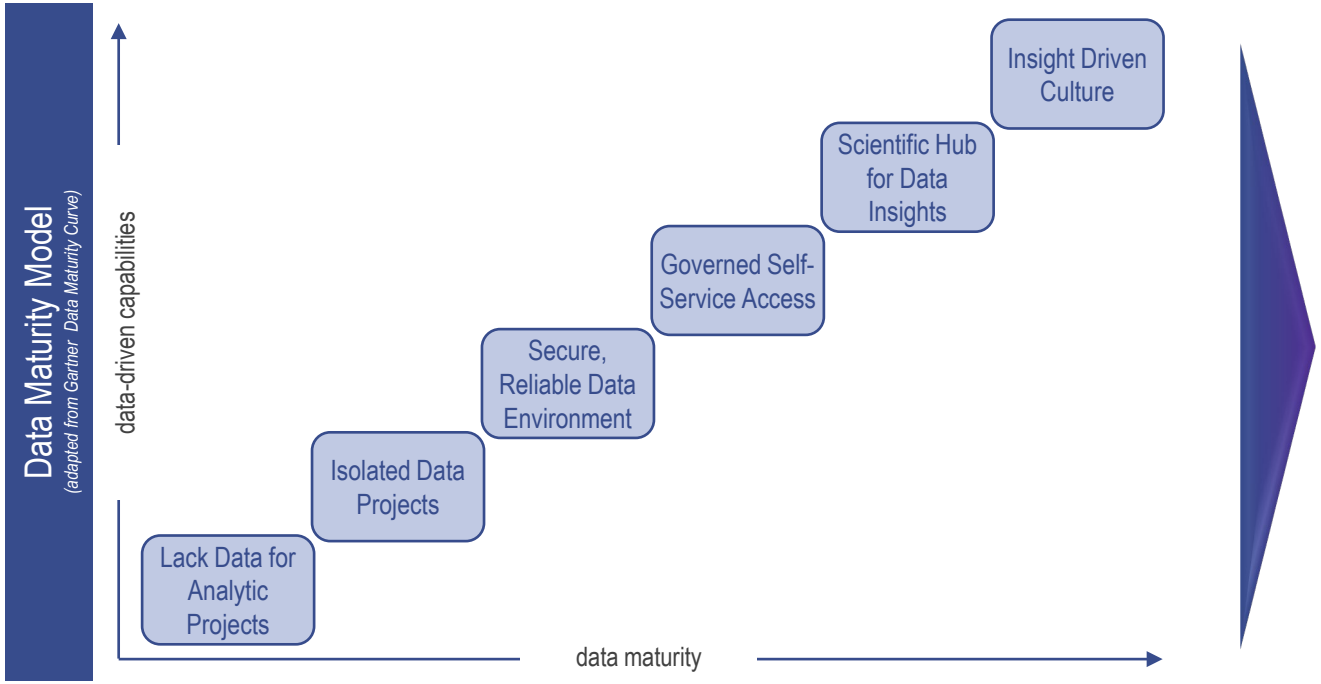
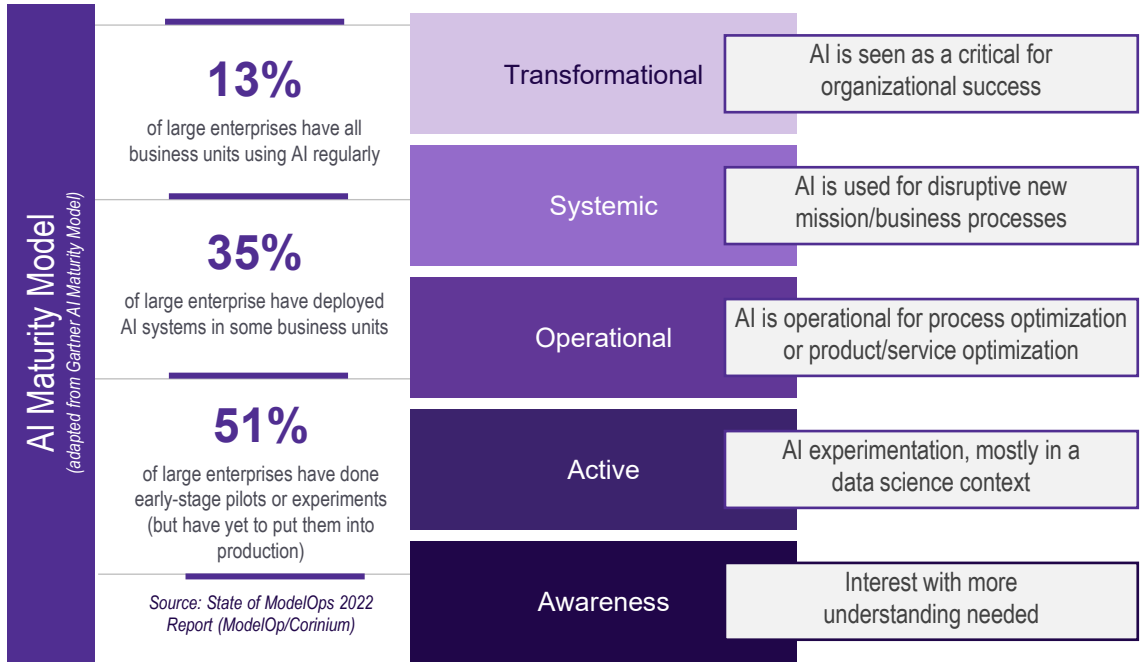
AI Adoption Overview

ASSESSMENT, STRATEGY & DESIGN • CHANGE MANAGEMENT • AI TRAINING & UPSKILLING • EXPERIENCE/HCD

AI Adoption starts with defining the mission/business outcomes desired, understanding where an organization is currently from both a data and AI/advanced analytics perspective— thinking holistically about all the elements needed for true adoption and knowing that it is a journey.





BARRIERS TO AI ADOPTION:

- Adapting operational processes
- Lack of understanding & education
- Talent with the right skills
- Lack of labeled data or data quality
- Organizational culture
- Technical infrastructure challenges
- Lack of regulatory guidelines

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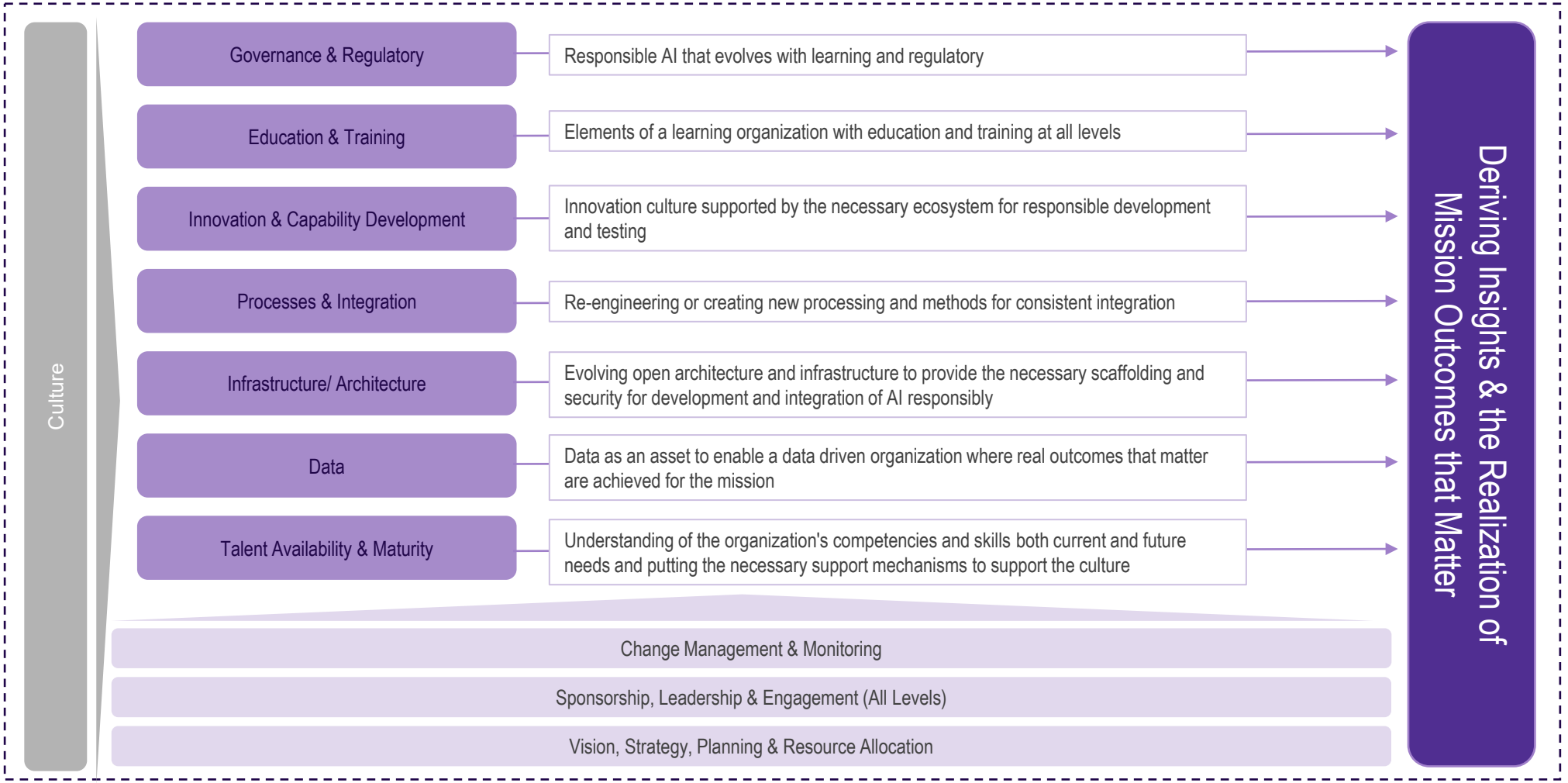
AI/Advanced Analytics Adoption Framework

ASSESSMENT, STRATEGY & DESIGN • CHANGE MANAGEMENT • AI TRAINING & UPSKILLING • EXPERIENCE/HCD

Maximus AI/Advanced Analytics Adoption Framework



KEY METHODOLOGIES:

- **Agile**: Leverage journey mapping to depict the prioritization of efforts/activities planning for continuous tangible milestones and mission outcomes while leaving flexibility to support Agile methods.
- **Human Centered Design & Experience** : Problem solving framework that puts being responsive to human needs and their experience at the forefront of design and implementation and throughout the journey.
- **Continual Change Management**: Application of structured processes and tools for leading the people side of the change to get to real adoption where humans believe AI improves their ability to support the mission.

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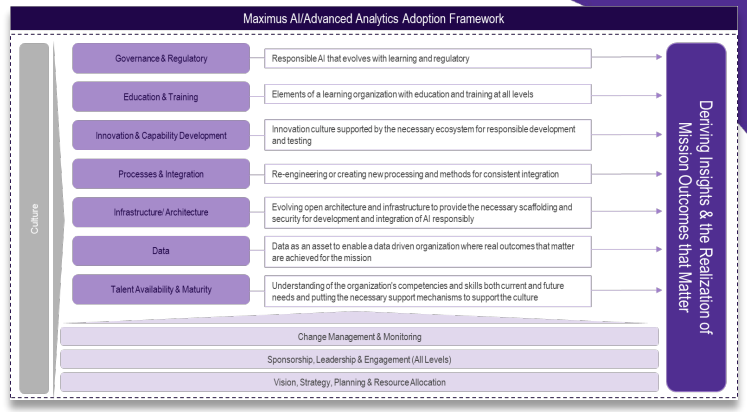
Use Case Evaluation



Mission Outcome

Describe the desired mission outcomes and the current state of how things are currently being performed, done, run etc. Is there an actively engaged mission owner and will they be available through out the entire project timeline?

Cultural

Describe the current cultural where innovation is to be deployed. Any barriers to overcome or mitigate?

Talent Availability & Maturity

Describe who will be the end users of the AI Innovations? How will they interact? What is their current skill levels? Is the right talent available to support this effort?

Data

Is the necessary data (that has been evaluated for pedigree, quality, and appropriateness against the use case) available? Does it require modification, conditioning, etc.?

Infrastructure/ Architecture

Does the current architecture and infrastructure support the development, training, testing and integration of the new AI innovation?

Governance & Regulatory

Any governance or regulatory applicable? Any perceived ones?

Stakeholder Engagement

Has Stakeholder Engagement been planned or currently happening?

Education & Training

Will education or training be needed?

Innovation & Capability Development

How complex is the AI innovation? Does it require all new research and model development? Is it a reuse with modification of an existing innovation? Has an ethical/responsible AI audit been conducted for all facets of the project?

Processes & Integration

In order to integrate the new AI innovation will changes and processes, procedures or governance be required? Any perceived ones? Do the process updates etc. have a definable timeline? This could include security reviews, policy updates, tech exceptions etc.

Mission Timeline

Is there a projected timeline? Is it reasonable for the type of innovation needed?

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AI Solutioning & Development Overview

AI/AUTOMATION SOLUTION DESIGN • AI SYSTEMS DEVELOPMENT • MODEL, SOFTWARE & TOOLS DEVELOPMENT

What is an algorithm?

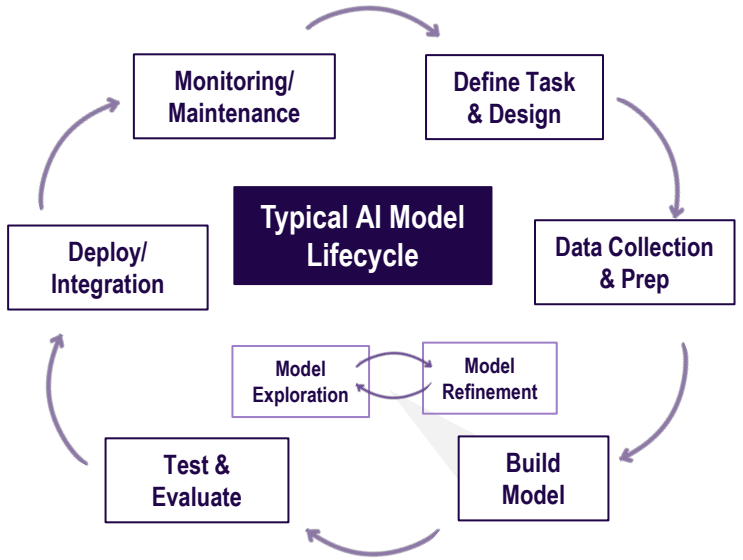
Set of step-by-step instructions (written in code) to perform a task, made up of three building blocks- sequencing, selection, and iteration. Used for solving a problem or performing a computation.

What is a model?

ML models are output by algorithms and are comprised of a model data and a prediction algorithm. It represents what was learned by the algorithm and is the 'thing' saved after learning on training data and represents the rules, numbers, and any other algorithm-specific data structures required to make predications

Models don't tend to stand alone, rather are integrated into tools, applications, systems

Algorithm & Model Dev (to include automation in theory)



AI Model Builders/Data Scientists

Types of AI Methods

- Machine Learning
  - Deep Learning
  - Predictive Analytics
- Natural Language Processing (NLP)*
  - Translation
  - Classification & Clustering
  - Information Extraction
- Speech
  - Speech to Text
  - Text to Speech
- Expert Systems
- Planning, Scheduling & Optimization
- Robotics
- Vision
  - Image Recognition
  - Machine Vision

Tools/Applications, Systems

1. Creation of new tool, application, system to run/use the model
2. Integration into existing tool, application and/or system
3. New tool, application, systems to run/use the model that is also connected to an existing system

**there are ML NLP models*

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AI Solutioning & Development

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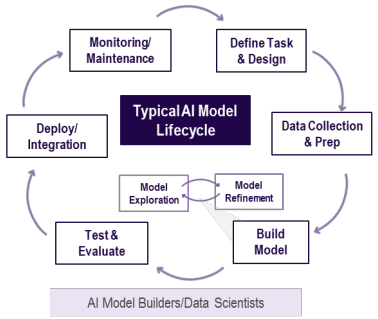

- Purpose- Mission/Business Need
- Domain Expertise
- Type of Model
- Data
- Scale (local vs enterprise)

BUILD

Creation of new algorithm/ models

HYBRID

Re-training of existing algorithms to a new but similar problem- reducing costs and development time

USE

Use of existing algorithm/ models, no changes

KEY TENANTS

- Use of model development and training environments that best replicate production level operational environments (to include validation & verification) and offer the scaffolding and structure to rapidly integrate and deploy models safely
- Minimize custom builds, leveraging no-code/low-code, and utilize industry leading models and development tools

Tools/Solutions/Systems

SCALED AGILE PARTNER GOLD

CMMI DEV/5 CMMI SVC/5

Leading Software Design, Development plus….

Data Preparation
- Data Cleansing & Prep
- Human Insight
- Simulation-Generated Data

AI Modeling
- Model Design & Tuning
- Hardware-accelerated Training
- Interoperability

Simulation & Test
- Integration into complex systems
- System simulation
- System Verification & Validation

Deployment
- Embedded Devices
- Enterprise Systems
- Edge, Cloud, On-Prem…

Key Design Considerations

Where will it run?	How will results be visualized?	Real-time data?
How much processing power needed?	How will models be monitored and updated?	Results return time?
Multiple models ensembled?	What will the models interact with?	Skill level of users?

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AI Engineering & Operations Overview

AI ENGINEERING • MODELOPS/MLOPS • AI SYSTEMS INTEGRATION • OPERATIONS & MAINTENANCE

Extending DevOps is not enough because AI/ML, while seemingly like traditional software at first there are some distinct differences that require specific engineering and operations processes and structures. DevOps was designed for automation and efficiency in technical implementations and not enterprise model governance. Therefore, AI/ML requires a purposeful engineering and operations approach that ensures consistency, reliability, insight into model performance.

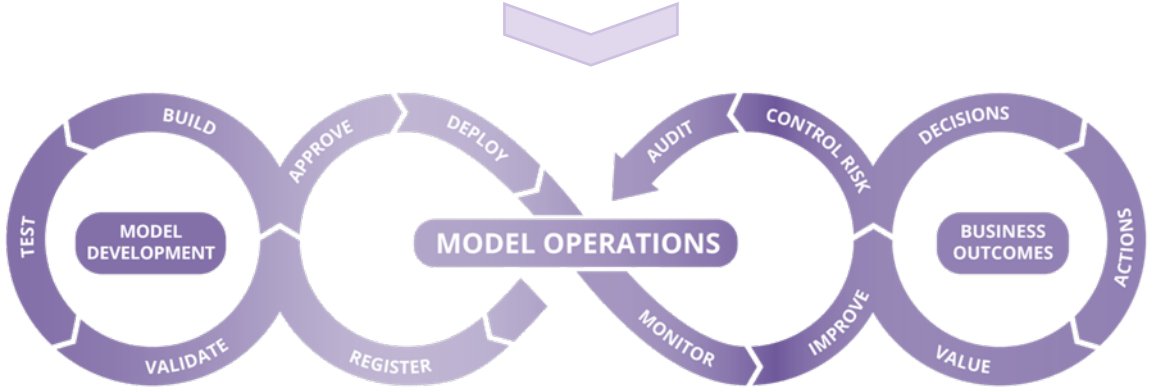
Just 5%

of executives say they have full visibility into all models in production across their enterprise

Source: State of ModelOps 2022 Report (ModelOp/Corinium)

Traditional Software	AI/ML Models
Deterministic	**Deterministic & Probabilistic** – with decisions that have business and ethical considerations
Code is separable from data	**Encoded with data** – tight relationship b/w data and the model with continuous monitoring needed
Does not degrade over time	**Drift over time and need refresh** – designed to alter the parameters with the intake of more data attributes

Source: ModelOps Essential Guide



ModelOps (or AI model operationalization)— focused primarily on the governance and life cycle management of a wide range of operationalized artificial intelligence (AI) and decision models, including machine learning, knowledge graphs, rules, optimization, linguistic and agent-based models. Core capabilities include continuous integration/continuous delivery (CI/CD) integration, model development environments, champion-challenger testing, model versioning, model store and rollback. Gartner

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Data Science & Advanced Analytics Overview

Mission/Agile Data Science • Exploratory Analytics • Viz & Data Simulation • BI & LCNC Analytics

Mission First Data Science as a Service is all about solving problems and always keeping that at the forefront. Data Science practioners will use a variety of tools and methodologies to solve the problem. This could include the development of models and tools but are focused on solving the problem first not building something to a set of technical requirements. Much of the time, they focus on the exploratory that then may taken by developers and engineers to be hardened and scaled for enterprise level solutions.

METHODOLOGIES

- CPMAI
- CRISP-DM
- Agile
- Human Centered Design & Experience

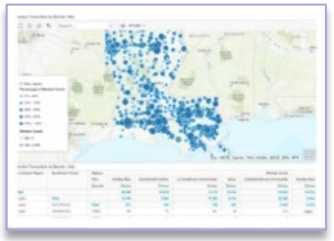
MISSION PROBLEM BASED APPROACH

1. What is the mission problem to be solved and what are the specific outcomes desired?
2. Do we have the right domain experts to really understanding the unique aspects of the problem?
3. Has anything analogues to this problem already been done (from both tools/methodologies, etc.)
4. Is there an appropriate Proof of Concept (POC) or Minable Viable Product (MVP) to re-use or develop a new solution for?
5. What data do we have available or can obtain that is relevant or might be relevant and appropriate for this mission problem?

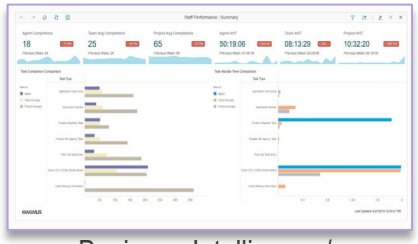
COMMON DATA SCIENCE & ADVANCED ANALYTICS SOLUTIONS

Awareness & Understanding of Trends and Patterns

Data Visualization

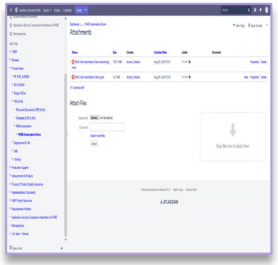


Geospatial Analysis

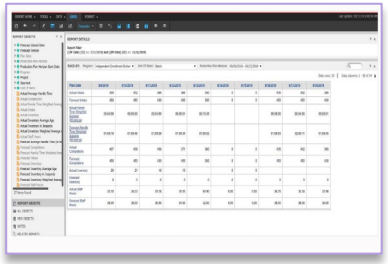


Business Intelligence/ Advanced Analytics

Automation & Optimization

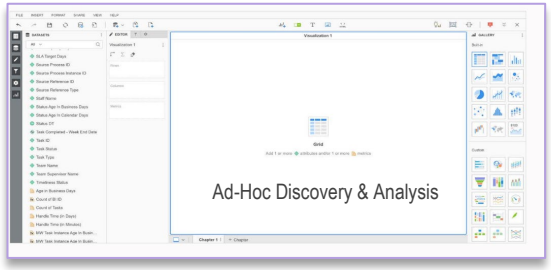


Robotic Process Automation (RPA) & Other Automation



LCNC Analytics

Discrete Problem Insights



Exploratory Discovery

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