

DATA & AI ARCHITECTURE CASE STUDY

Aura Retail Data & AI Transformation

Independent portfolio case | Enterprise data architecture, AI enablement, architectural trade-offs and implementation roadmap

2,000+

Stores globally

3

Operating regions

5

Business priorities

24 mo.

Illustrative transformation horizon

CASE STUDY BRIEF | ILLUSTRATIVE SCENARIO

The business challenge: scale trusted data and AI across regions

THE ASSIGNMENT

Recommend an enterprise Data & AI architecture and operating model that unifies fragmented data, enables scalable AI, and supports trustworthy, compliant execution across regions.

BUSINESS CONTEXT

2,000+ stores • 3 operating regions

Global omnichannel retailer with legacy systems, uneven cloud adoption, and regionally managed analytics.

THE CORE PROBLEM

Customer, product, transaction, inventory, and marketing data are fragmented across functions and regions.

Inconsistent metadata, data quality, access controls, and privacy practices limit interoperability and make AI difficult to scale.

FIVE BUSINESS PRIORITIES

01

Personalized marketing

Initial AI lighthouse

02

Demand forecasting

Inventory and planning

03

Customer service

Knowledge and agents

04

Fraud detection

Risk signals and controls

05

Enterprise Agent OS

Reusable agent platform

WHAT A STRONG SOLUTION MUST ADDRESS

ARCHITECTURE

Shared services, trusted domain data products, AI and agent capabilities

GOVERNANCE & DELIVERY

Privacy, security, accountability, regional flexibility and key trade-offs

ROADMAP & MEASUREMENT

Phased 24-month rollout, adoption plan, measurable KPIs and value gates

CASE STUDY ROADMAP

Five sections connect the business challenge to the recommended transformation

Follow the case from its business context through architecture, AI design, trade-offs and implementation.

01	Problem framing & assumptions	Validate assumptions, priorities, objectives and design guardrails.	SLIDE 4
02	Data architecture response	Target platform, domains, integration, governance, security and operating model.	SLIDE 8
03	AI architecture artifacts	Personalized marketing requirements, architecture and enterprise agent platform.	SLIDE 14
04	Trade-offs & decisions	Centralization, standardization, build/buy, AI team model and governance speed.	SLIDE 19
05	Implementation & value	Roadmap, adoption, KPIs and value realization.	SLIDE 21

SECTION 01

Problem framing

~5 min

THIS SECTION WILL COVER

Validate assumptions, objectives, risks and design guardrails.

01 Problem framing

02 Data architecture

03 AI architecture

04 Trade-offs

05 Implementation

Working Assumptions & Design Guardrails

Working assumptions establish the guardrails for architecture decisions

Assumptions would be validated during discovery before final architecture and implementation decisions.

TECH LANDSCAPE

Cloud adoption is underway but uneven; legacy warehouses remain in regions and functions. No single hyperscaler is assumed.

DATA DOMAINS

Core domains include Customer, Product, Orders/Transactions, Inventory, Supply Chain, Marketing, Service and Payments/Fraud.

ORGANIZATION

Regional and business-unit analytics teams exist; enterprise data/AI governance maturity is limited and inconsistent.

REGULATORY

Customer and behavioral data may be personal data. Design must support lawful basis, purpose limitation, minimization, data-subject rights, transfer safeguards and localization where required.

BUDGET / CHANGE

Aura Retail can invest incrementally; wholesale replacement of all legacy systems is not assumed or recommended.

DESIGN PRINCIPLES

Cloud-first, modular, API/event-oriented, metadata-driven, secure-by-design and product-oriented for reuse.

SCOPE OF THIS RECOMMENDATION

IN SCOPE	Target Data & AI architecture, governance/security/privacy, operating model, personalized-marketing AI architecture, trade-offs and roadmap.	NOT DEFINED AT THIS STAGE	Final vendor selection, detailed cloud/network topology, source-by-source migration plan, full architectures for all five AI use cases or quantified business case.
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IMPLICATION FOR THE TARGET STATE

Aura Retail needs one governed enterprise control plane and shared platform services, while domain and regional teams retain enough ownership to meet local business, lawful transfer/localization and speed requirements.

Objectives-to-Architecture Alignment

The target architecture directly addresses Aura Retail’s five transformation objectives

The design response translates the case study objectives into platform, governance, operating-model and AI capability decisions.

Aura Retail objective	Design response	How success is visible
Unified enterprise data platform	Lakehouse-first analytical foundation with common ingestion, catalog, security and governance services.	Shared data foundation replaces fragmented regional/BU reporting patterns.
Scalable analytics and AI	Reusable data products, AI services, MLOps/LLMOps, feature management and model monitoring.	Multiple AI products reuse the same platform services instead of building one-off stacks.
Accessibility, governance and interoperability	Data marketplace/catalog, lineage, quality scorecards, data contracts, APIs/events and domain product standards.	Teams discover, trust and integrate certified data products across regions/functions.
Global compliance support	Policy-aware access, classification, minimization, audit logging, transfer safeguards and localization-aware deployment.	Privacy/security controls operate as platform capabilities, not manual afterthoughts.
Scalable AI operating model	Enterprise council, platform team, domain product teams and regional execution within common standards.	Clear decision rights and accountability for data quality, AI risk and product adoption.

HOW THE PLATFORM SUPPORTS AURA RETAIL'S FIVE

Personalized

marketing

Customer 360 + recommendations

Demand

forecasting

Orders + inventory + forecasting models

Customer service

enablement

Customer context + RAG / agents

Fraud

detection

Payments + streaming + risk controls

Enterprise

Agent OS

Gateway + tools + guardrails

Problem Framing & Transformation Approach

Aura Retail should solve the problem as an enterprise architecture and operating-model transformation

The case is not just a platform migration: it is a shift to trusted data products, reusable AI services and governed regional execution.

Business priorities

- Personalized marketing
- Demand forecasting
- Customer service enablement
- Fraud detection
- Enterprise Agent OS

Current-state constraints

- Regional data silos
- Legacy + emerging cloud mix
- Fragmented analytics
- Inconsistent governance / metadata / quality
- Limited enterprise AI operating model

Required design response

- Federated/hybrid architecture
- Lakehouse-first data foundation
- Domain data products
- Governed AI platform
- Risk-aware rollout

KEY DEPENDENCIES TO MANAGE EARLY

Data readiness	Decision rights	Privacy/legal	Adoption capacity
Customer / product / transaction data quality and identity resolution.	Named owners for domains, data products, security exceptions and AI risk.	Lawful-use, consent/preference and transfer safeguards designed up front.	Change champions, role-based training and regional rollout support.

SECTION 02

Data architecture

~10 min

THIS SECTION WILL COVER

Target platform, domains, integration, governance, security and operating model.

01 Problem framing

02 Data architecture

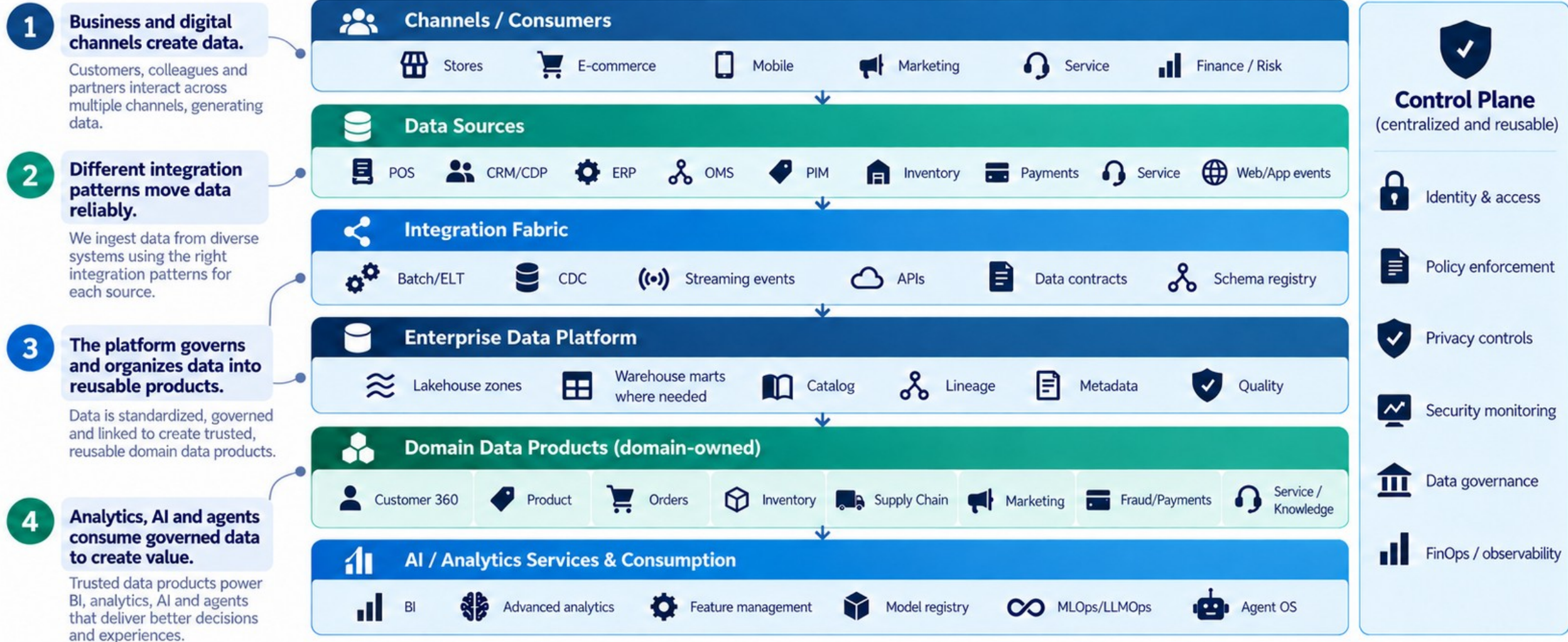
03 AI architecture

04 Trade-offs

05 Implementation

Aura Retail Target Enterprise Data & AI Architecture

A simple view of how data moves from source systems to governed data products and AI services.



Why this architecture works



SCALE

Shared platform services + federated domain execution



TRUST

Catalog + lineage + metadata + quality + accountable ownership



AI READY

Reusable governed data products + AI/MLOps/Agent services

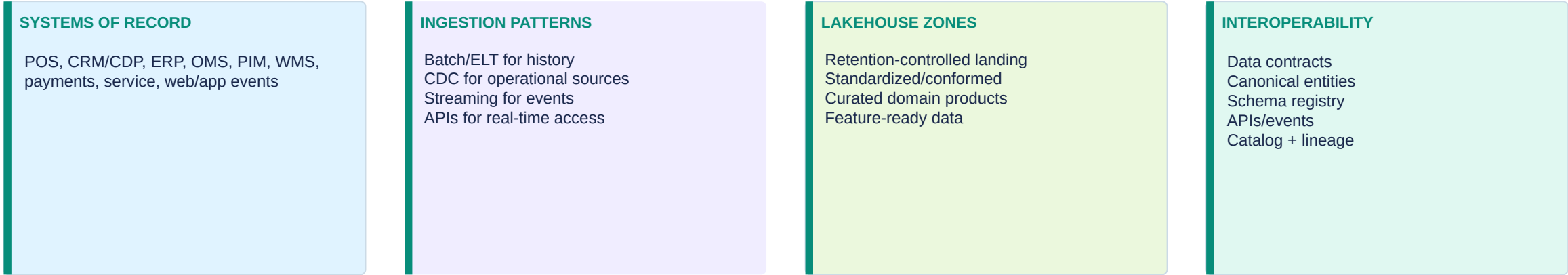


Recommendation: Use a hybrid/federated model with centralized, reusable platform services and controls, while domains own their data products and regions execute locally, complying with local legal and regulatory needs.

Lakehouse, Integration & Interoperability

Lakehouse-first storage with interoperable patterns supports BI, AI and regional compliance

The platform should coexist with legacy systems while progressively replacing fragmented reporting environments.



WHY LAKEHOUSE-FIRST, NOT LAKEHOUSE-ONLY

A lakehouse-centered analytical foundation supports structured, semi-structured and AI-ready data while allowing coexistence with warehouse marts, regional stores and specialized operational systems where needed.

Architecture implication: standardize metadata, quality, security and governance across patterns rather than forcing every workload into a single physical store.

Domain Data Products & Ownership

Domain-owned data products turn enterprise data into reusable assets

Ownership must shift from report ownership to reusable, certified data products with clear quality, lineage and business accountability.

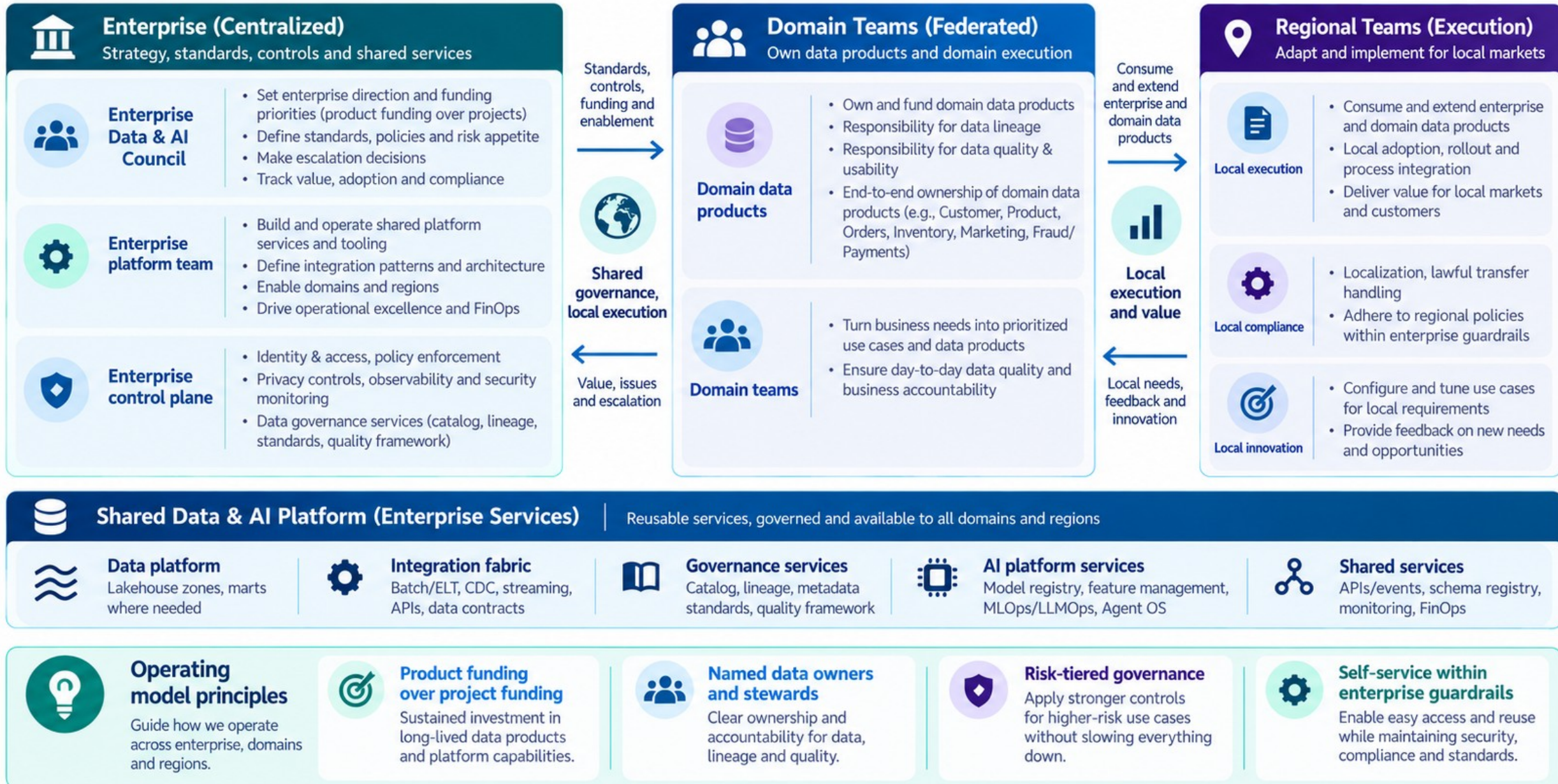
CUSTOMER 360 Identity, preferences, lawful-use attributes, loyalty, segments	PRODUCT Catalog, attributes, hierarchy, price, content	ORDERS / TRANSACTIONS Orders, baskets, returns, channel, margin signals
INVENTORY Availability, store/DC inventory, replenishment signals	MARKETING Campaign history, audience membership, channel engagement	PAYMENTS / FRAUD Payment events, risk indicators, investigation outcomes

OWNERSHIP MODEL

Enterprise standards Owner: Data & AI Council Policies, funding priorities, risk appetite and common controls	Platform services Owner: Enterprise Platform Team Shared ingestion, catalog, security, MLOps/LLMOps and observability	Data products Owner: Domain Teams Meaning, quality, documentation, access patterns and lifecycle
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Target operating model for Aura Retail's enterprise data & AI transformation

Centralize reusable controls and platform services; federate data-product ownership and regional execution.



Governance, Security, Privacy, Metadata & Data Quality

Governance, security and privacy must be embedded as reusable platform services

A control-plane approach protects Aura Retail while enabling data products and AI use cases to move faster.

DATA GOVERNANCE

- Enterprise catalog + glossary
- Lineage for critical flows
- Business + technical metadata standards
- Glossary + stewardship + automated harvesting
- Data quality scorecards + SLAs

SECURITY

- Identity-centered access
- RBAC + ABAC policies
- Encryption in transit and at rest
- Audit logging + monitoring

PRIVACY + COMPLIANCE

- Data classification + minimization
- Lawful basis / consent / preference controls
- Privacy by design + data-subject rights
- Transfer safeguards + localization-aware deployment
- Retention + deletion workflows

AI GOVERNANCE

- Use-case intake and risk tiering
- Model registry + evaluation records
- Human review for higher-impact use
- Drift, bias and incident monitoring

DESIGN PRINCIPLE

Controls should be automated, observable and risk-tiered so governance improves trust without becoming the primary delivery bottleneck.

SECTION 03

AI architecture

~15 min

THIS SECTION WILL COVER

Personalized marketing requirements, architecture and enterprise agent platform.

01 Problem framing

02 Data architecture

03 AI architecture

04 Trade-offs

05 Implementation

AI Use Case Selection — Personalized Marketing

Personalized marketing is the right lighthouse because it exercises the full Data & AI stack

This use case is commercially meaningful, technically representative and reusable across future AI products.

BUSINESS RELEVANCE Directly supports a named Aura Retail priority and links to conversion, retention, loyalty and basket size.	ARCHITECTURE PROOF POINT Requires Customer, Product, Order, Inventory, Marketing and preference data to work together.	MEASURABILITY Can be tested through experiments, incremental lift, channel performance and engagement metrics.	REUSABILITY Creates reusable identity, feature, decisioning, experimentation and monitoring capabilities for later AI use cases.
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SEQUENCING NOTE

Personalization should be the initial lighthouse, while forecasting, service, fraud and enterprise agents are sequenced after discovery validates value, data readiness, risk and implementation complexity.

Personalized Marketing — AI Product Requirements

The personalization product must deliver relevant decisions while respecting policy, inventory and privacy

Product requirements should be specific enough to guide architecture, governance and rollout decisions.

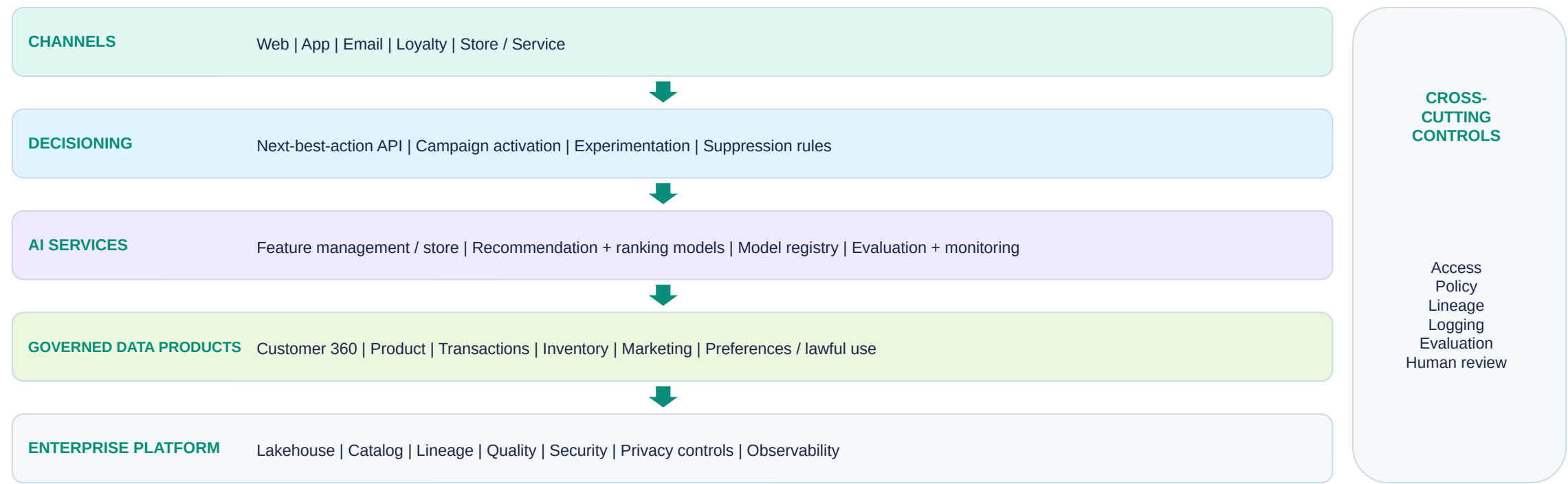
OBJECTIVE Increase relevance of offers, recommendations and next-best-actions across digital and marketing channels.	USERS Marketing, e-commerce, loyalty, store/service associates and analytics teams.	INPUTS Customer 360, product catalog, inventory, transactions, behavioral events, campaign history and preferences.
OUTPUTS Ranked recommendations, next-best-actions, offer eligibility, reason codes and campaign decision signals.	NON-FUNCTIONALS Privacy-aware, auditable, explainable enough for business review, monitored, scalable and low-latency where real-time.	MEASURES Incremental lift, conversion, engagement, suppression accuracy, latency, drift, policy exceptions and adoption.

Key product constraint: personalization decisions must incorporate lawful-use restrictions, customer preferences, inventory availability and channel eligibility before activation.

Personalized Marketing — AI Architecture

Personalized marketing consumes governed data products through reusable AI platform services

Batch campaigns and real-time decisioning should share platform services rather than create parallel stacks.



Operational pattern: train models on curated historical data, serve recommendations through approved channels, capture outcomes, and feed performance back into monitoring and retraining.

Enterprise Agent Operating System

A governed Enterprise Agent OS prevents disconnected bots and unsafe tool use

Agentic services should be a platform capability with enterprise identity, approved tools, retrieval, guardrails and observability.

AGENT EXPERIENCE

Employee, service and knowledge agents exposed through approved channels.

ORCHESTRATION RUNTIME

Routes tasks, manages state and invokes tools under defined policies.

MODEL GATEWAY

Controls model access, routing, logging, cost visibility and model fallback.

TOOLS + KNOWLEDGE

Tool registry, APIs, vector/RAG retrieval and governed enterprise data products.

TRUST + OBSERVABILITY

Identity, permissions, guardrails, evals, audit logs, incident workflows and human escalation.

KEY DESIGN DECISION

Aura Retail should create a shared agent platform, not one-off bots embedded in each function.

This creates reusable controls for identity, tools, knowledge access, monitoring and escalation.

SECTION 04

Trade-offs

~10 min

THIS SECTION WILL COVER

Centralization, standardization, build/buy, AI team model and governance speed.

01 Problem framing

02 Data architecture

03 AI architecture

04 Trade-offs

05 Implementation

Key architecture decisions and why they were chosen

The recommendation balances scalability, control, speed and regional compliance.

Decision	Options considered	Recommended choice	Why it wins
 Platform model	Centralized / Federated / Hybrid	Hybrid-federated	Shared standards and services with local ownership and flexibility.
 Data platform	Warehouse-first / Lakehouse-first / Fully distributed	Lakehouse-first with coexistence	Supports BI plus AI-ready data while allowing marts and operational stores where needed.
 Integration approach	Batch-only / Real-time everywhere / Mixed	Mixed integration fabric	Uses batch, CDC, streaming and APIs based on business need.
 AI operating model	Decentralized / Centralized / Hub-and-spoke	Hub-and-spoke	Enterprise consistency with business adoption close to the domain.
 Governance model	Heavy centralized control / Light decentralized control / Risk-tiered	Risk-tiered governance	Stronger controls for higher-risk use cases without slowing everything down.
 Standardization vs. local flexibility	Fully standardized / Balanced / Fully local	Balanced with guardrails	Common standards, reusable services and guardrails, with local flexibility for regional and business unit needs.
 Build vs buy	Build in-house / Buy commercial / Hybrid	Hybrid (buy core, build for differentiation)	Leverage best-of-breed solutions for speed while building differentiated capabilities where it creates value.
 Shared Enterprise Agent OS	No shared platform / Domain-specific agents / Shared enterprise platform	Shared enterprise Agent OS	Reusable agent tooling, guardrails, orchestration and monitoring with room for domain-specific agents.



Executive takeaway: Each design choice avoids false either-or trade-offs and creates a scalable, governed and practical target state.

SECTION 05

Implementation

~5 min

THIS SECTION WILL COVER

Roadmap, adoption, KPIs and value realization.

01 Problem framing

02 Data architecture

03 AI architecture

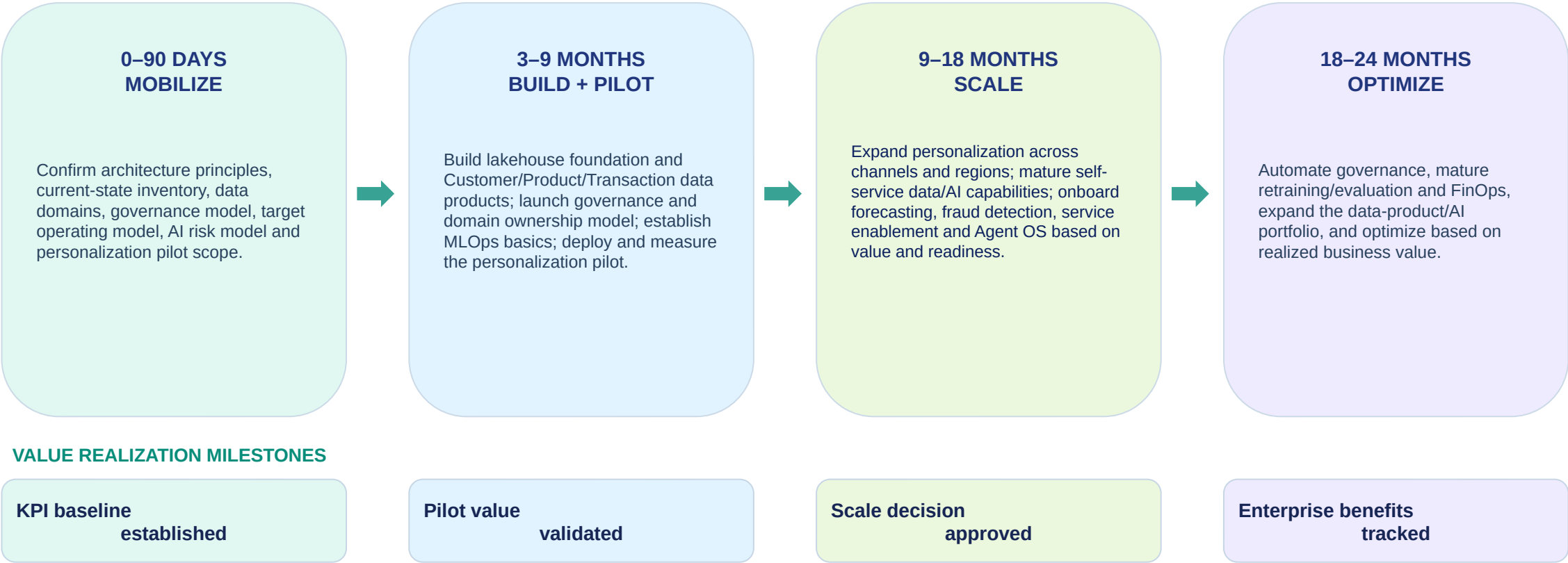
04 Trade-offs

05 Implementation

Implementation Roadmap & Value-Realization Milestones

Sequence foundation, pilot value and enterprise scaling to meet the full implementation ask

Timing is illustrative and should be validated against Aura Retail’s budget, source systems, regions and delivery capacity.



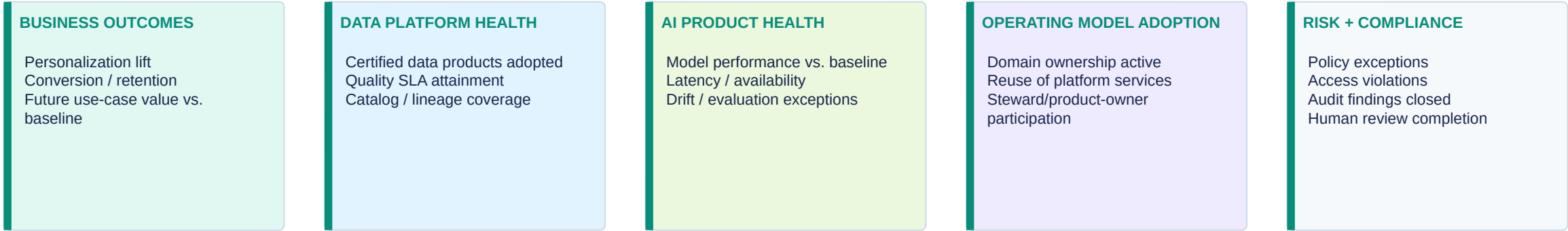
CHANGE & ADOPTION ACROSS ALL PHASES

Executive sponsorship • product-owner/steward enablement • role-based training • regional champions • adoption tracking

KPIs & Value Realization

Success should be measured across business value, data trust, AI reliability, adoption and risk

The scorecard keeps Aura Retail focused on outcomes while the platform and operating model mature.



EXECUTIVE RECOMMENDATION

Aura Retail should pursue a hybrid/federated Data & AI architecture with a lakehouse-first analytical foundation, domain-owned data products, embedded governance/security controls and a governed enterprise AI platform.

This approach enables the stated objectives: a unified platform, scalable analytics/AI, trusted accessibility/interoperability, global compliance support and a durable operating model for enterprise AI.

Discussion & Questions

Discussion and questions

Thank you. I welcome discussion on the architecture choices, implementation sequencing, security/privacy controls and operating model.

ARCHITECTURE CHOICES

Centralized vs. federated, lakehouse-first patterns and regional flexibility.

AI SCALING MODEL

Personalization lighthouse, MLOps/LLMOps maturity and Enterprise Agent OS.

IMPLEMENTATION

Roadmap sequencing, adoption, decision rights, risks and value realization.

SUPPORTING EXHIBITS

Appendix

Supporting detail available if discussion goes deeper

Data-product backlog

RACI

Control model

AI/MLOps lifecycle

Risks

Sources

Illustrative domain data-product backlog

The exact backlog should be refined with business owners, source-system owners and privacy/legal stakeholders.

Domain	Candidate data products	Primary AI uses	Owner
Customer	Customer 360; consent/preferences; loyalty profile; segments	Personalization, service, fraud	Customer / Marketing
Product	Catalog, attributes, price, content, taxonomy	Recommendations, search, agents	Merchandising / Product
Orders	Basket history, returns, channel, margin signals	Personalization, demand forecasting	Commerce / Finance
Inventory	Store/DC availability, replenishment, substitutions	Personalization, forecasting	Supply Chain
Marketing	Campaign history, audiences, channel engagement	Personalization, attribution	Marketing Operations
Fraud/Payments	Payment events, risk signals, outcomes	Fraud detection	Risk / Payments
Service / Knowledge	Cases/interactions; knowledge articles; policies; resolutions	Customer service enablement; agents	Service / Operations

Operating model RACI for scalable data and AI delivery

Illustrative responsibility model — finalize with Aura Retail’s actual organization, legal accountabilities and decision rights.

Activity	Council	Platform team	Domain team	Region / BU	Security / Legal
Architecture principles and standards	A	R	C	C	C
Data product definition and quality	C	C	A/R	C	C
Catalog, lineage and metadata enablement	A	R	R	C	C
Access-policy implementation	C	R	C	C	A
AI use-case intake and risk tiering	A	R	R	C	R
Model deployment and monitoring	C	A/R	R	C	C
Regional rollout and adoption	C	C	R	A/R	C

R = Responsible | A = Accountable | C = Consulted

Control model for data, AI and agentic services

Illustrative internal oversight tiers — not regulatory classifications. Final thresholds should be set with Legal, Privacy, Security and Risk.

TIER 1 | LOWER IMPACT

Example: Internal analytics using non-sensitive certified data

Controls: Automated access controls, standard logging, quality checks, catalog metadata

TIER 2 | MODERATE IMPACT

Example: Personal-data analytics, internal AI assistant, controlled personalization experiments

Controls: Owner approval, lawful-use check, model evaluation, monitoring, documented human review path

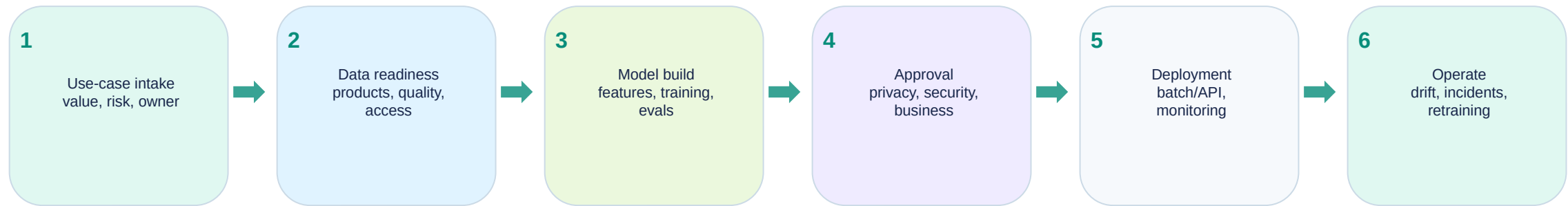
TIER 3 | HIGHER IMPACT

Example: Sensitive data, autonomous actions or material customer decisions

Controls: Formal review, privacy/legal/security input, enhanced monitoring, escalation and incident playbooks

AI / MLOps lifecycle enables scalable Aura Retail personalization

The lifecycle makes AI repeatable, monitorable and governable beyond a one-time model build.



MINIMUM PLATFORM CAPABILITIES

Model registry • Experiment tracking • Feature management • CI/CD controls • Evaluation records • Drift and quality monitoring • Incident response • Cost and performance observability

Key risks and mitigation plan

Most risks are addressable if governance, platform and operating-model decisions are made early.

Risk	Why it matters	Mitigation
Data quality blocks AI value	Personalization and future AI are only as strong as Customer, Product and Transaction data.	Prioritize critical data products, quality SLAs, lineage and issue-management workflow.
Regional privacy constraints slow adoption	Global sharing may require lawful-use, transfer and localization controls.	Design policy-aware access and regional deployment patterns; include Legal/Privacy early.
Platform becomes bottleneck	Centralized team can slow delivery if domains wait for every implementation.	Use federated domain teams with enterprise standards and self-service platform patterns.
AI pilots do not scale	One-off models fail without monitoring, ownership, governance and reusable services.	Use MLOps/LLMOps, named product owners, value tracking and operating-model accountability.
Agentic services create unsafe tool access	Agents can amplify data access and action risk if unmanaged.	Central Agent OS with identity, tool registry, guardrails, observability and human escalation.

Sources and reference standards

The hypothetical case context is illustrative; external standards inform the non-vendor-specific recommendation.

Source category	Use in the architecture
Illustrative scenario	Adapted from a strategy case exercise. Fictional enterprise scenario; no actual client engagement or realized outcomes.
AI risk governance	NIST AI Risk Management Framework 1.0 / AI RMF Playbook: Govern, Map, Measure and Manage.
Privacy / transfers	GDPR principles and international-transfer safeguards; localization requirements depend on jurisdiction and data context.
Zero trust / security	Identity-centered access, least privilege, policy enforcement, logging and monitoring.
Architecture knowledge	Data product, lakehouse, MLOps/LLMOps and agentic platform patterns applied as design guidance, not vendor prescriptions.