



# Data Ecosystem

TDPAC Update



# Introductions

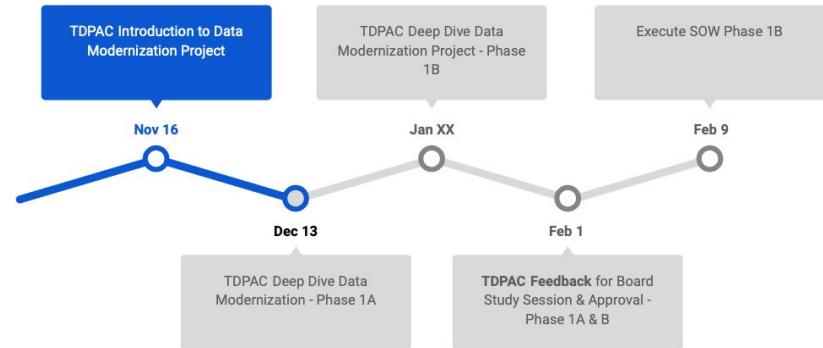
**Betsy Conti** - Principal Data Architect

**Daniel Clements** - Information Security Strategic Manager

**Brett Adams** - Purchasing Director

# Meeting Outcomes

- Inform the committee on Data Modernization Initiative
- Begin dialogue on **Infrastructure, Architecture, Risks**, Strategic Goals, Project Risks, and Governance
- Identify risks to be monitored by BOE
- Identify areas of public interest and/or concern for communications
- If necessary suggest changes to scope, contract language, or practices



# Data Initiative Background

- inBloom
- TDPAC creation
- Classroom Dashboard
- California and Colorado privacy law creation
- Jeffco purchasing process and contract wrapper creation
- Data Tactic

# Previous Community Concerns

- FERPA “School Official” definition
- Lack of district transparency
- Distrust in grant partners
- General distrust in ed tech vendors
- Overly broad information security generalizations
- Lack of privacy considerations
- Lack of information to quantify risk vs. reward

Panel discussion with Jeffco privacy advocate:  
[Transcript](#), [Video](#)

# Technical/Political/Scope Changes

- Exponentially better scope definition
- Maturation and reorganization of Jeffco Teams
- Slightly more mature (but not perfect) regulatory landscape
- Technology maturation
- Consistent support and expectations

# **Data Modernization** ***Strategic Plan Goals***



JEFFCO

2025

**THRIVES**

## Vision:

To be a thriving district where all students achieve their biggest dreams.

## Mission:

To provide a world-class education that prepares all Jeffco students for bright and successful futures locally & globally.

## Values:

Focus on Students | Excellence | Equity | Integrity | Belonging

## 4 Priorities:

### Our Learners: Our Future

- *Culture of Instructional Excellence*
- *Extraordinary Student Experience*

- Our People: Our Strength
- Our Operations: Our Foundation
- Our Communities: Our Legacy

## 2022-23 Foundational Initiatives: (that cross & impact all priorities)

- Regional Opportunities for Thriving Schools
- Healthy & Equitable School Start & End Times
- Data Dashboard
- District Culture

**Data Modernization Project**





# Project Dashboard Metrics

Support Jeffco Thrives 2025 and improve the experience for **school and district leaders** with access to data and reporting that supports their work

## 1 Elementary Reading

All students proficient on state reading test by the end of 3rd grade

## 2 Elementary Math

All students proficient on a state math test by the end of 5th grade

## 3 Middle School Math

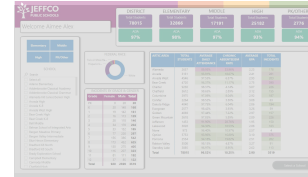
All students proficient on a state math test by the end of 8th grade

## 4 High School - PWR

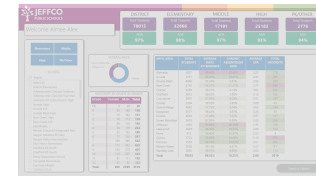
Frequent early warning of students' course failure, attendance, and behavior



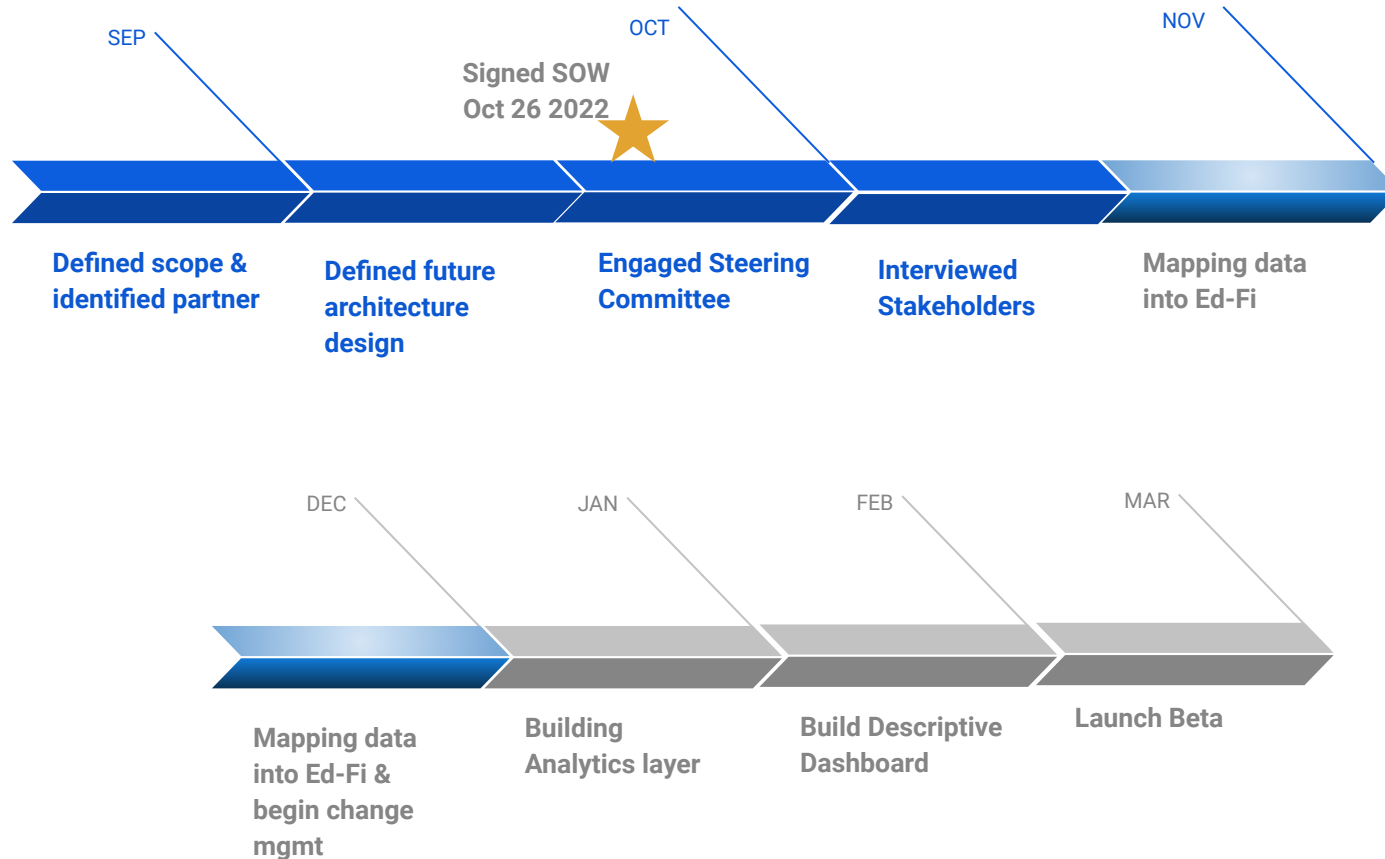
**Descriptive dashboard(s)**  
*"What happened"*



**Predictive dashboard(s)**  
*"Likelihood of future outcomes"*



# Project Approach: Phase 1A

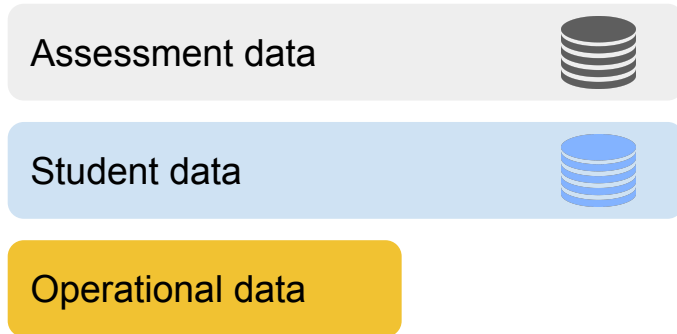


# **Data Modernization**

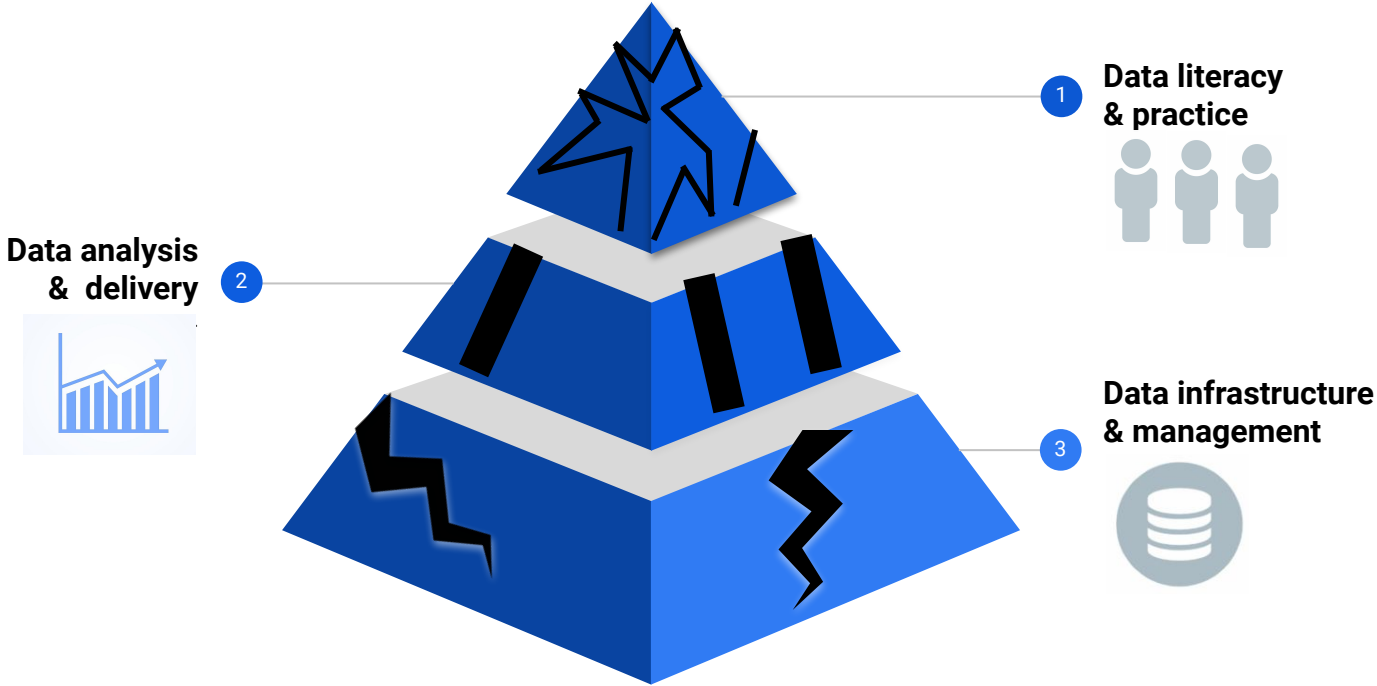
## ***Understanding Current State***

# Current State: Data Architecture Overview

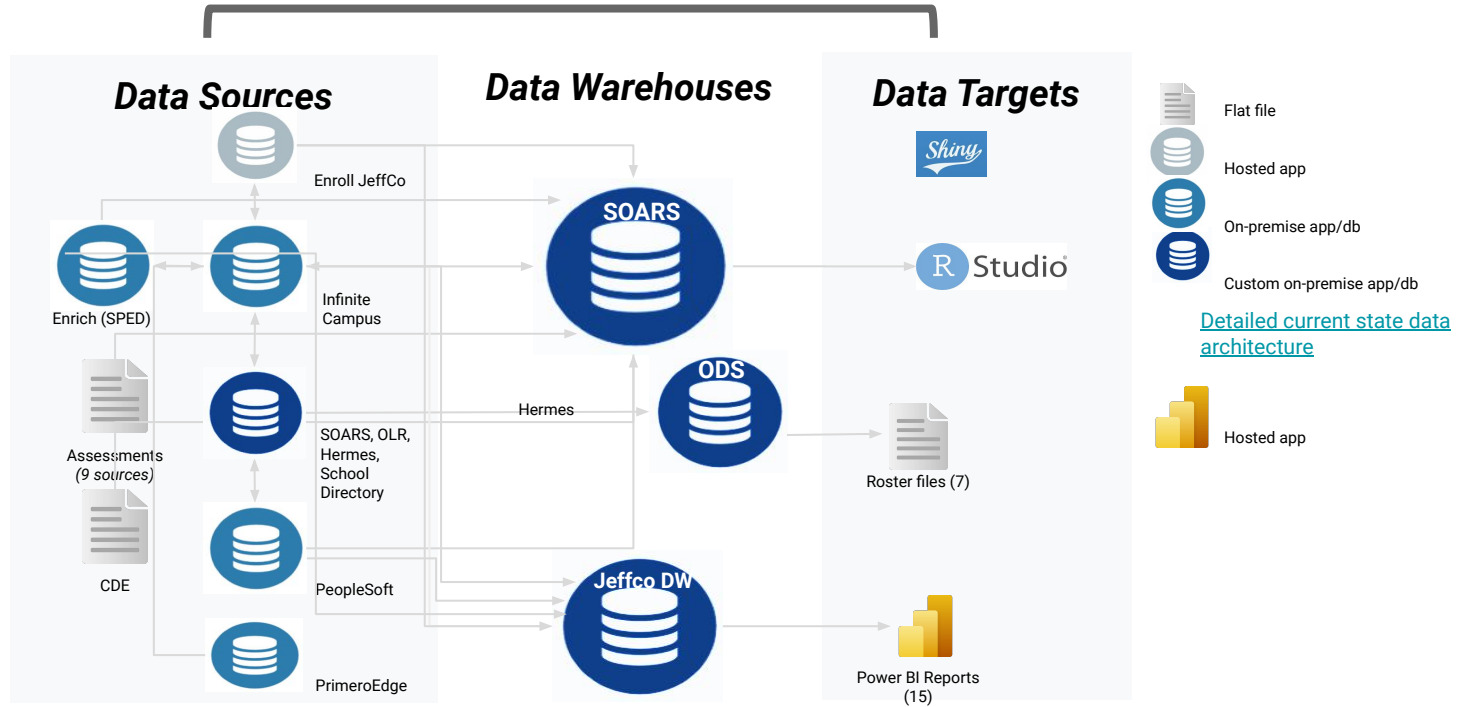
The current data environment at Jeffco is the result of teams working to meet their unique needs within the limitations of staffing, differing/changing objectives, budget, and compliance needs. As a result of these constraints, **data became siloed within functional areas and the opportunity for collaboration, operational efficiencies and the ability to maximize the potential of data on common data sets is limited.**



# Current State: Data Practice



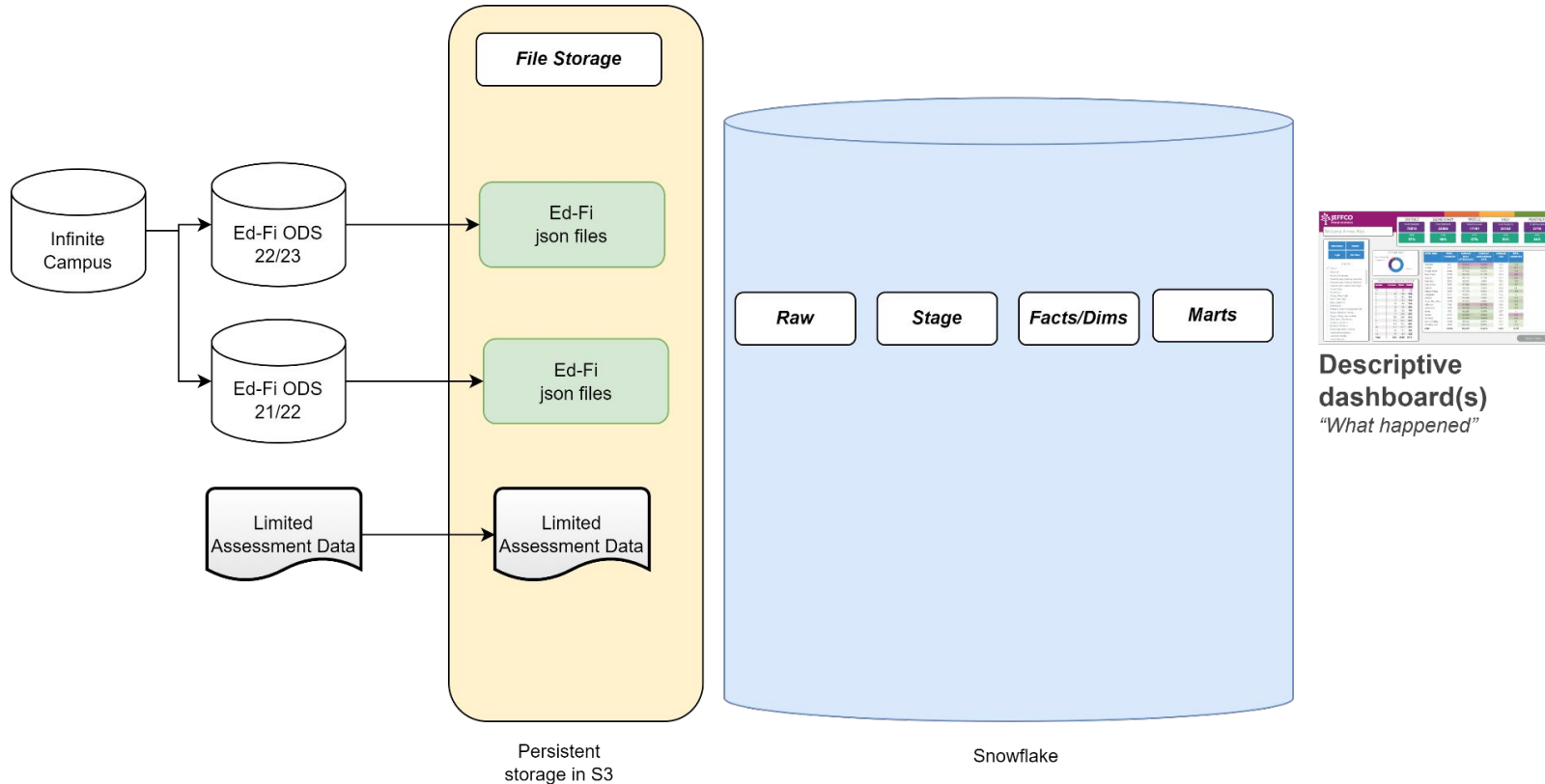
# Current State: Data Flow



# **Data Modernization 1A**

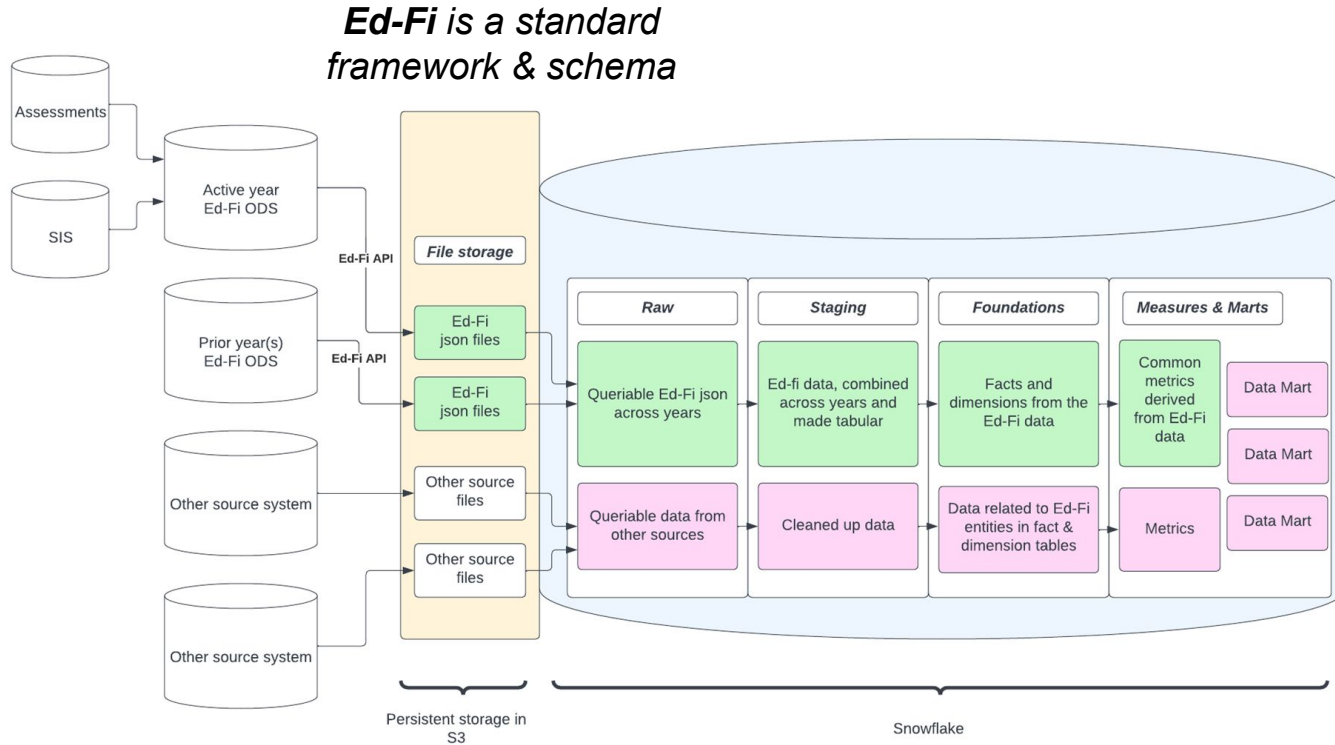
## ***Designing Future State Architecture***

# Data Modernization Project: In Scope 1A





# Future State Solution: Data Flow



## Data analysis & delivery



Statistical Analysis



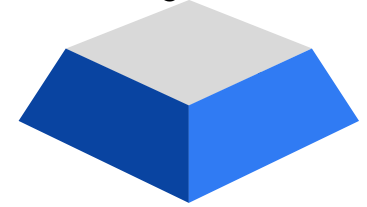
Reports & Visuals



Roster Files

# Future State Solution: Data Architecture




Data infrastructure & management








Managed and hosted by Education Analytics


 Other Jeffco Sources  
Jeffco specific descriptors

  
AWS  


 PostgreSQL  
 Ed-Fi ODS  
 AWS Secrets Mgr


 EC2 Linux Machine  
  dbt

  
 S3 Bucket- Raw Storage

 snowflake

Jeffco Ed-Fi based Data Warehouse

 R Studio



 Apache Superset

# Data Modernization Project: Out of Scope

1. Additional data sources that are not required for academic progress monitoring. This includes:
  - a. Enroll Jeffco
  - b. PeopleSoft
  - c. Survey data
  - d. OLR
  - e. Assessments not identified in scope
2. Additional dashboards or reports not specifically defined in the scope of work. This includes:
  - a. State reporting
  - b. Enrollment reporting/dashboards
3. Process improvements - while identifying data integrity issues will be a part of this work, the results will be shared with functional owners to lead on process improvements and potentially enforcement of guidelines

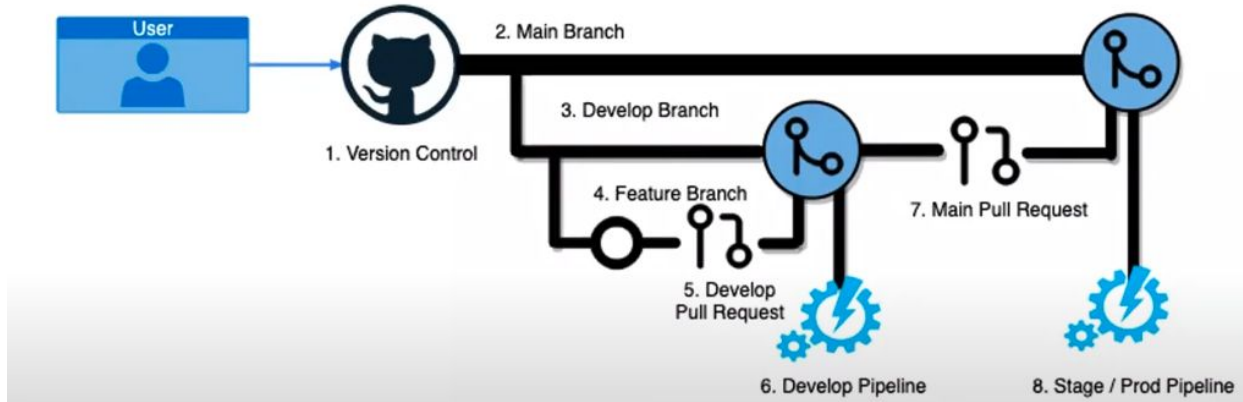
# Info Sec

# Background and Maturity

- Source Control
  - 3-4 Locations of code
- Access Control
  - Manually Provisioned
  - Historically hard to track
- Secrets Management
  - Disparate locations for secrets of service accounts
- Configuration Management
  - Multiple sources of accepted config
  - Attempt to move security related configuration items moved to configuration as code
- Data flows mapping
  - Little to no mapping of data from source to consumption
  - Leads to data in multiple places

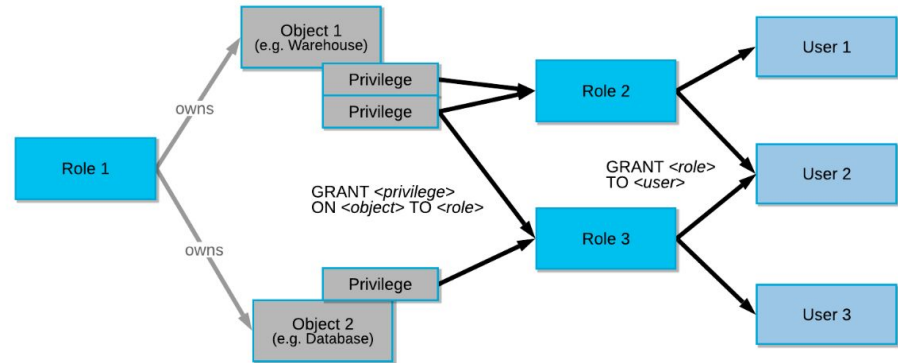
# Source Control

- **Immediate** - Schemas and Snowflake Configs as code
  - Easier to audit
  - Ability to scan before deployment for misconfigs
- **Horizon** - Remove direct edit access, all changes pushed through source control and CI pipeline



# Access Control

- **Immediate** - Standardize, simplify and consolidate roles and privileges
- **Horizon** - As more sensitive data is onboarded, create more granular policies
  - Row and Column level security
  - Masking and de-identifying data



# Secrets Management

- **Immediate** - Begin to store all net-new data flow and application secrets in a secure vault
  - Remove application secrets from individual's password managers
  - Reduce attack surface area used to pivot
  - Increase visibility into use of secrets
- **Horizon** - Work to integrate all other apps to retrieve secrets from vault



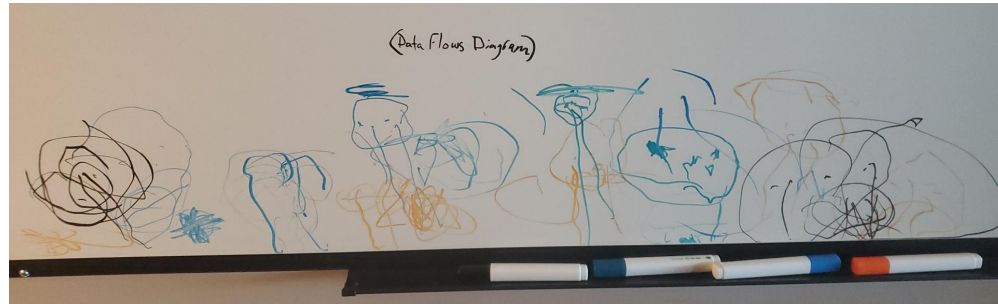


# Configuration Management

- **Immediate** - All related configuration items held in source control - manual deployment
  - Reduce reliance on 'tribal knowledge'
  - Reduce drift and increase visibility of configurations
- **Horizon** - Pipeline configuration item changes - Config as code and infrastructure as code
  - Approval process through pull request acceptance gates
  - Create security tests as part of the deployment pipeline

# Data Flow Mapping

- **Immediate** - work to document and prioritize transition of current data flows
- **Horizon** - Standardize data flows
  - Consistent access control models
  - Decrease attack surface area
  - Single 'source' for data consumption



(Jeffco's current Dataflows)

# Purchasing

# Purchasing Logistics

## Contracting Constraints and Considerations

- a. Data protection
- b. District ownership of work product
- c. Funding Constraints
- d. Flexible Statements of Work (SOWs)
- e. Aggressive timelines

Contracts have been established with logical partners leveraging cooperative relationships, and extending current agreements.

# Purchasing Logistics

Contracts are being compartmentalized into small SOWs in such a way that if a vendor fails to meet expectations, funding or timeline requirements change, or District leadership introduces scope creep the district is well positioned to:

- Take ownership of all work product and quickly pivot to a new strategic partner or shift efforts in house.
- Maintain the data security integrity across the project through contractual relationship. Data Protection Agreements (DPAs) have been executed not only with the prime contractors but with subcontractors and data partners across the project.
-

# Purchasing Logistics

Contracts have been established with:

- **Education Analytics (EA)**
  - Using a the CPEC cooperative and like work taking place at Denver Public Schools (DPS).
- **Amazon Web Services (AWS)**
  - Data governance and transition conversations have taken place with AWS.
- **Snowflake**
  - The District has purchased our own instance and credits with Snowflake and can take ownership of EAs work product at any time.
- **dbt**

# Appendix

# Definitions

Build Jeffco environment within hosting provider, Education Analytics including:

- **Ed-Fi ODS (Postgres SQL):** Configure, connect to IC, valid data, define descriptors, resolve issues, and identify gaps
- **Apache Airflow & Python:** Configure tools and processes for scheduling and data extraction from Ed-Fi ODS into the data warehouse (Snowflake)
- **Snowflake data warehouse:** Ingest raw data, stage, and transform into functional data model
- **Dbt:** Configure tool used to transform data within Snowflake using SQL scripting, data definitions, meta-data management, and data lineage
- **GitHub:** Shared source control and management of code base



# Accomplishments



01	Deep dive interviews with Steering Committee	<ul style="list-style-type: none"><li>• 1:1 interviews to understand current data uses and tools</li><li>• Created consolidated report of results</li></ul>
02	Quick-win dashboard	<ul style="list-style-type: none"><li>• Drafted quick-win dashboard</li><li>• Facilitated observations with dashboard for feedback</li></ul>
03	Stakeholder engagement	<ul style="list-style-type: none"><li>• Implementation partner, Education Analytics, facilitated 50 end users in group sessions to understand current data needs</li></ul>
04	Predictive analysis and dashboard engagement	<ul style="list-style-type: none"><li>• Drafted a detailed scope of work and schedule to create analyze data and develop a predictive model</li></ul>

# Upcoming



05	Iteration on quick-win dashboard	<ul style="list-style-type: none"><li>• Update quick-win dashboard based on feedback and usability</li></ul>
06	TDPAC support	<ul style="list-style-type: none"><li>• Introduced Data Modernization project (done)</li><li>• Present deep-dive to build support and advise Board</li></ul>
07	Technical Ed-Fi mapping	<ul style="list-style-type: none"><li>• Identify custom “descriptors” for Jeffco</li><li>• Begin mapping data in Infinite Campus to Ed-Fi ODS (Operational Data Store)</li></ul>