NORTH CAROLINA
Department of Transportation

Data Governance at NCDOT

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CLEAR Lunch and Learn – 12/17/2024

Connecting people, products and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

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Agenda

Data Governance at NCDOT

- Introduction of SIPS and the Data, Technology, and AI Program
- Basics of Data Governance
- NCDOT's Data Governance Program
    - Evolution & Path Forward

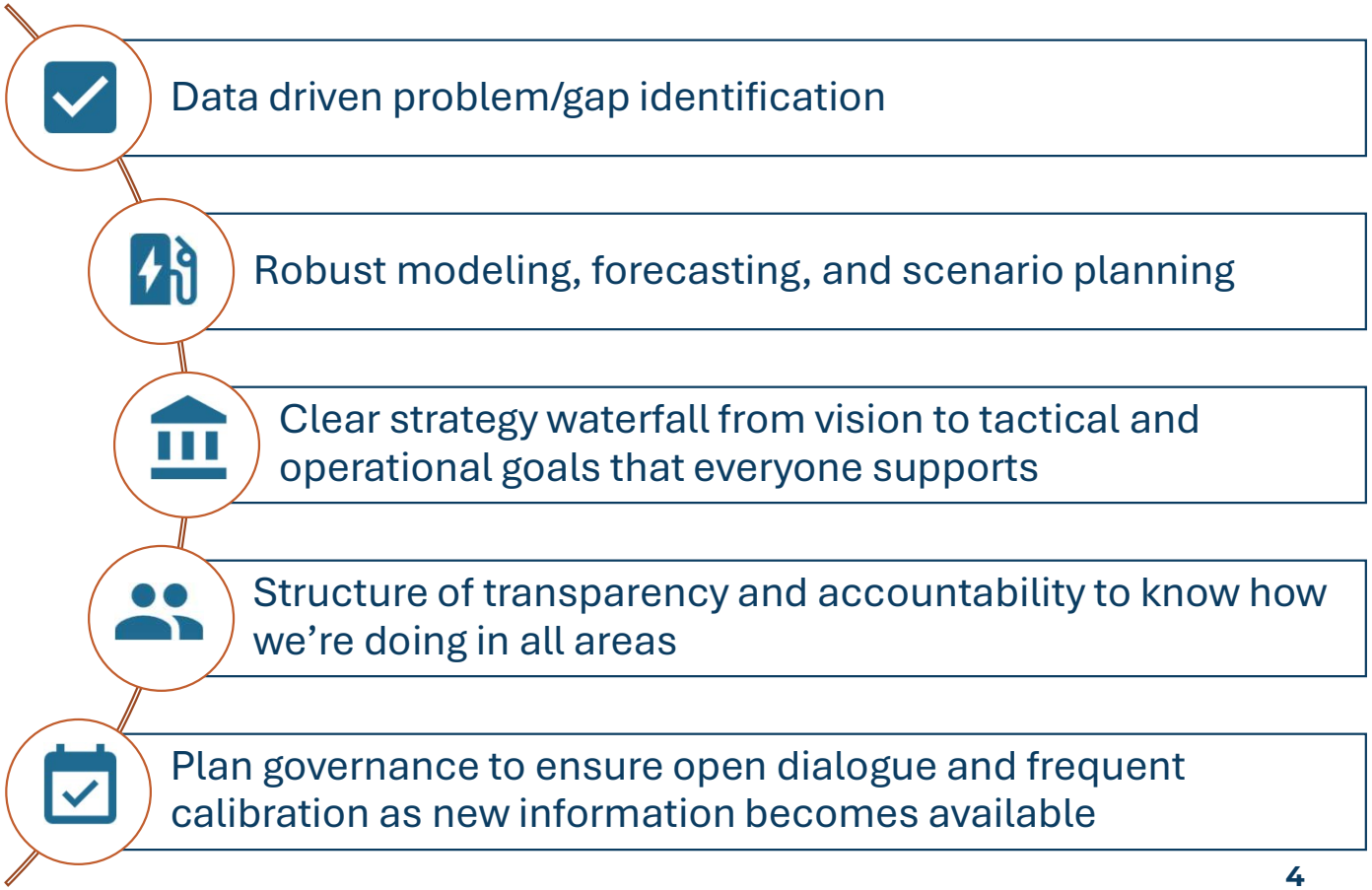
Intro to SIPS & NCDOT's Data, Technology, and AI Program

Office of Strategic Initiatives & Program Support

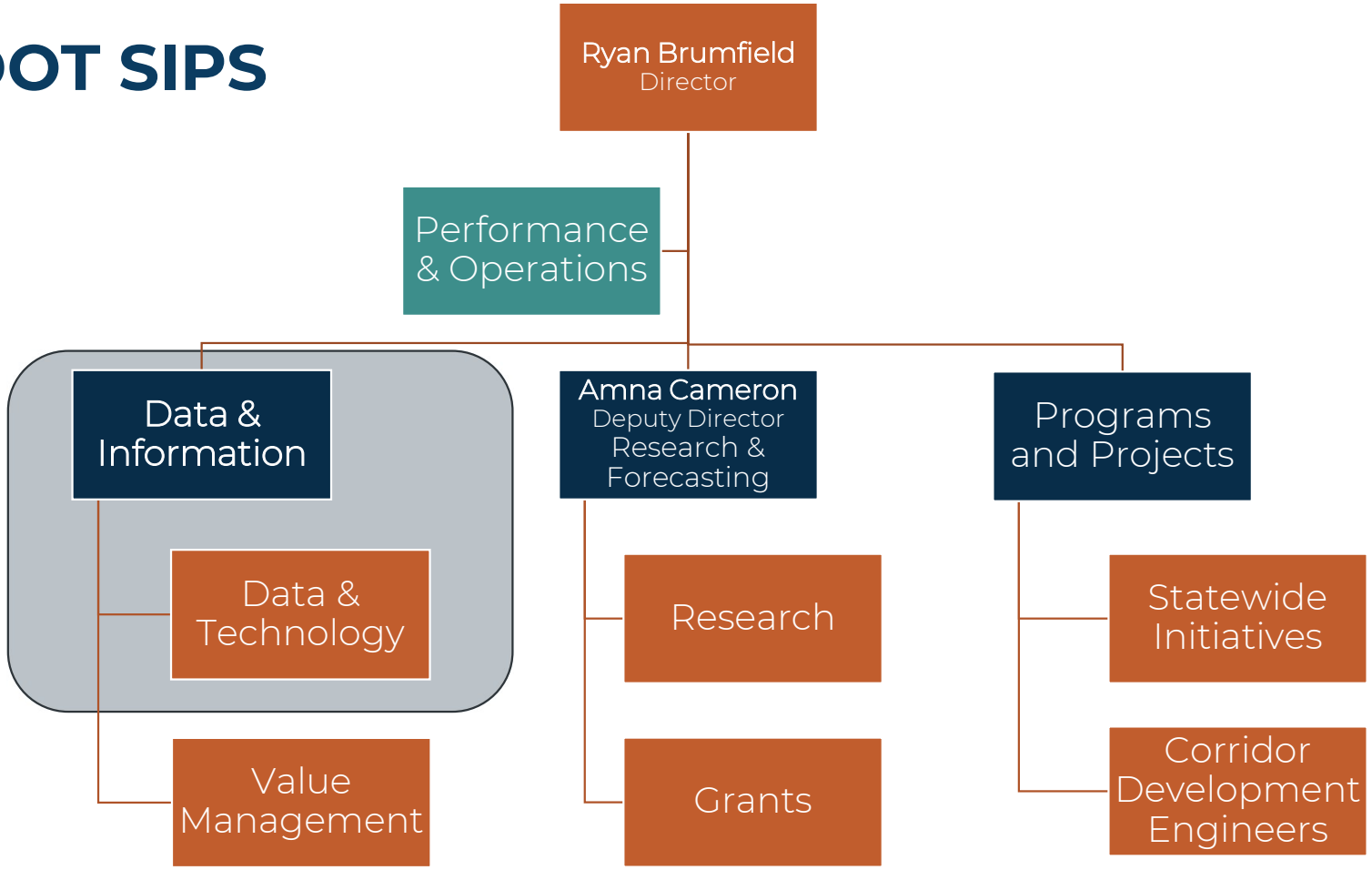
SIPS

Core Purpose:

Help NCDOT maximize success, act strategically, and prepare for the future



NCDOT SIPS


Ryan Brumfield
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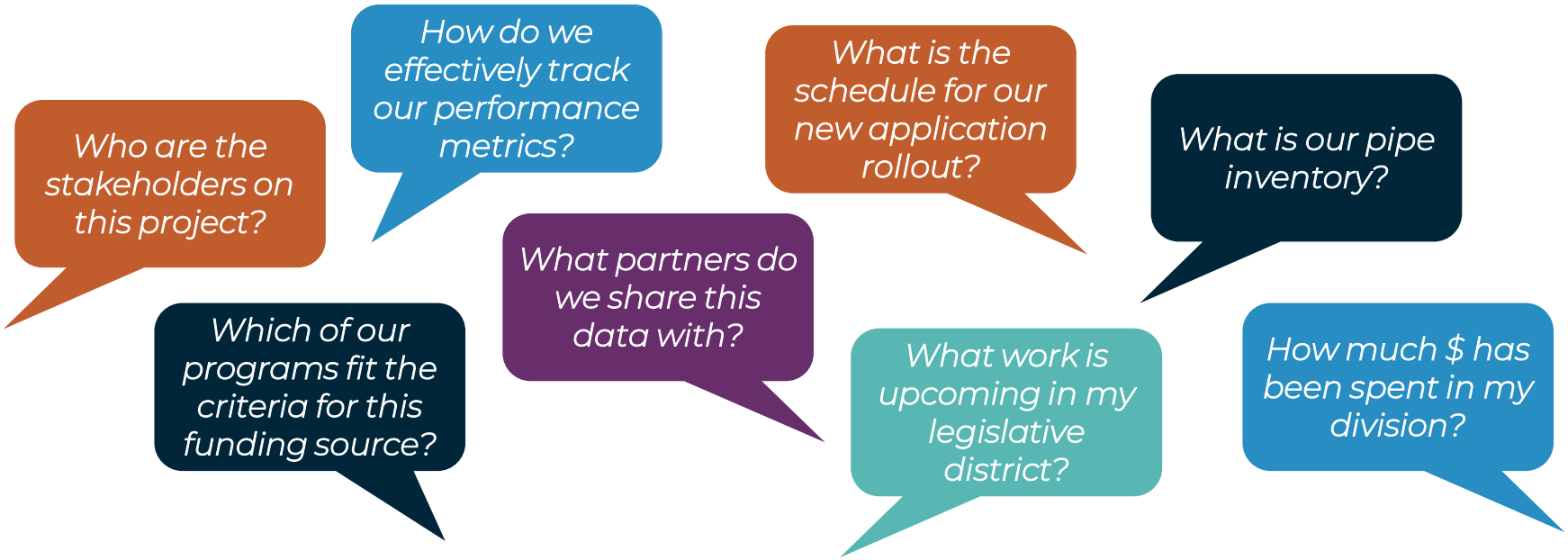
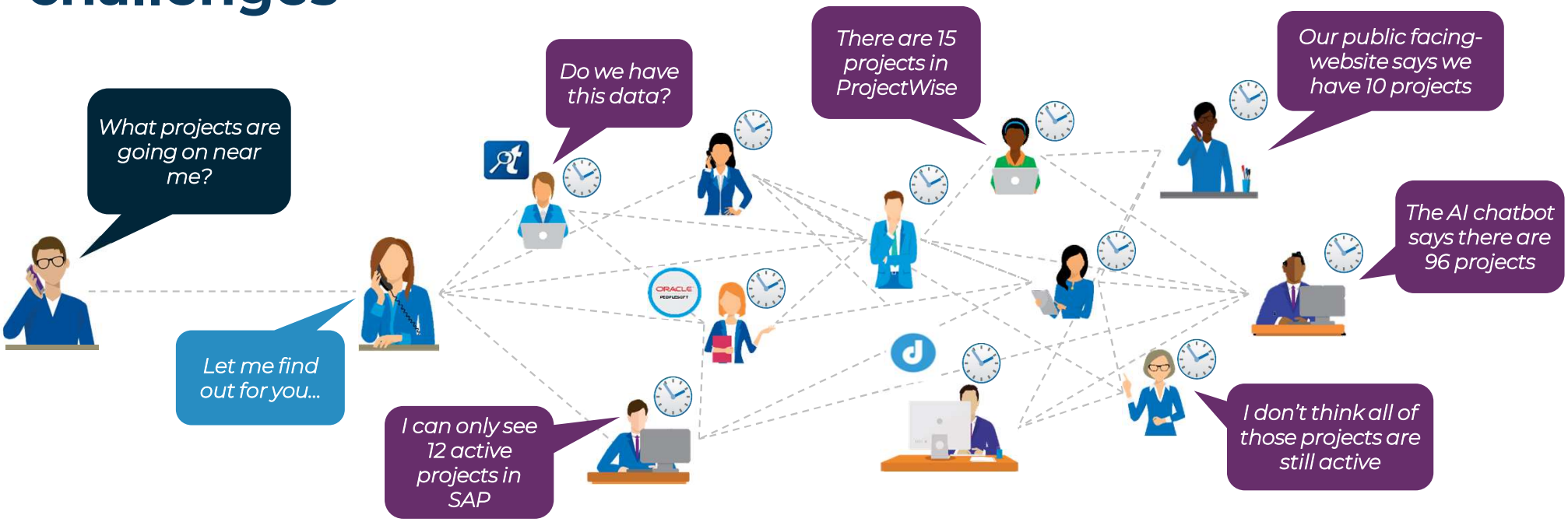
Performance & Operations
Data & Information
Data & Technology
Value Management
Amna Cameron
Deputy Director
Research & Forecasting
Research
Grants
Programs and Projects
Statewide Initiatives
Corridor Development Engineers

There are many questions that require NCDOT to have effective data capabilities



It is critical for transportation agencies to improve the formal execution around the definition, production, and usage of data to manage risk and improve the quality of decision making

An integrated strategy can help NCDOT solve challenges



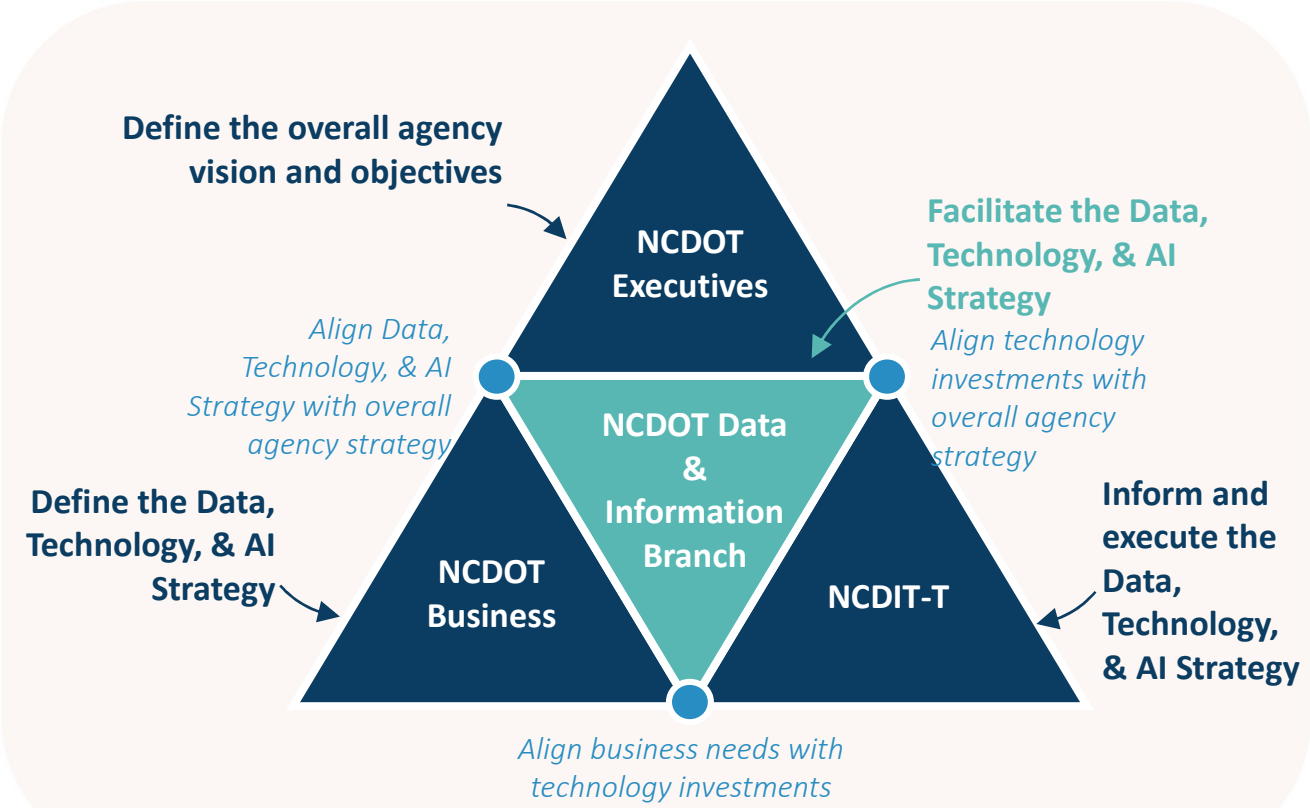
Simple requests become complex due to a range of issues including poor data integrity, lack of standard definitions, disparate systems, and lack of coordinated governance

SIPS Role in NCDOT's Data, Technology and AI Program

Data & Information Branch

est. Summer 2024

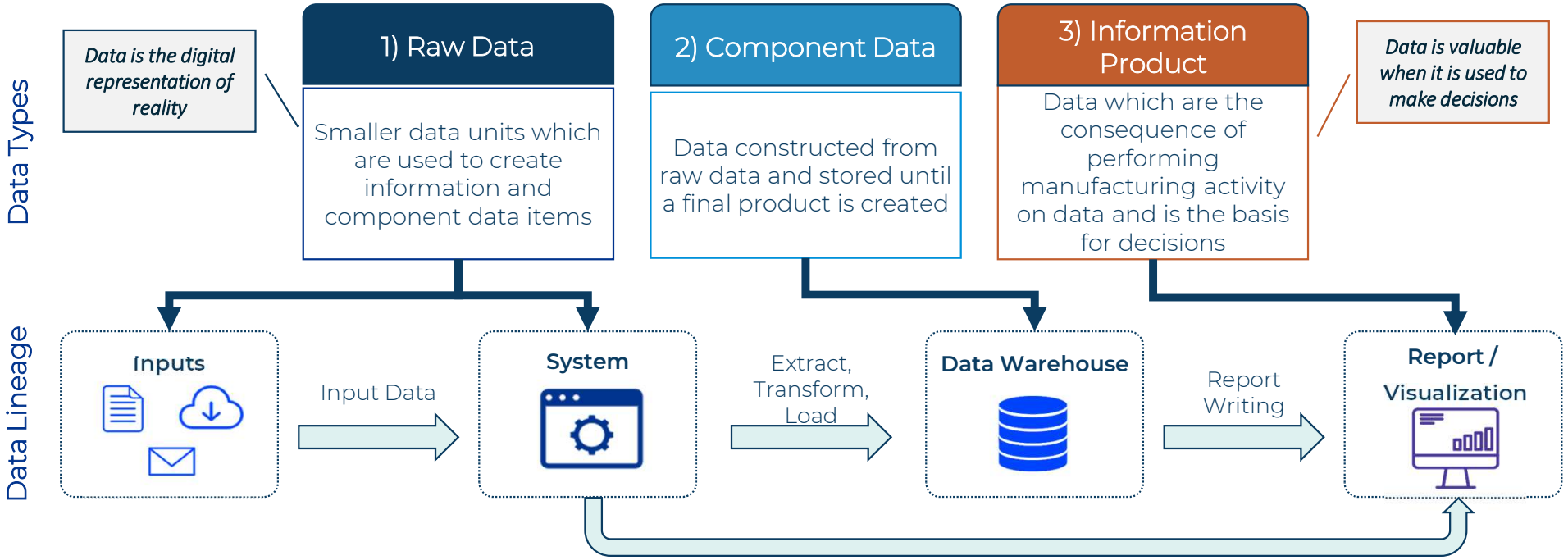
- Data driven problem/gap identification
- Robust modeling, forecasting, and scenario planning
- Clear strategy waterfall from vision to tactical and operational goals that everyone supports
- Structure of transparency and accountability to know how we're doing in all areas
- Plan governance to ensure open dialogue and frequent calibration as new information becomes available



NCDOT Data, Technology, and AI Strategy and Governance Plan to be completed by end of 2024

Basics of Data Governance

Defining and Understanding Data



Data governance *is the organizing framework that develops and oversees the policies and procedures around data.* ***The primary objective*** *is to manage risk and improve the quality and usability of data.*

Data Governance must be designed with consideration around data management and IT governance practices

Key Dimensions to Drive Data Governance

DATA MANAGEMENT	DATA GOVERNANCE	IT GOVERNANCE
Data Management is the specific policies, processes, tools, and technology that organizations employ to control, oversee, and utilize their data	*Data Governance is the organizing framework that develops and oversees the policies and procedures that make up the organization's Data Management*	*A framework for effective governance to assist those at the highest level of organizations understand and fulfill their legal, regulatory, and ethical obligations with respect to their organizations' use of IT*

Data Governance…

- ✗ IS NOT simply a way to *comply* with the minimum reporting requirements
- ✓ IS a way to *empower and transform* the organization by applying continuous improvement to data processes to achieve business objectives

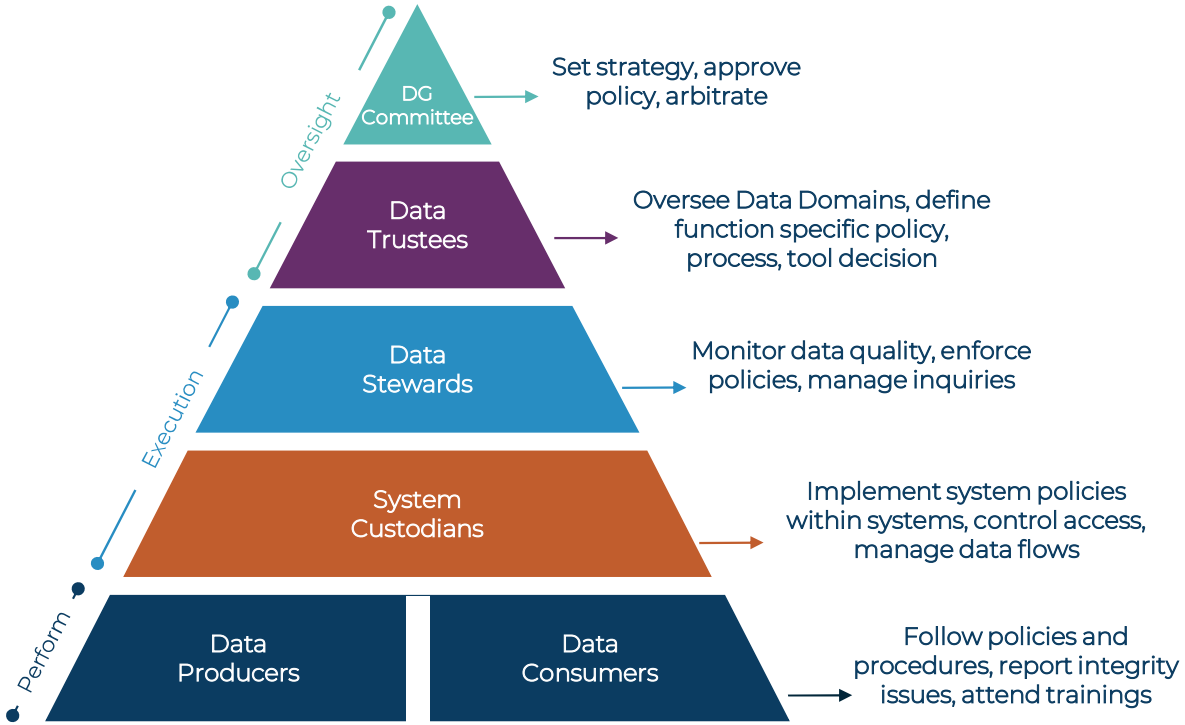
Data governance common misconceptions

Misconception	Reality
It's an IT responsibility	Data Governance requires a partnership between Business, Technology, and Operations
One size fits all	The organization, processes, and technology must be tailored to fit the culture and leverage existing governance structures and technology
It can succeed through a grass roots bottoms up effort	Success requires executive advocacy and sponsorship
It's about having the right tools	Data governance requires the integration of organization, processes, and technology tools
It can be an add on responsibility that doesn't need to be measured or rewarded	Data stewardship may require full time staff commitment. If the role is not measured or rewarded, the result will be ineffective governance action
It’s a big bang implementation	Standing up data governance structures is an evolutionary process that requires effective change management

Benefits of Strong Data Governance

Improved Decision Making	Operational Efficiency	Regulatory Compliance	Enhance Workforce Productivity
Completeness and accuracy of data enables improved real time decision making (e.g. project prioritization, asset mgmt etc.)	Increase the overall cycle time for execution across the project lifecycle	Ability to meet evolving regulatory demands for data management with accurate reporting	Increased usability of data to enable to increase worker productivity (do more with the same)
Enable Trust and Transparency	**Minimize Operational Risk**	**Increase Agility**	**Tighter Integration**
Increase trust with data within organizations and to external stakeholders: regulators, citizens, customers	Increase visibility into exceptions and risk identification with enhanced data capture and validations (e.g., holistic view)	Faster time to market on rolling out technology projects and strategic initiatives (e.g., respond to major weather events)	Unified Information/ flexible data models capable of supporting multiple business priorities / projects
Enable Advanced Analytics	**Increase Accountability**	**Reduce Waste / Rework**	**Minimize Security Risks**
Trusted, organized, and reliable source data is the foundation for effective predictive models	Enable a culture of accountability (data ownership) to meet minimum standards of data quality and enable points of single source of truth	Reduce the time for data acquisition and preparation (20%- 30%) and increase the time for analysis	Improve data classification capabilities for PII and other sensitive information to improve monitoring and better address reputational risk

Leading data governance programs employ a collection of roles to deliver various data governance responsibilities



Benefits and Defining Factors

- Network of people focused on data quality and access
- Method of structuring and enhancing scattered efforts that exist today
- Structure will overlay existing roles in organization
- Shift from systems-centric to Domain-centric
- Capable of surviving reorganizations by role reassignments
- Temporary membership will bring fresh ideas and buy in

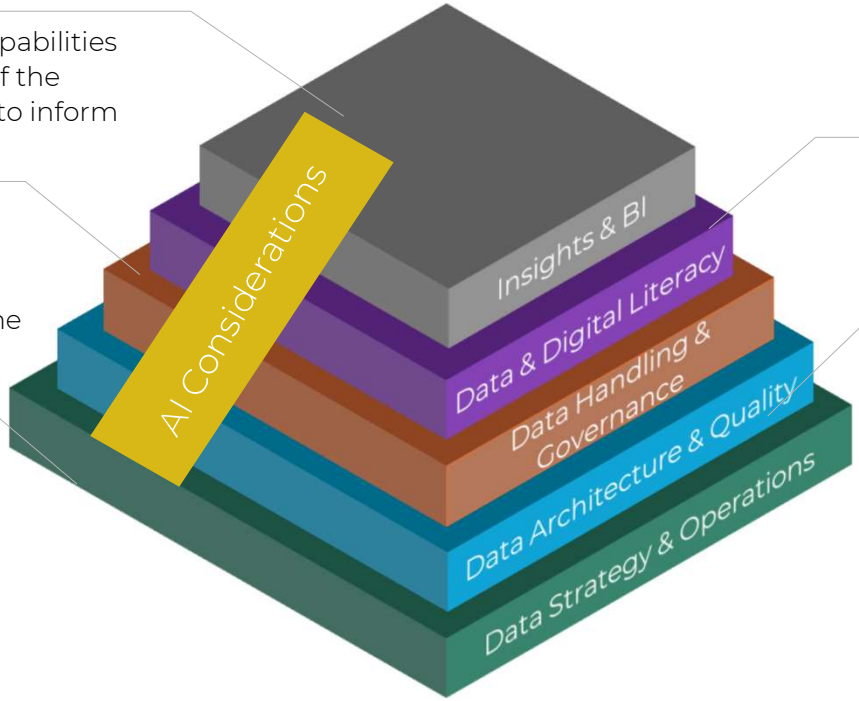
Leading Data, Technology, & AI Programs are being led by Chief Data Officers / Offices (CDOs)

More than 65% of organizations have implemented an Office of the CDO to be accountable for shaping and delivering data and/or analytic capabilities to the enterprise. Given the increased focus on AI, data literacy, data commercialization, the CDO role is becoming more strategic and less transactional with the portfolio of functions under their remit requiring increased levels of investment.

Provide insights and monitoring capabilities to support the growth and health of the business, leveraging data analytics to inform strategic decisions

Establish and oversee data governance frameworks to ensure data quality and accessibility while maintaining data integrity across the organization

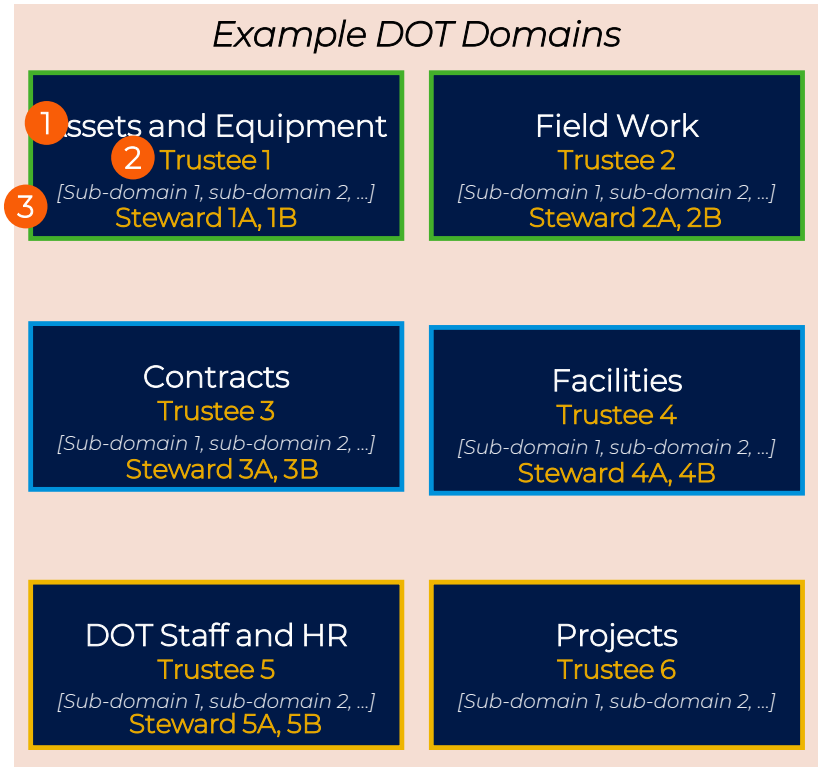
Develop and implement data strategies and policies that align with the organization's goals, ensuring that data is leveraged as a strategic asset



Drive cultural change to foster a data-driven organization, promoting data literacy among employees to enhance data utilization

Responsible for the overall architecture and quality of data, ensuring that it is structured and maintained in a way that supports business needs

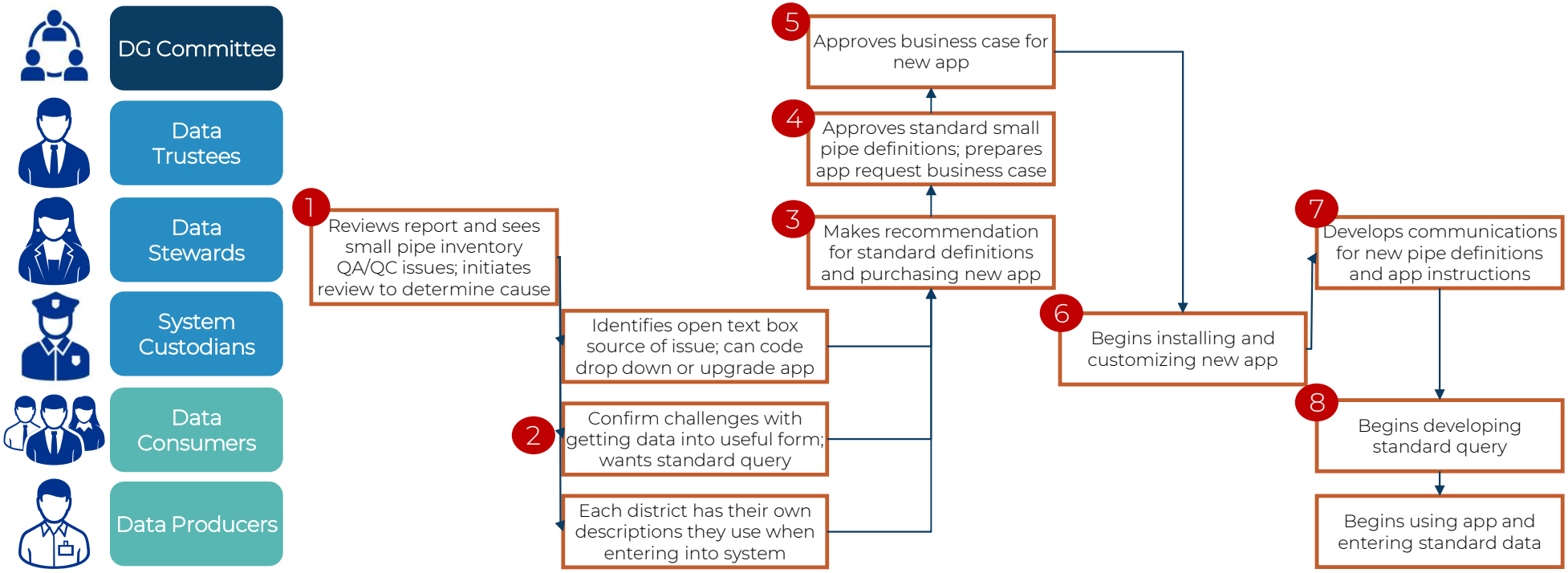
To facilitate this data governance transformation, a "domain-centric" view needs to be adopted



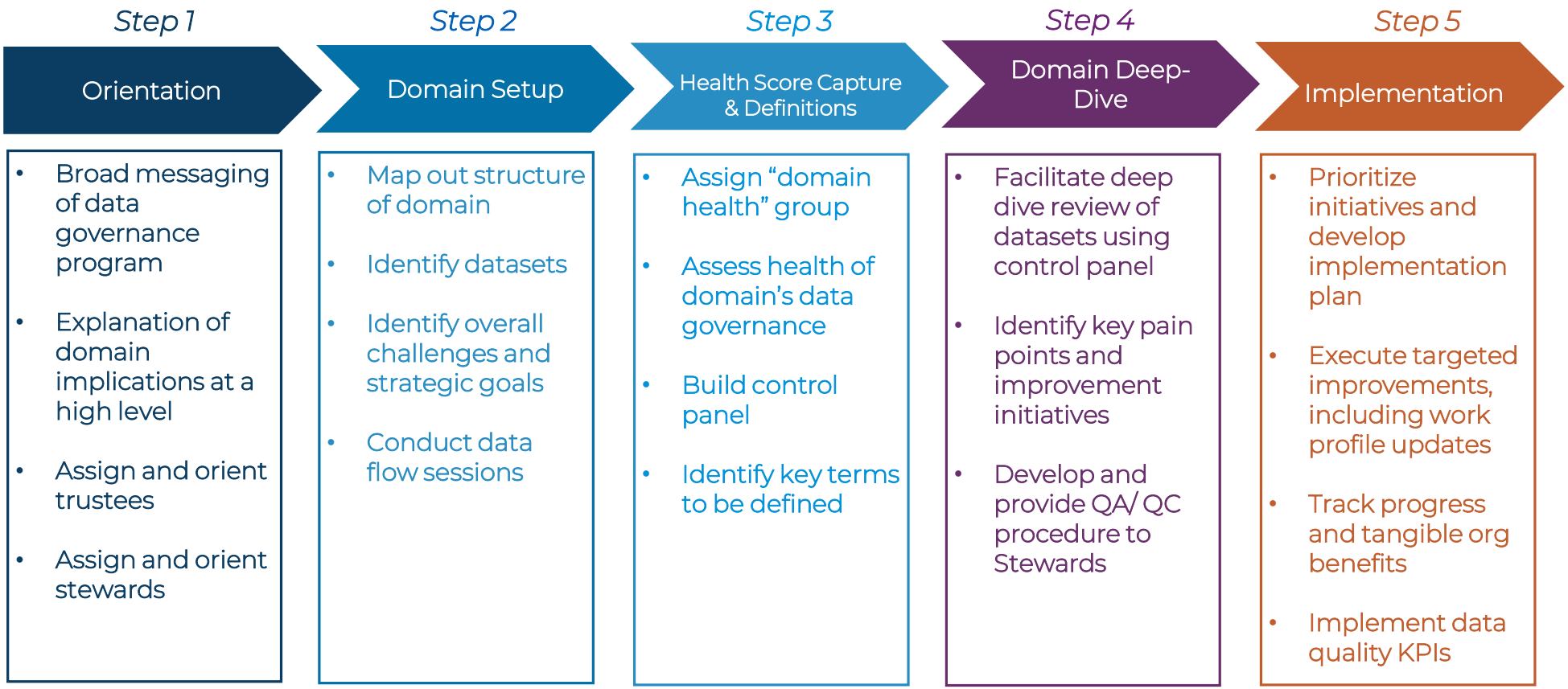
1. "Domains" or logical groupings of data will be assigned to Data Trustees across the organization
2. Trustees oversee a domain. Trustees define function specific policy, process and tool decisions, and provide oversight of data inquiries
3. Domain structures also include sub-domains stewards. Stewards are responsible for ensuring standards are followed, enforce policies, monitor data quality, handle data inquiries, identify data issues

These roles work closely together to quickly address data governance issues

Example of an issue with small pipe inventory reporting



Activating each domain will require a 5-step process…



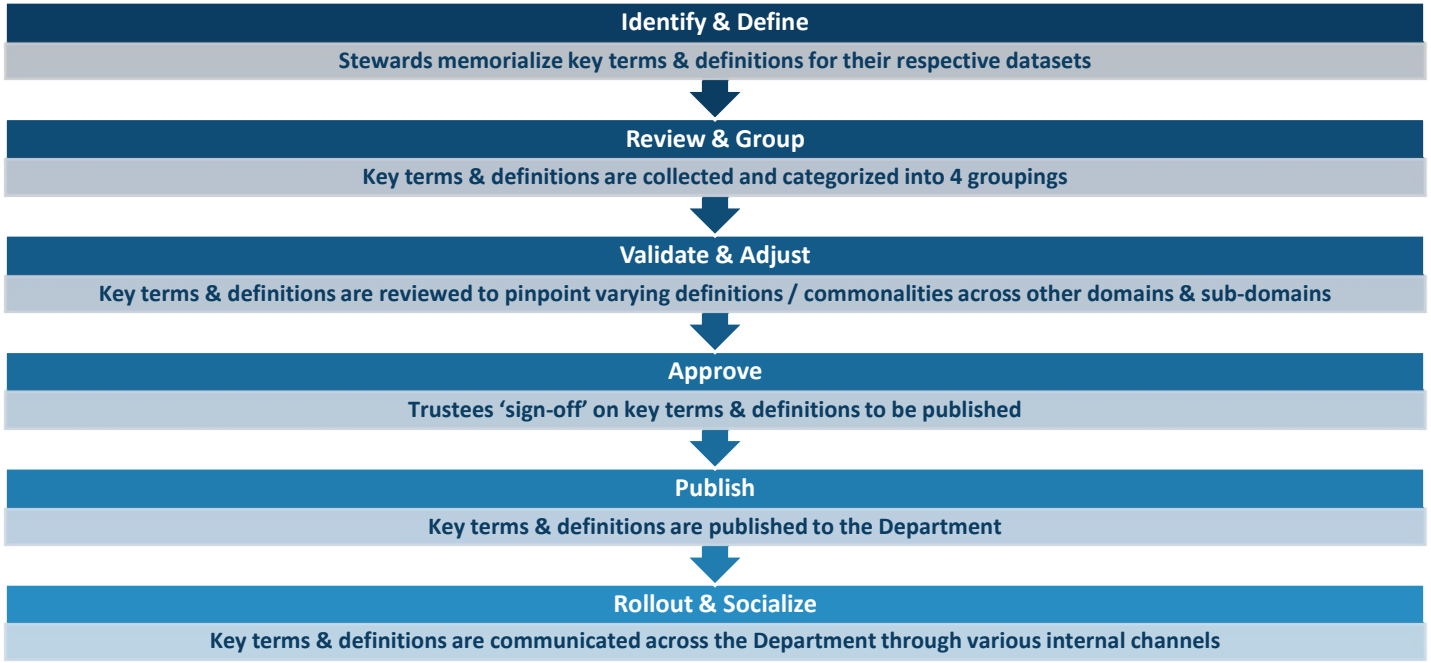
Domain Activation Playbook – Illustrative Example

Step 1	Step 2	Step 3	Step 4	Step 5
Orientation	Domain Setup	Health Score Capture & Definitions	Domain Deep-Dive	Implementation

Key Activities:

1) Prioritize initiatives and develop implementation plan
2) Execute targeted improvements, including work profile updates
3) Track progress and tangible org benefits
4) Implement data quality KPIs

Implementation will include activities such as the development and rollout of standard definitions:



Example activities / outcomes of a Data Governance Implementation

Functional Role	Project Managers	Stockroom Clerks
Actions	Required key project milestones and project details will become uniform among the divisions, standardizing reporting and expectations	Data entry standards and policies will be established, rolled out, and monitored for division level stockrooms
Benefits	*Trust and Operational Efficiency* *Standardized reporting → more consistent and reliable data results*	*Productivity and Decision Making* *Improvement of data standardization and accuracy through connection to producer*

NCDOT's Data Governance Program

Building the Strategy and Implementation Plan for the Program

Began with KPMG Scope of Work in July 2024

Evaluating NCDOT's current state through several avenues

82 documents

Documentation Review

Focus: Review of existing documentation to understand existing processes, procedures, guidelines related to data, technology and AI

690+ responses

Agency-Wide Survey

Focus: Agency-wide input on current state as well as aspirations for the future relating to data governance, AI readiness, and technology

11 responses

Functional Area Questionnaire

Focus: Feedback from Functional Area leads and teams on current practices, challenges, and opportunities for data governance, technology, and AI

44 interviews

NCDOT & NCDIT Interviews

Focus: 1-hr discussions to gather teams' experiences, opinions, and motivations (qualitative research)

Data/Systems Inventory

Focus: Development of an inventory of systems currently in use and associated datasets, reporting/analysis functionalities, and satisfaction levels

The assessment revealed several positive indicators…

- While individuals feel that there are pockets of data that have some challenges (e.g., duplicate or outdated data), >60% of individuals generally feel like they **have the data they need for their jobs and the data is of good quality.**
- While there is not a formal data governance program, **some systems and units are implementing elements of data governance in place** (e.g., standardized data entry templates for field data collection, manual QA/QC, built-in system data validation).
- While there is a strong desire for more systems integration, >60% of individuals feel that it is easy to share data between teams and **some systems are highly integrated** (e.g., DOH Inspector data flows from iPad forms -> HiCAMS -> SAP).
- Culturally, there is a **desire to transform** (e.g., adopt advanced analytics/AI, enhance the working relationship between NCDOT and NCDIT-T, develop a more integrated and strategic approach).

Extract from Agency-Wide Survey Results

	Unable to Answer	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I can trust that the data I am using is accurate	0%	1%	7%	17%	51%	23%
I know what to do when I find data that is inaccurate	1%	2%	14%	16%	45%	22%
I have all the essential data I need to do my job	1%	3%	12%	21%	43%	20%
I know where to find the data I need for my job	1%	2%	7%	15%	48%	28%
It is easy for me to request / share data with other NCDOT teams	2%	3%	10%	21%	44%	21%

Preliminary; Non-Exhaustive

...as well as several opportunities for improvement

1	While some elements of data governance exists in some units, there is **no formal data governance program** rolled out across the agency
2	While units generally feel like they have the technology they need, they face challenges with **disparate systems and a lack of an integrated, agency-wide data, technology, and AI strategy**
3	There are **opportunities to improve the working relationship between NCDOT and NCDIT-T** to improve collaboration in the day-to-day management of data, technology, and AI needs
4	There are **critical gaps in the operating model to oversee and implement the data, technology, and AI strategy program** (e.g., performance measures, roles/responsibilities, policies, risk management)
5	While there has been some AI adoption to date, there are **critical gaps across foundational elements to support large-scale adoption** (e.g., business strategy, policies, data infrastructure, skills / training)
6	**Historical behaviors and perceptions** (e.g., lack of collaboration, resistance to change, distrust in AI) **may present as cultural barriers to transformations** relating to data, technology, and AI

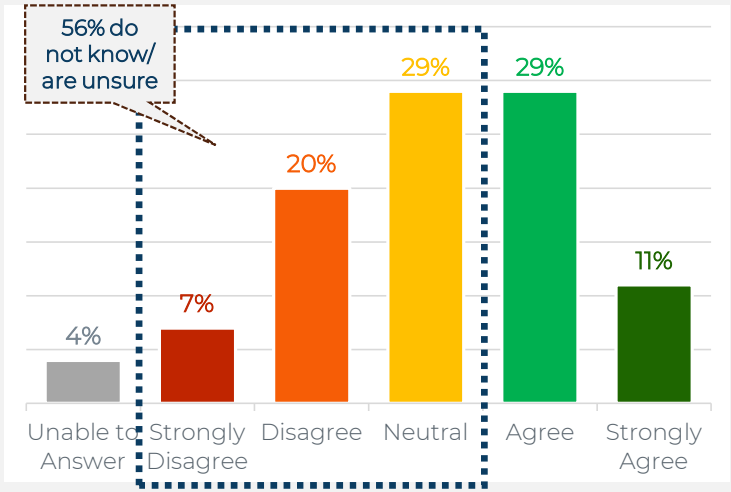
Improvement Opportunity:

1 While some elements of data governance exists in some units, there is no formal data governance program rolled out across the agency

Key Findings:

- While there is a general feeling of high data quality, there is **limited data governance elements** (e.g., formal processes, roles, data management standards) in place to validate quality.
- While some tools (e.g., ATLAS, Artemis) have data governance elements in place (e.g., templates and built-in data validation), generally other systems depend on **ad-hoc and manual QA/QC processes** for data validation with **no formal data roles** established.
- Disparate systems and inconsistencies in data collection, data definitions, and metadata management create further **challenges in identifying the "source of truth" and maintaining data integrity** (e.g., SharePoint).

"I know where to find the source of truth for data"



Impacts

- Reputation risk of incorrect information being shared with the public / legislature
- Quality risk of incorrect data being leveraged for projects/ assets/ service delivery
- Increased management and labor costs (time and resources) to make decisions without data

"For some data, you can go to 3 different places and get 3 different answers "

"There is a lack of definition of roles and responsibilities when it comes to data management"

"You can generally find the data, but it can be a roundabout process to find the right person who has it"

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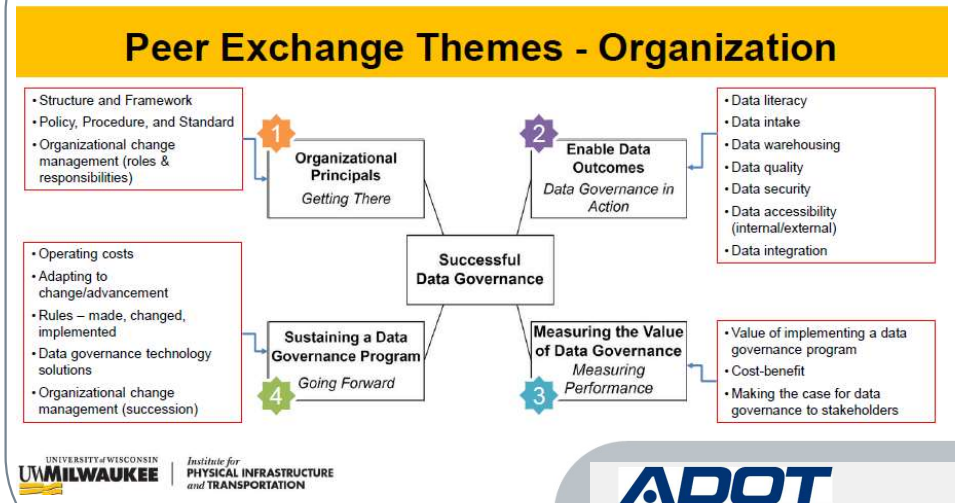
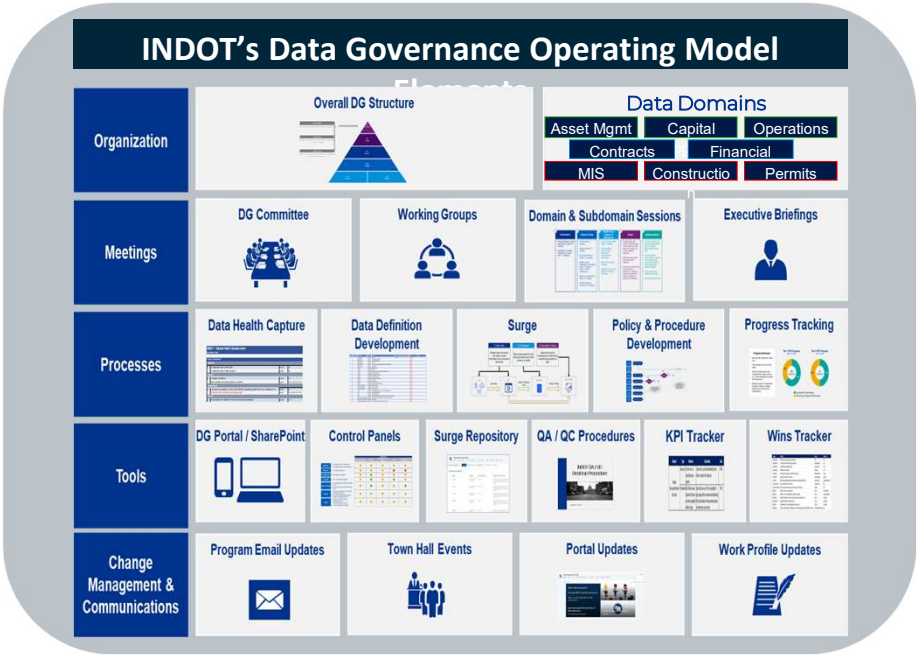
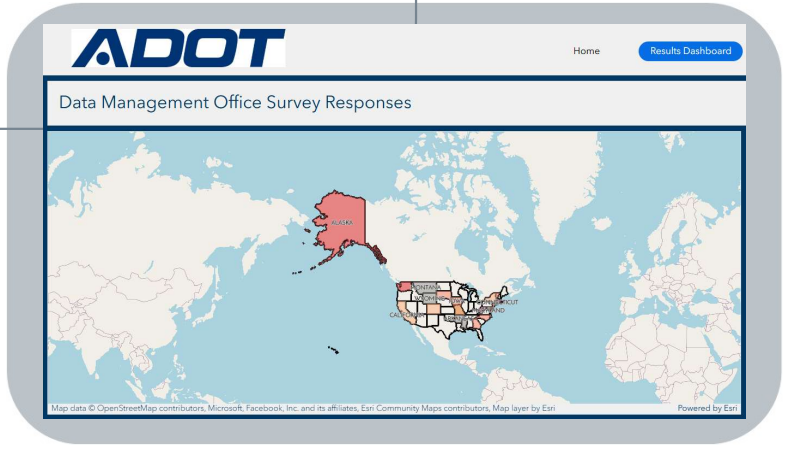
Looking to our Peers

NCHRP 20-44(48)

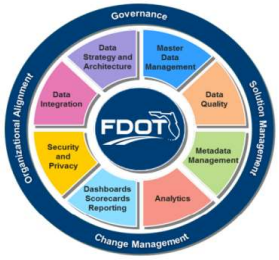
Peer Exchanges on Data Management and Governance Practices







Florida Department of Transportation: ROADS Initiative

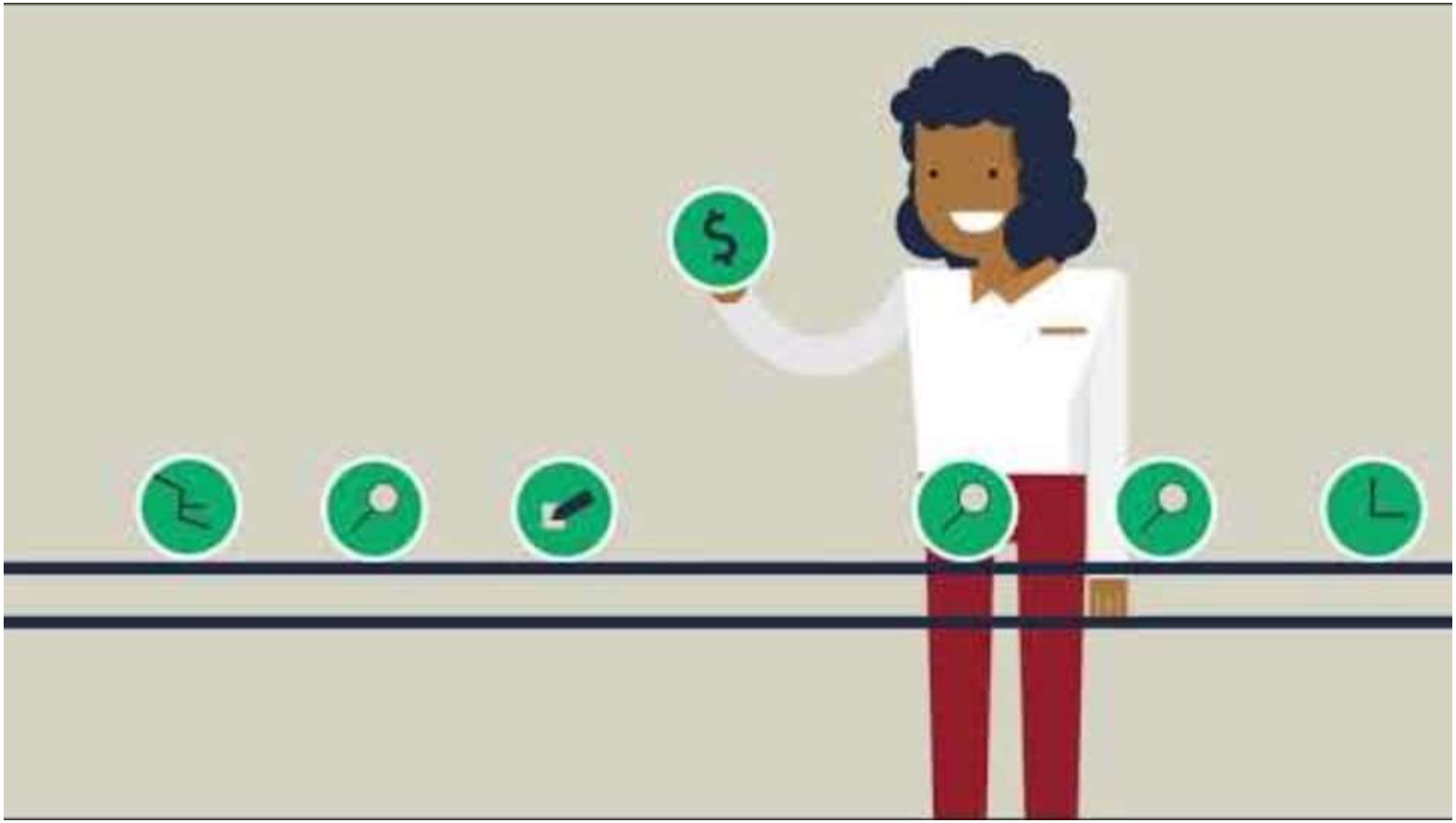


Closing the Gaps

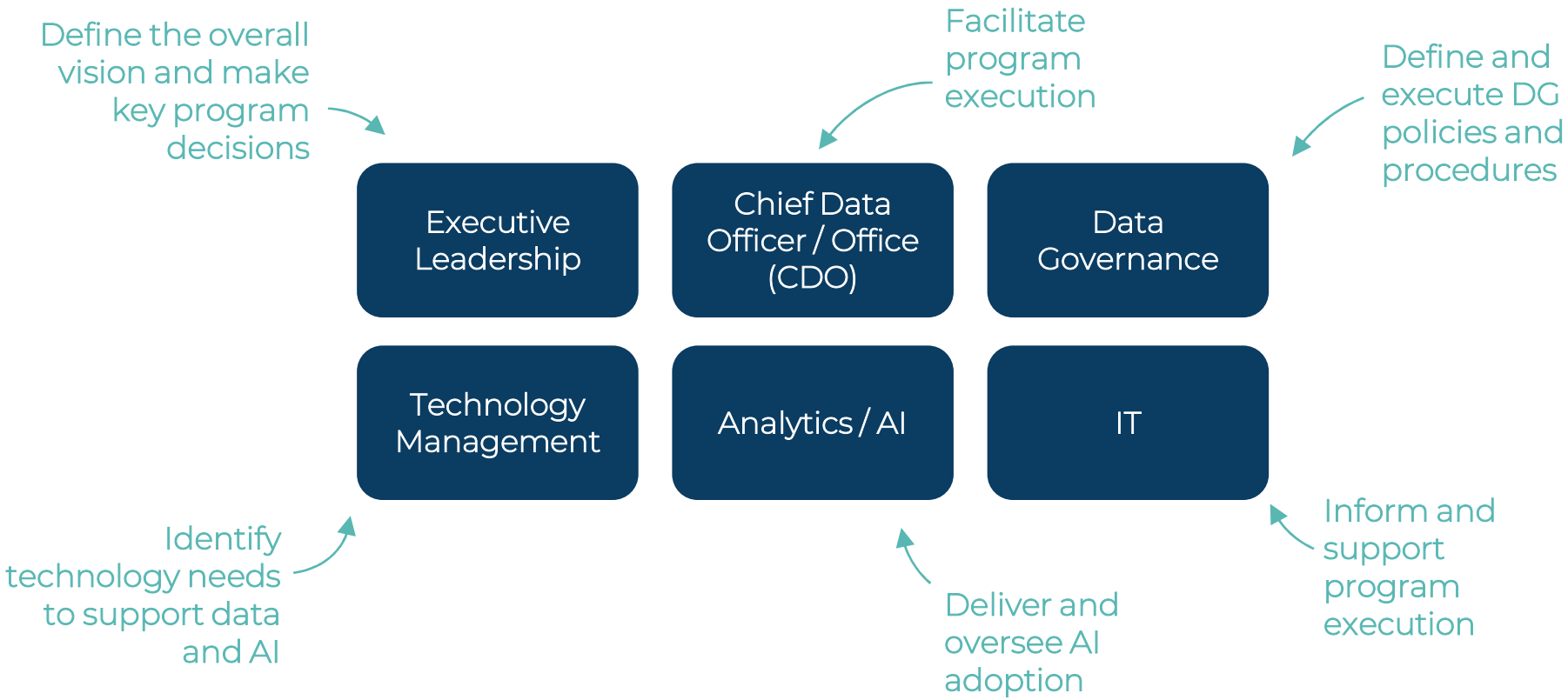
The ROADS Initiative will help to close the data and information gaps identified early in the project by:

- **People** - Establishing a formal data governance structure to make key decisions related to data and information.
- **Process** - Training FDOT staff on the Data Governance Component Model and implementing standard processes and routines to provide a formal approach to data governance.
- **Technology** - Providing common standardized tools, technologies and frameworks that will be used across FDOT to make data/information more accessible.

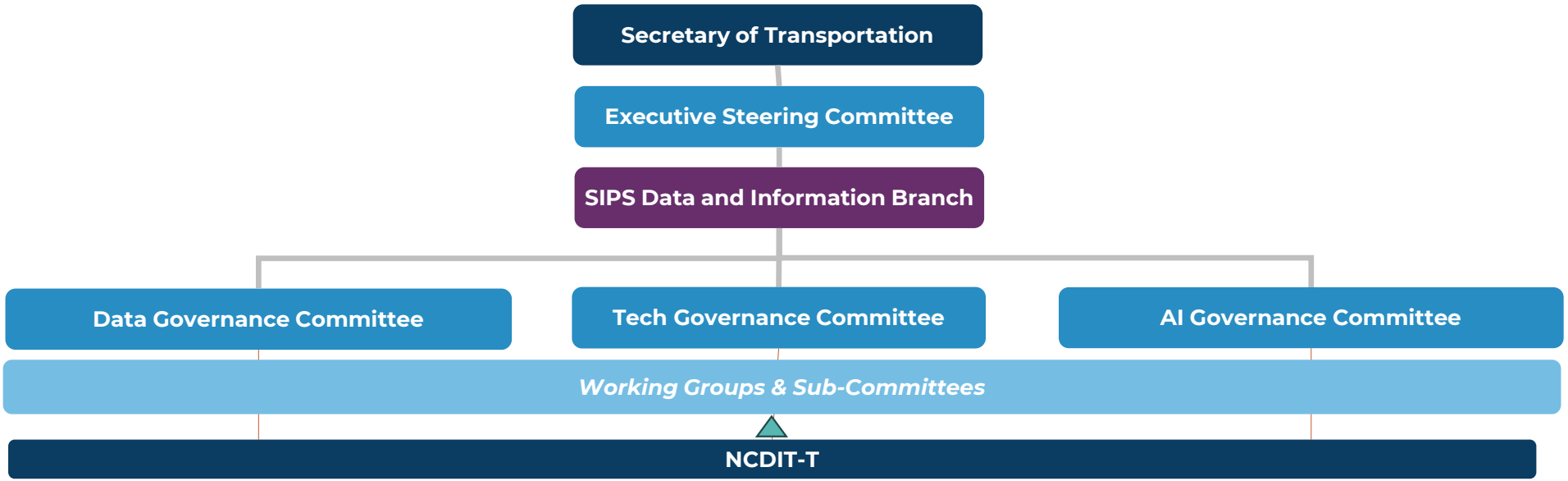
Example from Ohio DOT



Leading Data, Technology, & AI Programs utilize several “building blocks” to oversee and execute the program



Proposed NCDOT Program Structure



Data, Technology, and AI Program Vision

Vision:
NCDOT leverages data, technology, and advanced analytics at all levels of the organization to enable data-driven decisions and improve business outcomes

Focus Area: Data	Focus Area: Organization	Focus Area: Technology	Focus Area: Strategy	Focus Area: Insights
Near-Term Focus: Prepare NCDOT's data and systems for AI and analytics	**Near-Term Focus:** Establish structure and governance policies	**Near-Term Focus:** Enhance work planning and prioritization processes	**Near-Term Focus:** Improve risk management and organizational alignment	**Near-Term Focus:** Develop core data models for common analytic needs

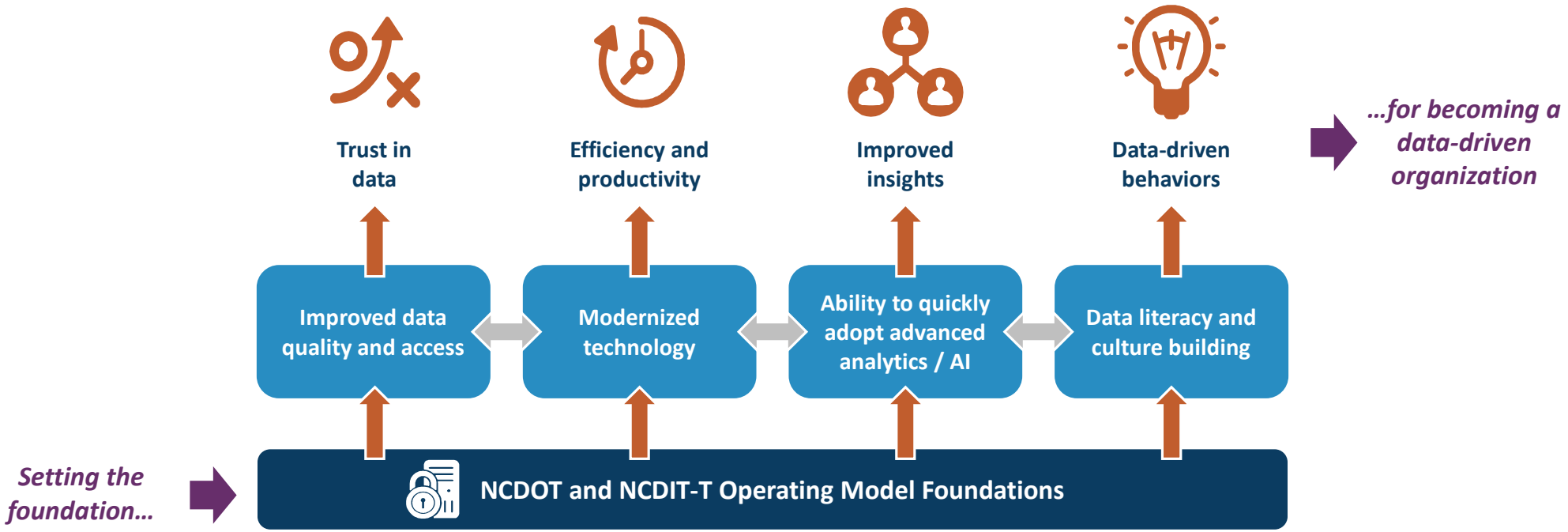
Key Component of Program Success = Data Governance

Draft

Program Objectives:

- Improve decision-making insights and capabilities
- Generate workforce capacity
- Enhance external transparency
- Be good stewards of public funds
- Foster innovation
- Improve the employee experience

Data, Technology and AI Program Benefits



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