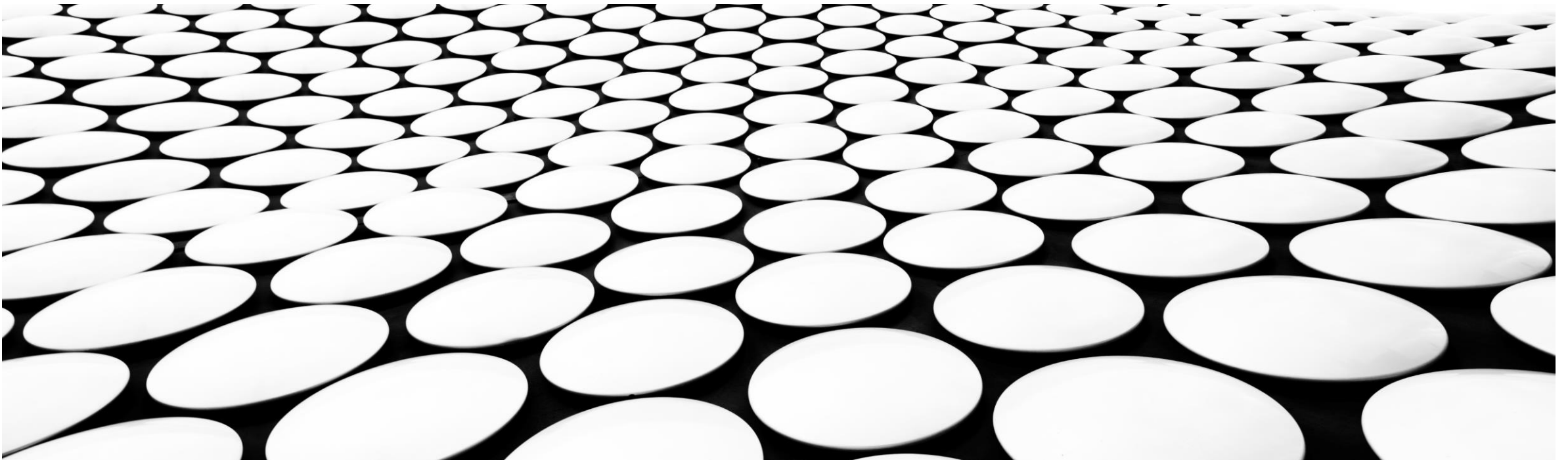# PLUGGING NZ'S WATER INFRASTRUCTURE HOLE WITH A DATA-CENTRIC SOLUTION

BY KEAGAN LEHMANN, DATA ARCHITECT, NTU WATER SERVICES

Wellington's water crisis poses a threat to growth

Nicholas Boyack | *March 12, 2024*

"Significant" water loss costs NZ millions - report

ON AIR | MIKE HOSKING BREAKFAST

Newstalk ZB, Wed, 13 Mar 2024, 8:12AM

iHeart
Marnie Prickett: Co-author on the Otago University report that found New Zealand'...
The Mike Hosking Breakfast

+ FOLLOW THE PODCAST ON iHeartRADIO

Photo / Mark Mitchell

Water lost to leaks could be costing New Zealand more than $100 million each year.

Council water spend unlikely to be enough to rid the city of chlorine

Tina Law | *February 7, 2024*

Leaking pipes, sinkholes: Our will likely get wo

Kevin Norquay | *February 25, 2024*

Martin
waste
SUPPL

Water infrastructure is a persistent challenge across Aotearoa following dec
ADOBE STOCK

Lest you think water woes are confined
leaks sprouting across Wellington, thin
even parts of Auckland are just a couple
water.

WATER WOES

...and | John Campbell's Water Woes

👍 86 👎 ↱ Share ⬇ Download Save ...

1News Chief Correspondent John Campbell travels to the Rangitikei District.

...nt repairs require an expensive, temporary solution to a long-term problem. So, the country's local councils are looking to find money, save ...cale.

...Local Government Minister Simeon Brown.

DISCUSSION TOPICS

1. Unified Insights:
Bridging Data from Diverse Sources with a Seamless Interface

2. Guarding Public Data:
Privacy-Driven Integrity with Unwavering Conformance

3. Empowering Excellence:
Cutting-Edge Tech Meets World-Class Services

4. Forging Ahead:
Future-proofing with the Unity of Scalability & Automation

WHAT WERE WE TRYING TO ACHIEVE?

The NZ Govt had created ten new publicly-owned Water Services Entities to run NZ's drinking water, wastewater and stormwater services (3 waters) – currently operated by 67councils on behalf of communities – to ultimately deliver better health and wellbeing outcomes for communities and protect the environment for generations to come.

CORPORATE SYSTEMS

SYSTEMS OF RECORD

OPERATIONAL TECHNOLOGY

SYSTEMS OF DIFFERENTIATION

MODELLING, REPORTING & ANALYTICS
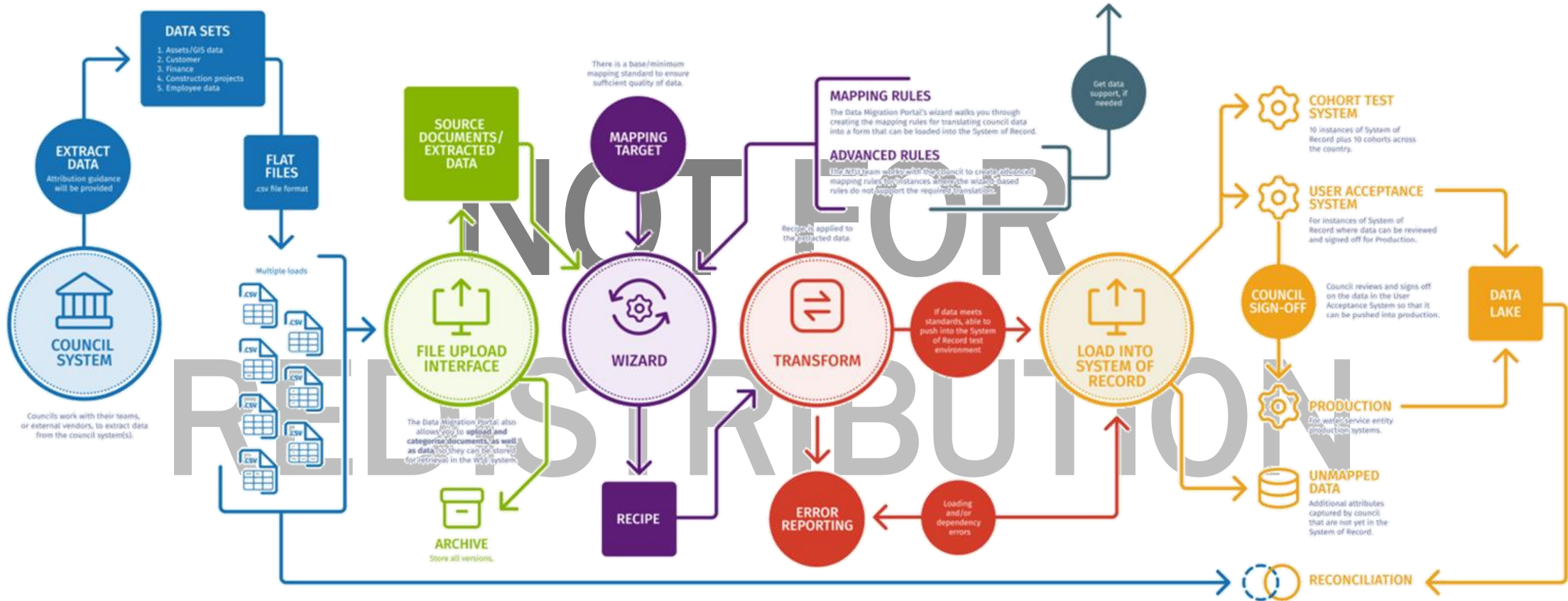
Resources & Support

INSTRUCTIONS
The Data Migration Portal provides councils and cohorts instructions on how to migrate each of the data sets, and where to download templates and get support.

COLLABORATION, SUPPORT AND FAQS
The Data Migration Portal provides a place where councils and cohorts can work together and collaborate on data migration. It also provides a place to go for help, FAQs and to request support from the NTU team.

DATA SETS
1. Assets/GIS data
2. Customer
3. Finance
4. Construction projects
5. Employee data

EXTRACT DATA
Attribution guidance will be provided

FLAT FILES
.csv file format

COUNCIL SYSTEM

Councils work with their teams, or external vendors, to extract data from the council system(s).

Multiple loads

SOURCE DOCUMENTS/ EXTRACTED DATA

There is a base/minimum mapping standard to ensure sufficient quality of data.

MAPPING TARGET

MAPPING RULES
The Data Migration Portal's wizard walks you through creating the mapping rules for translating council data into a form that can be loaded into the System of Record.

ADVANCED RULES
The NTU team works with the council to create advanced mapping rules for instances where the wizard-based rules do not support the required translation.

Get data support, if needed

FILE UPLOAD INTERFACE

The Data Migration Portal also allows you to upload and categorise documents, as well as data so they can be stored for retrieval in the NTU system.

WIZARD

Recipe is applied to the extracted data.

TRANSFORM

If data meets standards, able to push into the System of Record test environment

LOAD INTO SYSTEM OF RECORD

COHORT TEST SYSTEM
10 instances of System of Record plus 10 cohorts across the country.

USER ACCEPTANCE SYSTEM
For instances of System of Record where data can be reviewed and signed off for Production.

COUNCIL SIGN-OFF
Council reviews and signs off on the data in the User Acceptance System so that it can be pushed into production.

DATA LAKE

PRODUCTION
For water service entity production systems.

RECIPE

ARCHIVE
Store all versions.

ERROR REPORTING

Loading and/or dependency errors

UNMAPPED DATA
Additional attributes captured by council that are not yet in the System of Record.

RECONCILIATION

Dashboards & Progress Tracking

DATA QUALITY
Once mapped, the Data Migration Portal provides an assessment of data quality and completeness. This identifies missing, non-unique or invalid values and indicates if the data quality is sufficient to move onto the loading phase.

PROGRESS
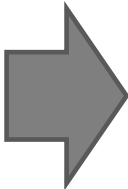The Data Migration Portal tracks progress as councils map and transform their data across the five data sets.

LEADER BOARD
The leader board shows which councils have made the most progress.

2. Guarding Public Data: Privacy-Driven Integrity with Unwavering Conformance

Framework development for all required guardrails to ensure integrity & alignment with strategy
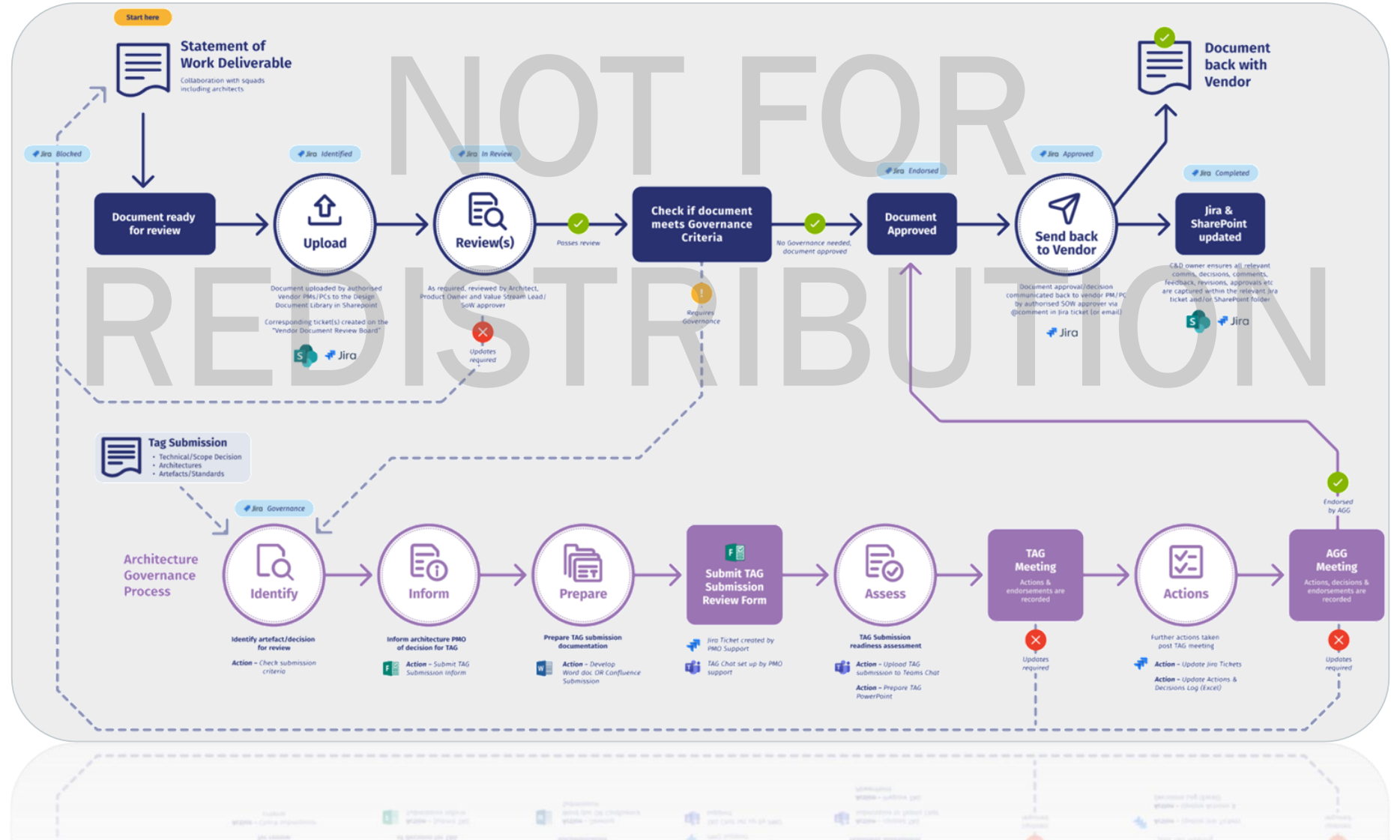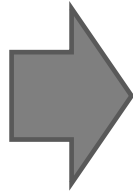
Data Strategy

Why And What We Are Doing For Day 1?

Day 1 Continuity Imperative
On day 1 all WSEs need to have required data in order to deliver service continuity.

Building Trust Imperative
Day 1 represents the beginning of the Reform journey and to enable its long-term sustainability, WSEs and stakeholders must ensure data is trusted and protected.

Data Impact Imperative
Data and world class data capabilities are being delivered to enable billion dollar differences in our water services work for all New Zealander's in the future

What Are Our Main Data Goals For Day 1?

Goal 1: WSEs have the systems and data they need.
On day 1 all WSEs will have trustworthy data, world-class data systems, data controls as well as the data skills they need to deliver service continuity and commence the post-transition transformation.

Goal 2: WSEs can protect their new world-class data assets.
WSEs will have people, process and technology capabilities to protect the sensitivity, accuracy, confidence, trustworthiness and utility of data, so the Reform investment can measurably improve Aotearoa's water sector performance for the following 100 years.

Goal 3: WSEs can leverage data for meaningful impact.
WSEs will have data solutions and data capabilities that can meaningfully impact New Zealand's water sector by measurably improving social, environmental and economic outcomes for the following 100 years.

What Are The Key Things We Will Deliver?

Delivery 1: Day 1 data platforms and day 1 data.
We will deliver the foundations for a secure data ecosystem including the portals, data platforms, pipelines, reporting, models and tooling.

Delivery 2: Day 1 data protection capabilities.
We will deliver the policies, processes, and standards to sustainably care for, share and protect WSEs high-quality data ecosystem, that enables users to move with confidence.

Delivery 3: Day 1 analytic tools.
We will deliver reporting and advanced analytical models that empowers users, teams, and communities to leverage and use data in a purposeful way to deliver meaningful impact.

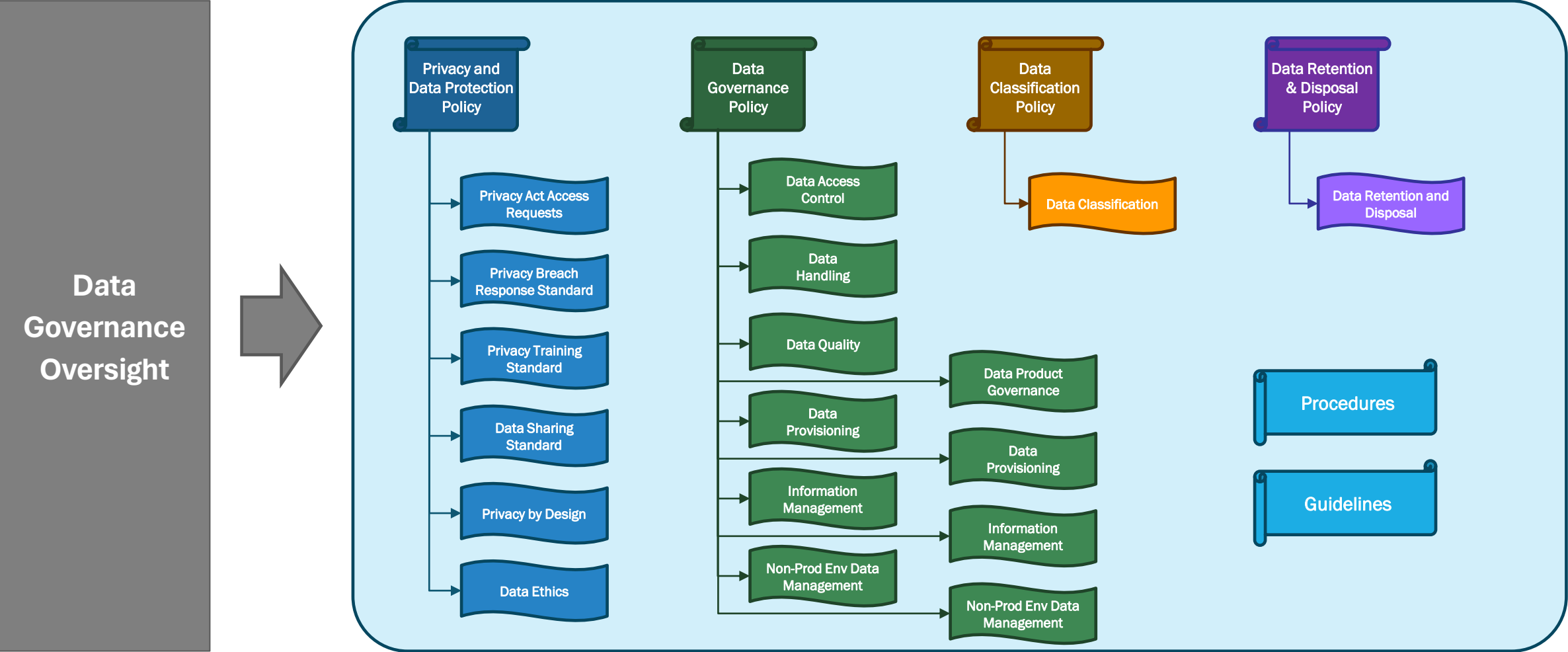# 2. Guarding Public Data: Privacy-Driven Integrity with Unwavering Conformance

Framework development for all required guardrails to ensure integrity & alignment with strategy

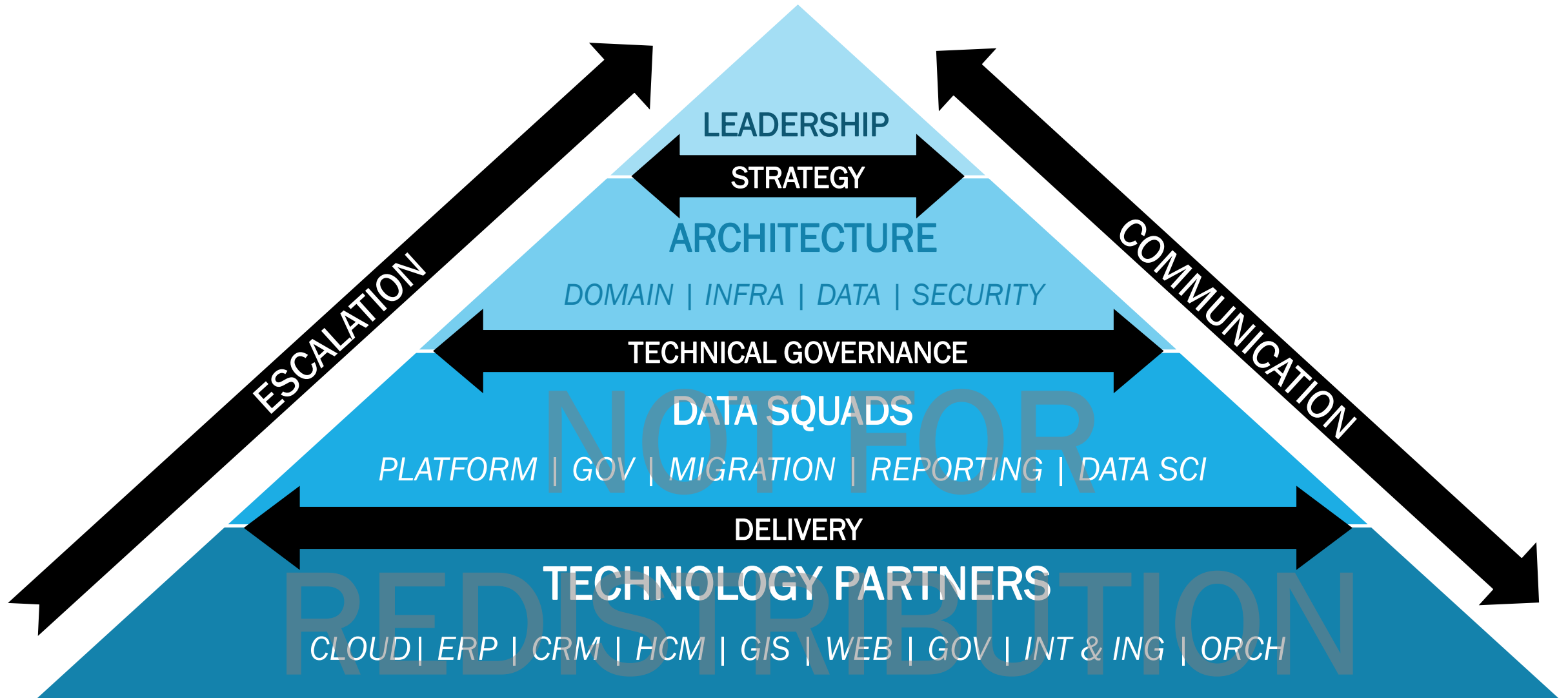# 2. Guarding Public Data: Privacy-Driven Integrity with Unwavering Conformance

Framework development for all required guardrails to ensure integrity & alignment with strategy
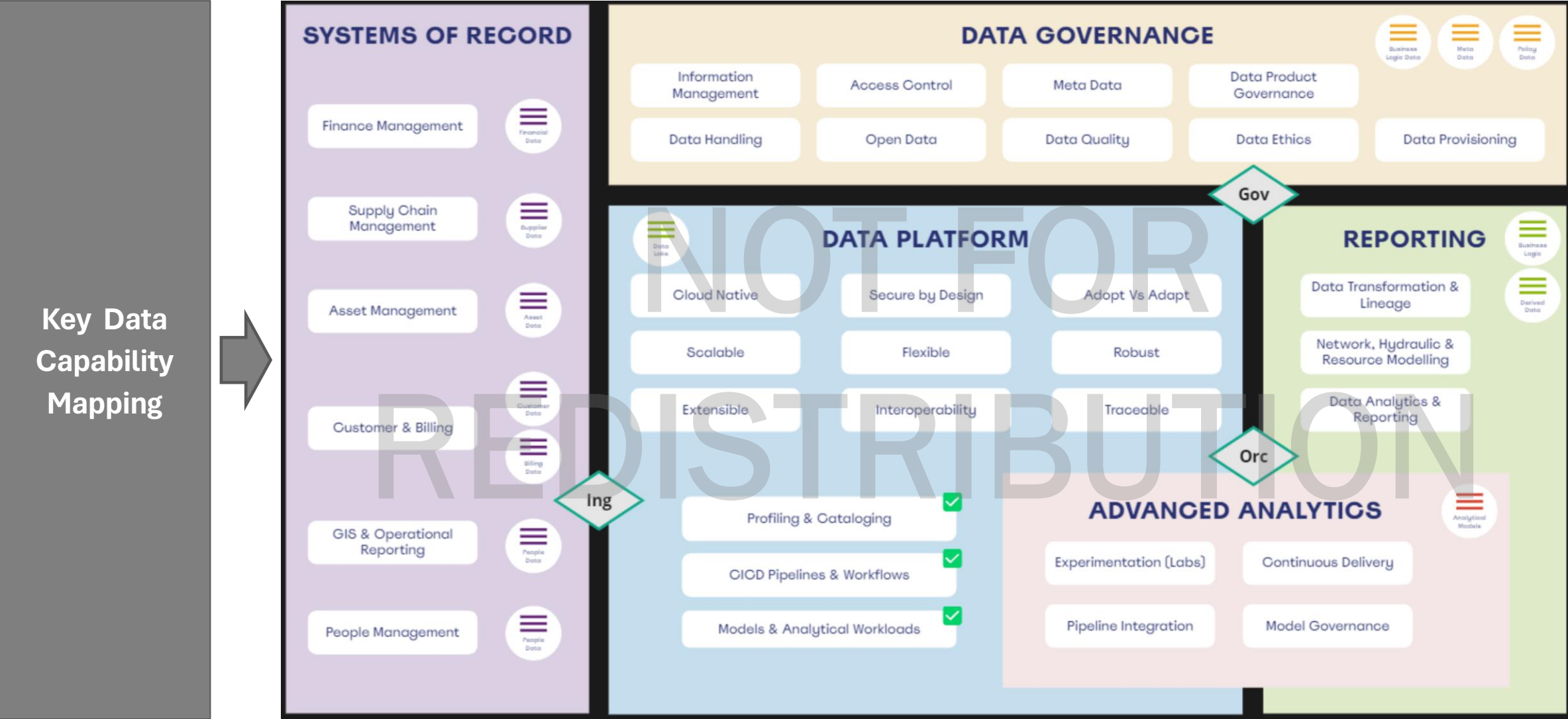
Data Governance Oversight

Privacy and Data Protection Policy
- Privacy Act Access Requests
- Privacy Breach Response Standard
- Privacy Training Standard
- Data Sharing Standard
- Privacy by Design
- Data Ethics

Data Governance Policy
- Data Access Control
- Data Handling
- Data Quality
- Data Provisioning
- Information Management
- Non-Prod Env Data Management
  - Data Product Governance
  - Data Provisioning
  - Information Management
  - Non-Prod Env Data Management

Data Classification Policy
- Data Classification

Data Retention & Disposal Policy
- Data Retention and Disposal

Procedures

Guidelines

Key Data Capability Mapping

SYSTEMS OF RECORD

- Finance Management — *Financial Data*
- Supply Chain Management — *Supplier Data*
- Asset Management — *Asset Data*
- Customer & Billing — *Customer Data / Billing Data*
- GIS & Operational Reporting — *People Data*
- People Management — *People Data*

DATA GOVERNANCE

Business Logic Data · Meta Data · Policy Data

- Information Management
- Access Control
- Meta Data
- Data Product Governance
- Data Handling
- Open Data
- Data Quality
- Data Ethics
- Data Provisioning

DATA PLATFORM

Data Lake

- Cloud Native
- Secure by Design
- Adopt Vs Adapt
- Scalable
- Flexible
- Robust
- Extensible
- Interoperability
- Traceable
- Profiling & Cataloging ✓
- CICD Pipelines & Workflows ✓
- Models & Analytical Workloads ✓

REPORTING

Business Logic · Derived Data

- Data Transformation & Lineage
- Network, Hydraulic & Resource Modelling
- Data Analytics & Reporting

ADVANCED ANALYTICS

Analytical Models

- Experimentation (Labs)
- Continuous Delivery
- Pipeline Integration
- Model Governance

Gov · Orc · Ing

MRA: 1. Information Platform Governance, Planning & Management

MRA: 1.1 Information Platform Governance

MRA: 1.1.1 Information Platform Policy, Standard & Procedure Management

MRA: 1.1.2 Information Ethics Management

MRA: 1.1.3 Information Platform Oversight

MRA: 1.1.4 Information Platform Governance Reporting

MRA: 1.2 Information Platform Strategy & Planning Management

MRA: 1.2.1 Information Platform Strategy

MRA: 1.2.2 Information Platform Planning

MRA: 1.2.3 Information Platform Products & Services Roadmaps

MRA: 1.2.4 Information Platform Investment Management

MRA: 1.2.5 Information Platform Initiative Management

MRA: 1.2.6 Information Asset Re-Use & Commercialisation Management

MRA: 1.4 Information Platform Business Performance Management

MRA: 1.4.1 Information Platform Business Management

MRA: 1.4.2 Information Platform Business Reporting

MRA: 1.3 Information Platform Architecture

MRA: 1.3.1 Information & Data Architecture

MRA: 1.3.5 Open Data Architecture

MRA: 1.3.2 Enterprise Taxonomy

MRA: 1.3.6 Information Platform Technology Evaluation & Innovation

MRA: 1.3.3 Enterprise Data Model

MRA: 1.3.7 Information Platform Change Definition

MRA: 1.3.4 Information Exchange Architecture

MRA: 1.5 Information Platform Financial Management

MRA: 1.5.1 Information Platform Financial Control

MRA: 1.5.3 Information Cost & Charging Management

MRA: 1.5.2 Information Platform Accounting Management

MRA: 1.7 Information Organisation Management

MRA: 1.7.1 Information Platform Organisation Management

MRA: 1.7.2 Information Ways of Working Management

MRA: 1.7.3 Information Communities of Practice Management

MRA: 1.6 Information Platform Supply Management
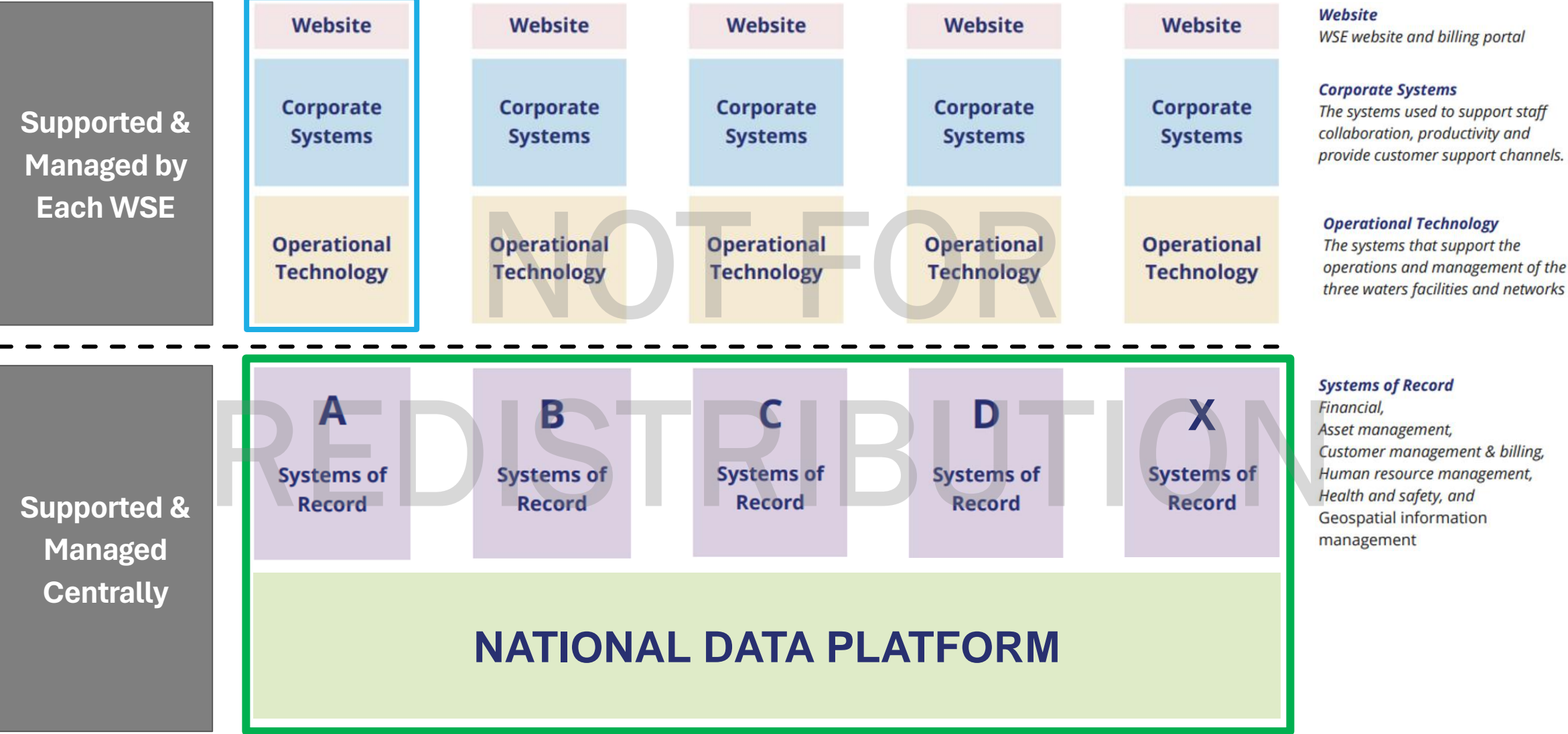
MRA: 1.6.1 Information Platform Partnership Management

MRA: 1.6.3 Information Platform Supply Management

MRA: 1.6.2 Information Platform Supplier Management

*The above is a sample of the full MRA Model capability

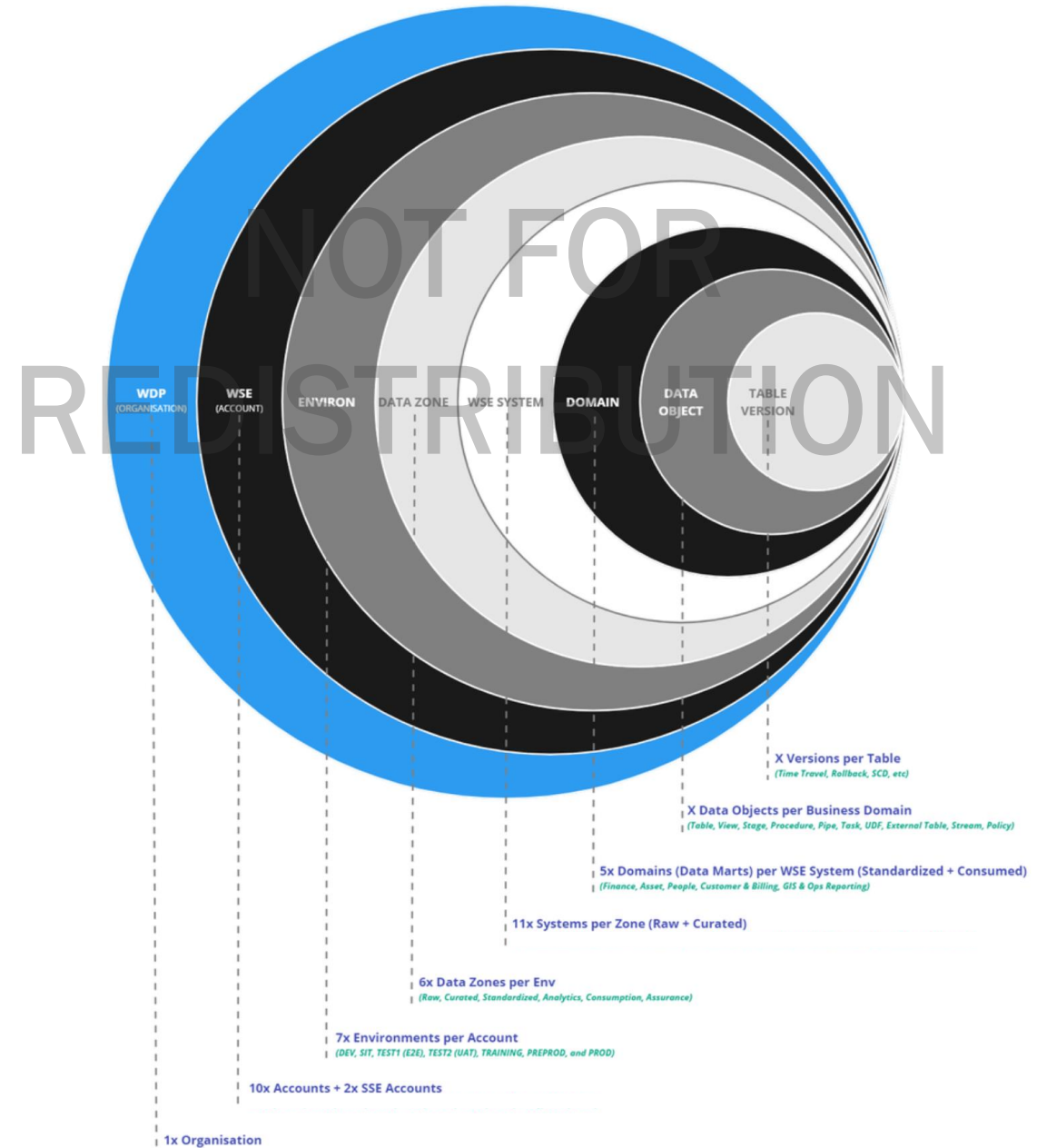# 4. Forging Ahead: Future-proofing with the Unity of Scalability & Automation

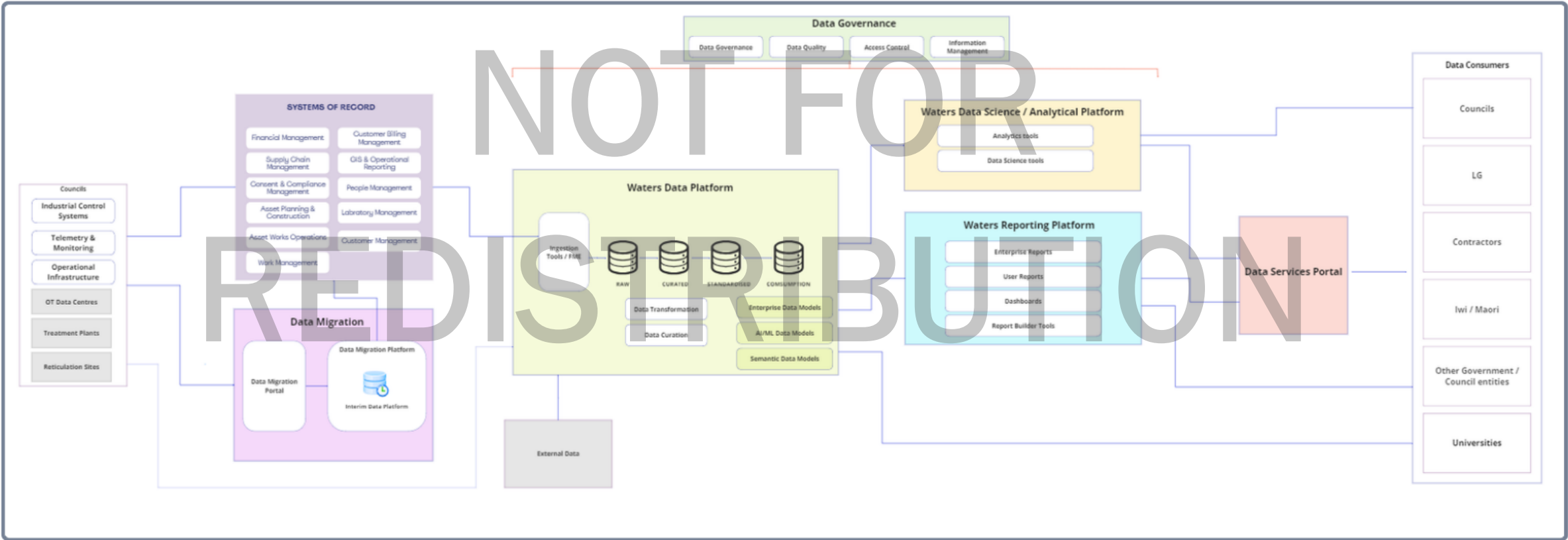*Tackling interoperability and scalability at the same time...*

Supported & Managed by Each WSE

Website	Website	Website	Website	Website
Corporate Systems	Corporate Systems	Corporate Systems	Corporate Systems	Corporate Systems
Operational Technology	Operational Technology	Operational Technology	Operational Technology	Operational Technology

Website
WSE website and billing portal

Corporate Systems
The systems used to support staff collaboration, productivity and provide customer support channels.

Operational Technology
The systems that support the operations and management of the three waters facilities and networks

Supported & Managed Centrally

A	B	C	D	X
Systems of Record	Systems of Record	Systems of Record	Systems of Record	Systems of Record

NATIONAL DATA PLATFORM

Systems of Record
Financial,
Asset management,
Customer management & billing,
Human resource management,
Health and safety, and
Geospatial information management

NATIONAL DATA PLATFORM

HIERARCHY & SEGMENTATION

WDP (ORGANISATION) · WSE (ACCOUNT) · ENVIRON · DATA ZONE · WSE SYSTEM · DOMAIN · DATA OBJECT · TABLE VERSION

X Versions per Table
(Time Travel, Rollback, SCD, etc)

X Data Objects per Business Domain
(Table, View, Stage, Procedure, Pipe, Task, UDF, External Table, Stream, Policy)

5x Domains (Data Marts) per WSE System (Standardized + Consumed)
(Finance, Asset, People, Customer & Billing, GIS & Ops Reporting)

11x Systems per Zone (Raw + Curated)

6x Data Zones per Env
(Raw, Curated, Standardized, Analytics, Consumption, Assurance)

7x Environments per Account
(DEV, SIT, TEST1 (E2E), TEST2 (UAT), TRAINING, PREPROD, and PROD)

10x Accounts + 2x SSE Accounts

1x Organisation

Big Picture: Bringing it all together...

Data Services Portal

Big Picture: Bringing it all together...

WSE Reporting

ASSET MANAGEMENT

- Abandoned Asset Report
- Materials (Parts) Utilization Analysis
- Portfolio Activity Report
- Asset Health

CUSTOMER & BILLING

- Customer Impact Report
- Meter Reading Exception Report
- Water Consumption Report
- Customer Usage Analysis Report

FINANCE

- Cost Centre Report
- Labour Recovery Report
- Operating Cost Report
- Project Financials

SUPPLY CHAIN

- Fraud Analytics Report
- Invoice Processing Report
- PO Workflow Report
- Stock Report

Big Picture: Bringing it all together...

Data Science Solutions

Leakage Transparency and Reduction Solutions (LTRS)

- AssetInsight
- AssetPulse
- ExcessFlow
- FaultVoice
- HydroBalance
- LeakSense
- SupplyCast
- TimeSeriesCorrection

THANK YOU!

QUESTIONS....