



— BUREAU OF —  
RECLAMATION

# The Bureau of Reclamation's Transformative Maximo Journey



# Who am I?

- Graduated from UC Davis
  - BS in Civil and Environmental Engineering
- Joined Reclamation in Nov 2010
  - Reclamation tenure within Asset Management Division (AMD)
  - Two-year detail with Bureau of Land Management
  - Now supervising Infrastructure Branch within AMD
- Husband, Girl Dad, and Dodger fan.





Hoover Dam

# Outline

- Reclamation Background
- History of Maximo at Reclamation
- Challenges and Advocating for Change
- CARMA 2.0 Project Overview
- Accomplishments (so far)
- Q&A



The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

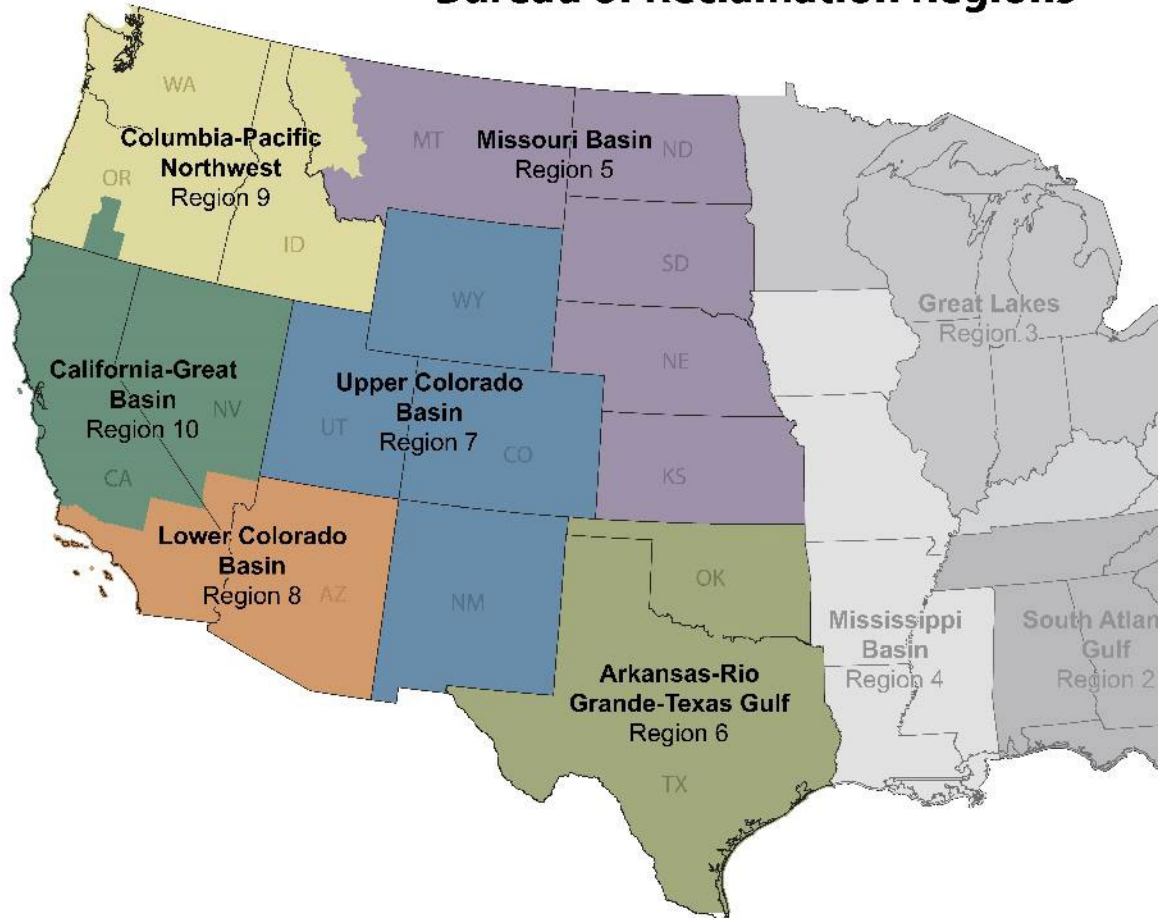


Jackson Lake Dam and Reservoir



# Organization

## Bureau of Reclamation Regions

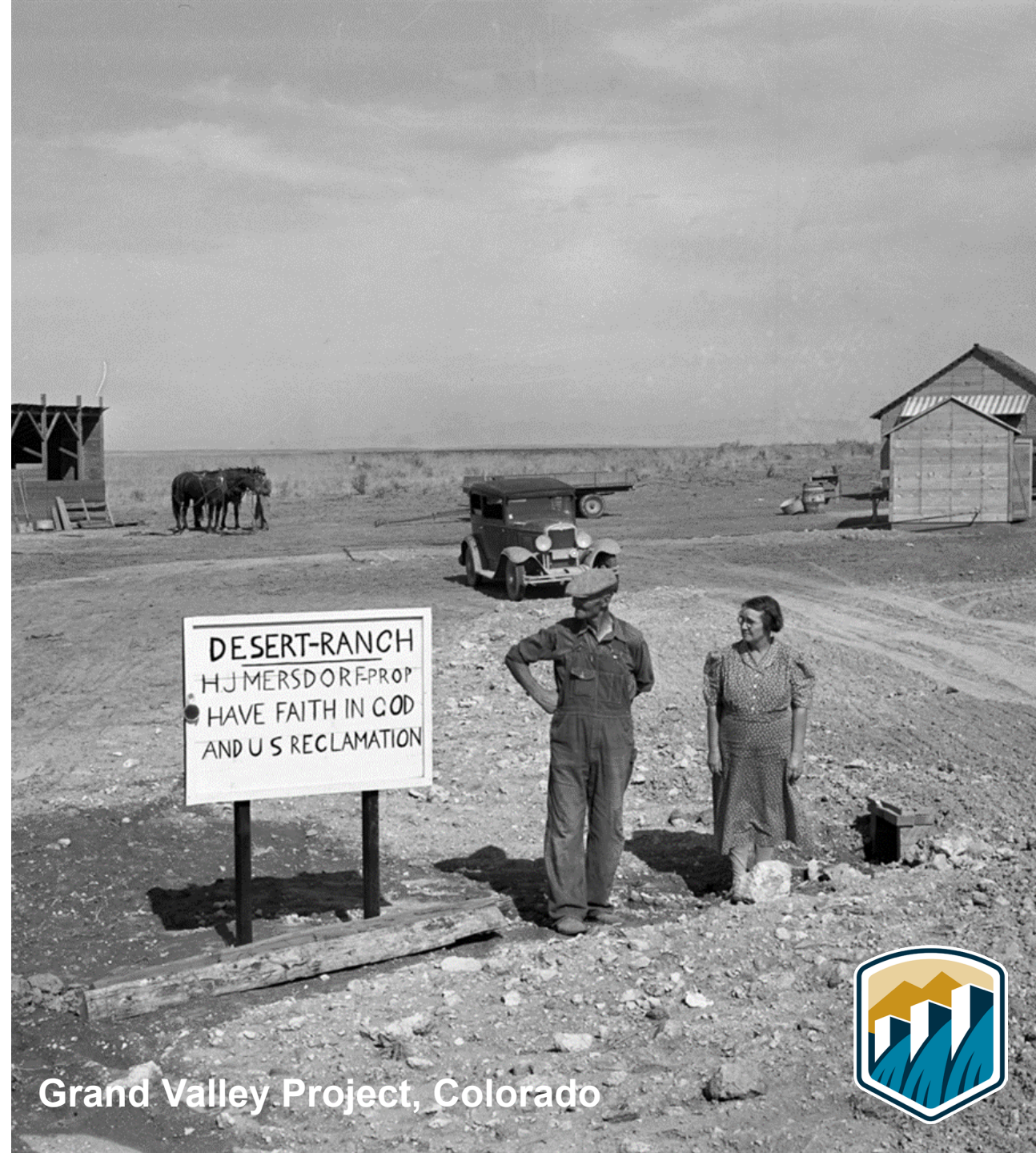


- Missouri Basin and Arkansas-Rio Grande-Texas Gulf
- Upper Colorado Basin
- Lower Colorado Basin
- Columbia-Pacific Northwest
- California-Great Basin



# Water Delivery

- Largest wholesaler of water in the United States, serving 31M people
- Provides irrigation water to 20% of U.S. Western farmers (10M acres)
- Reclamation Projects enable farmers to produce 60% of the nation's vegetables and 25% of the nation's fruit and nut crops



Grand Valley Project, Colorado



# Power Generation

- Second largest producer of hydroelectric power in the United States
- 53 powerplants provide more than 40 billion kilowatt hours and a \$1B in power revenues
- Electricity produced is enough to serve 3.5 million homes



Glen Canyon Dam Generators



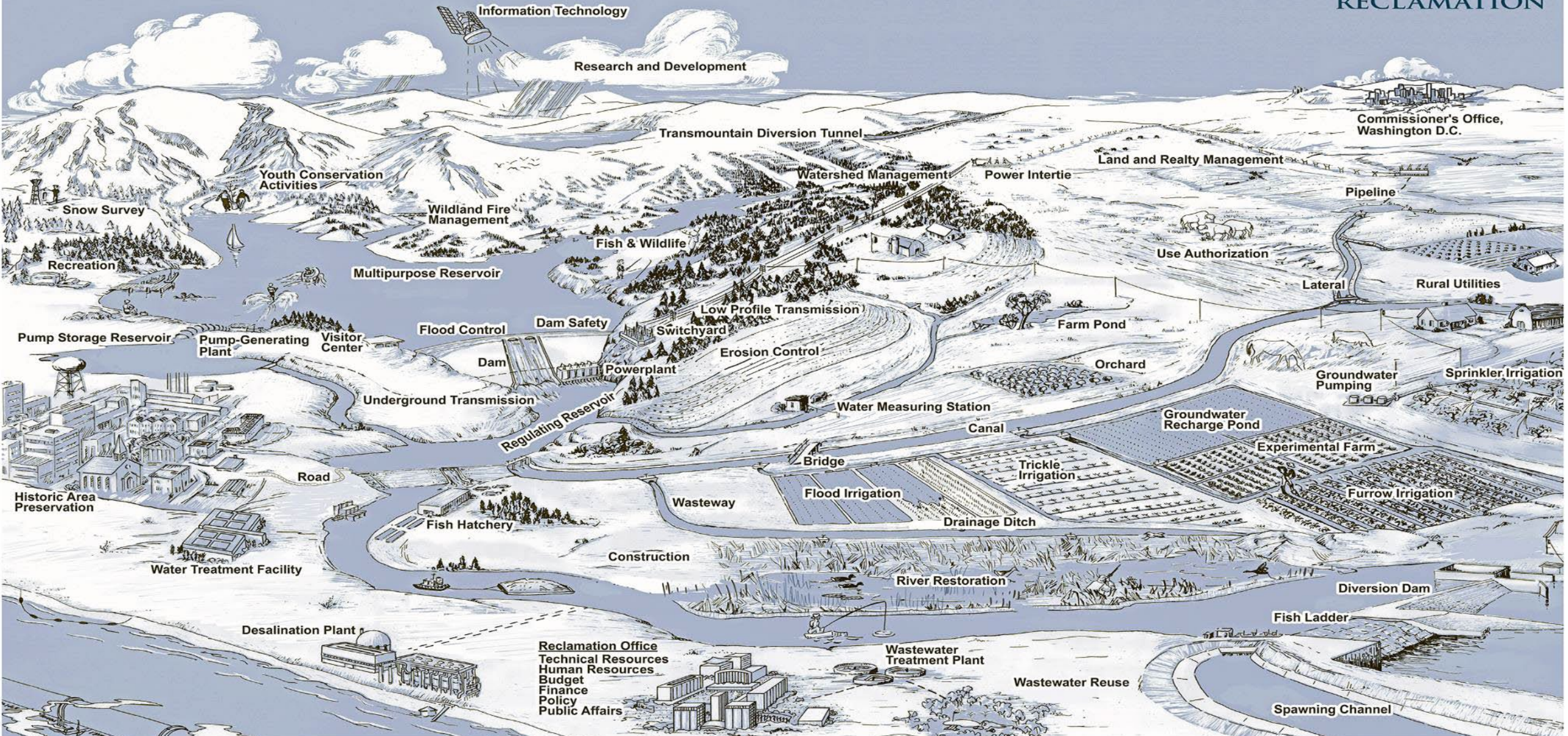
# Bureau of Reclamation Asset Management

The coordinated activity of an organization to realize value from assets.

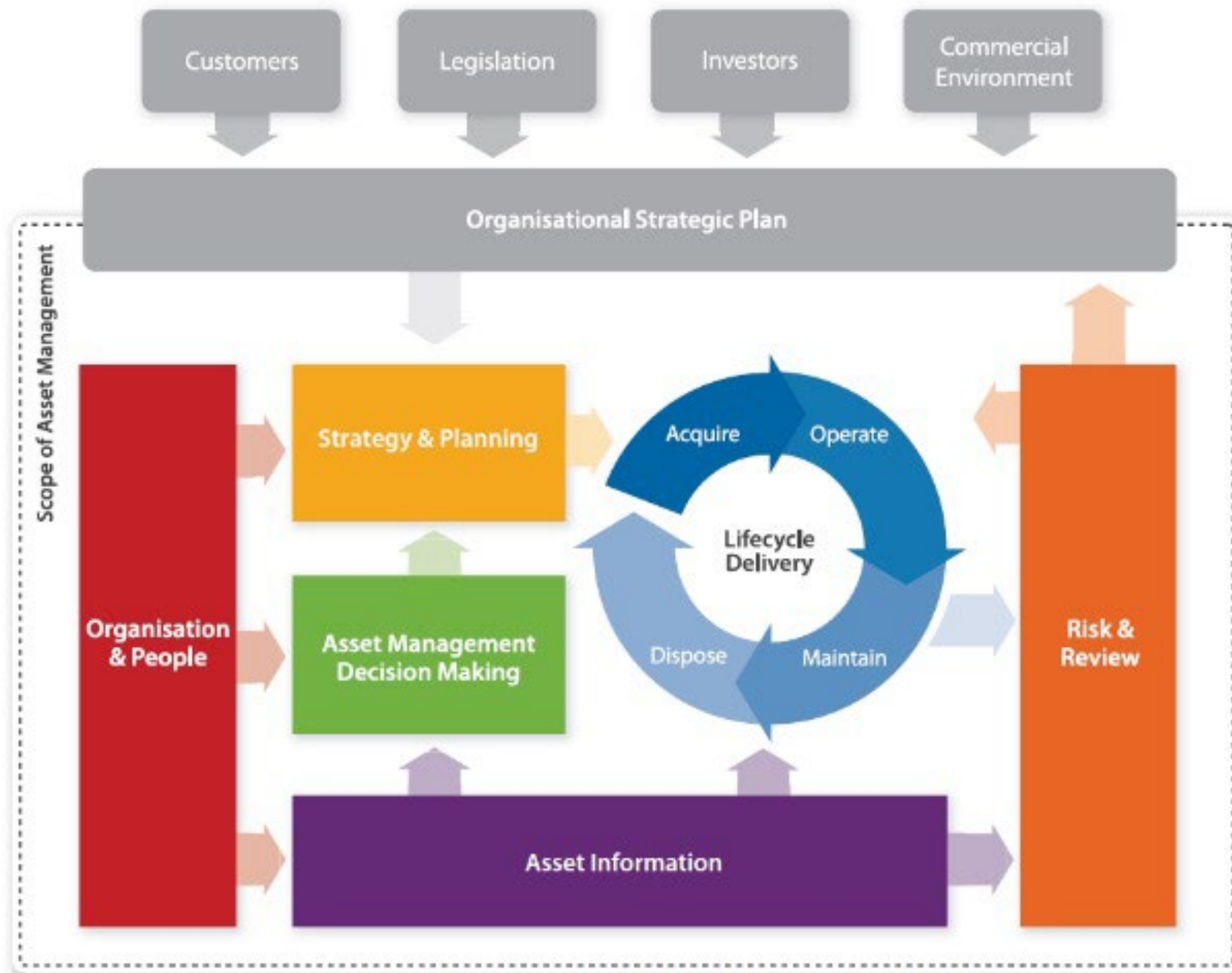
(International Organization for Standardization ISO 55000 Asset Management, (Clause 3.3.1))



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# Reclamation's Maximo History

**CARMA** (Capital Asset Resource Management Application) is Reclamation's implementation of IBM Maximo®'s core functionality.



**IBM Maximo®** is the world-leading maintenance management software solution with numerous applications and capabilities.

It is considered by many in the industry to be the '**best of breed**' option.



# Capital Asset & Resource Management Application (CARMA)

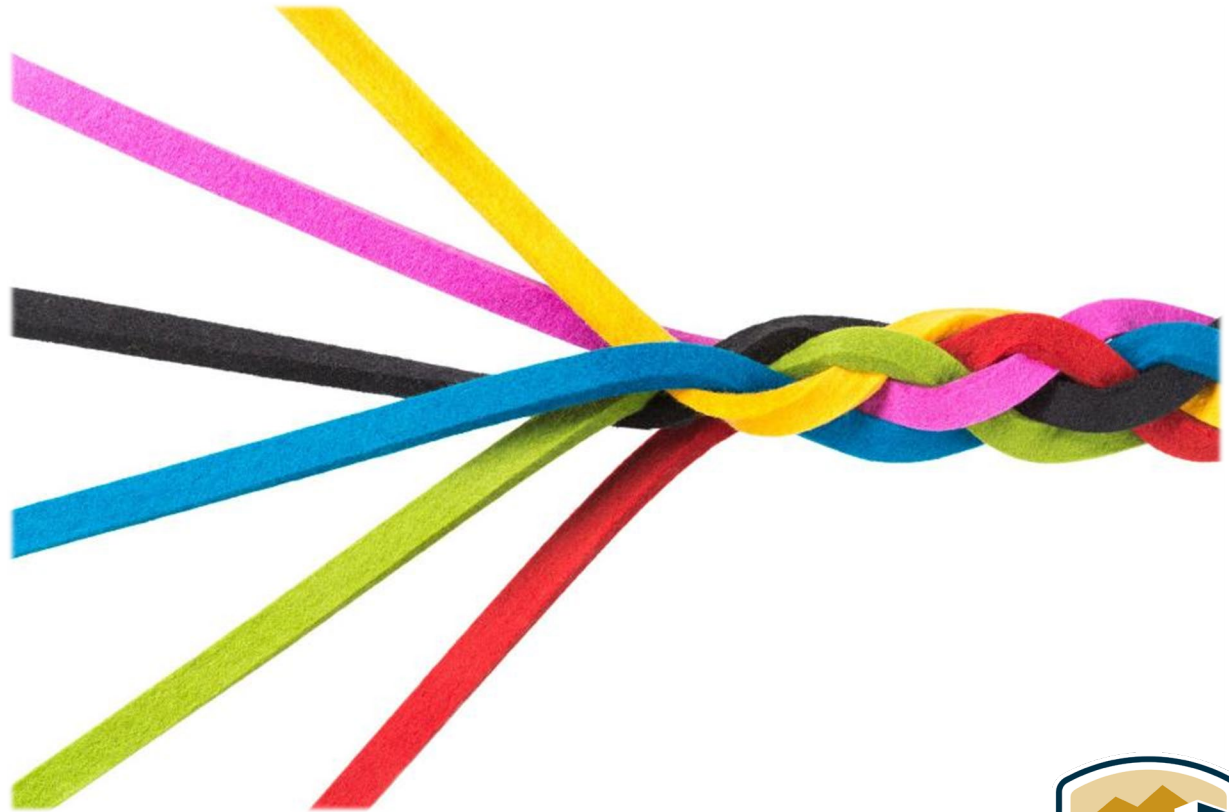
CARMA is Reclamation's customized deployment of:

1. IBM® Maximo® Enterprise Asset Management software system;
2. DOI FBMS financial system built on SAP technology;
3. DOI Quicktime timekeeping application;
4. DataSplice – CARMA inventory for mobile devices (work orders and assets now available too);
5. CiM – Work Order Scheduling tool; and
6. RulesManager – business rules validation software.

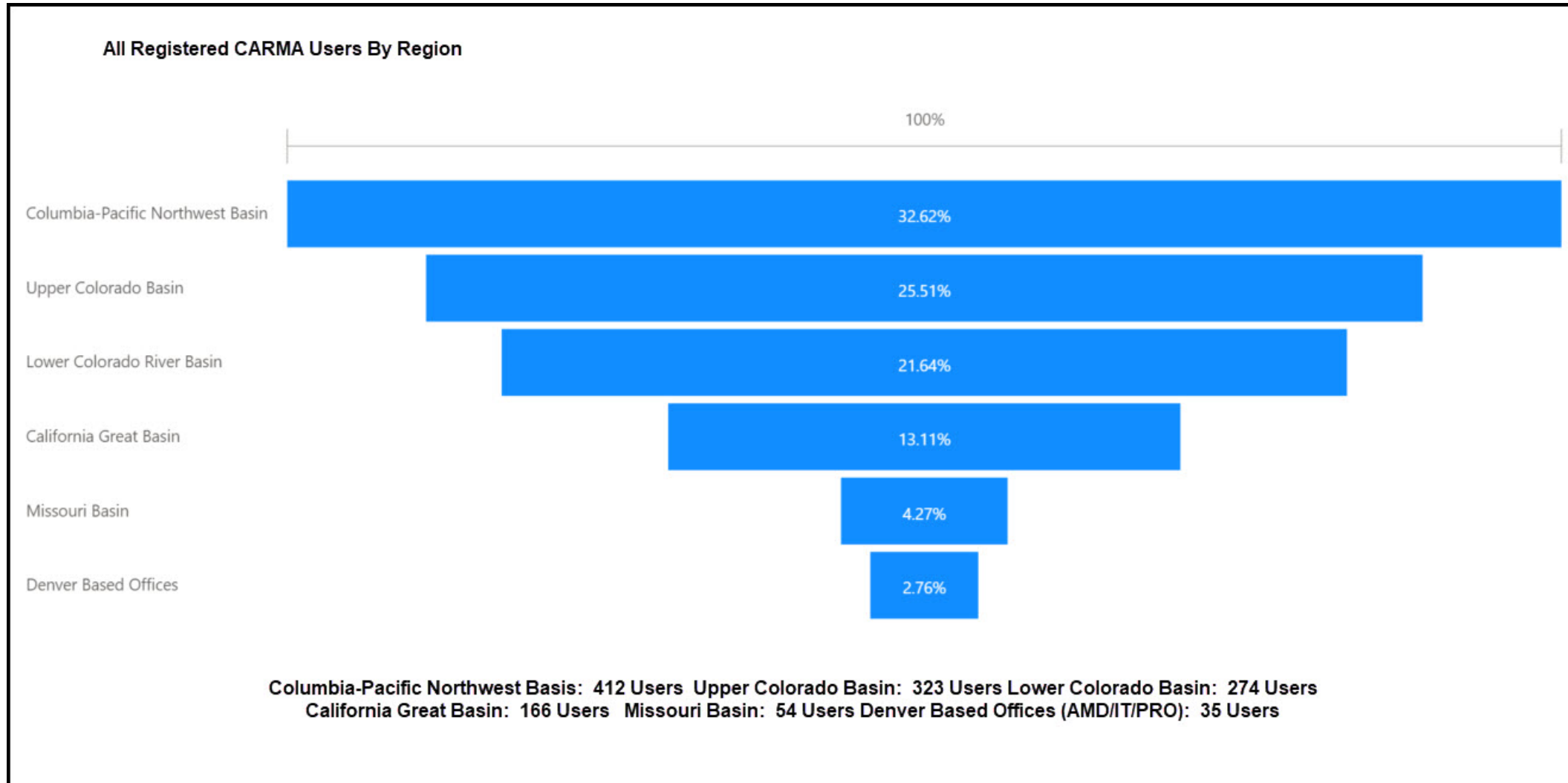


# 18 Instances Consolidated into 1 “Enterprise”

- Predicated on end of support for Maximo v4 in December 2005
- Departmental effort to transition Single Platform Maximo in Fiscal Year 2007
- Migration to single server to support CARMA 1.0
- Since 2008, has grown organically to 26 Maximo sites

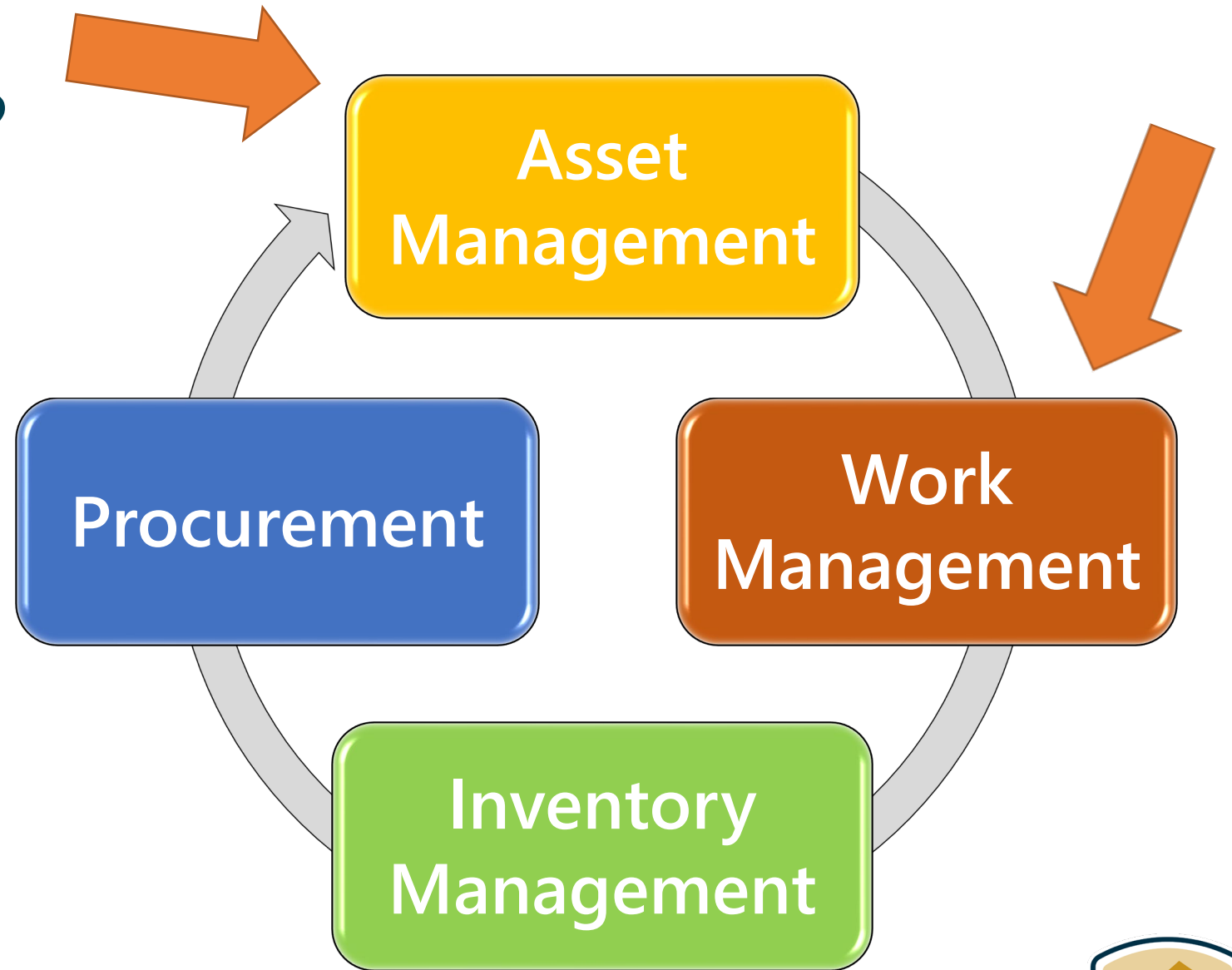


# Current CARMA Users by Region



# How do we use it?

1. Asset Management
2. Work Management
3. Inventory Management
4. Procurement (FBMS and CARMA)



## All IBM Maximo Features Available

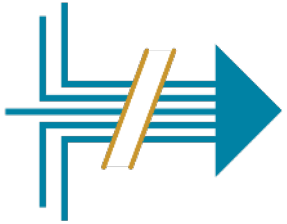
- **Locations, Assets**, Asset Templates, Asset Meter data, Asset Condition Monitoring, Asset Failure Codes, Inspections, Location & Asset Hierarchy for financial, failure, and usage data roll-ups, AI asset data collection
- Purchasing Requests, **Orders**, Request for Quotes, **Receiving**, Invoicing, **Vendor list**, financial approval process for purchasing
- Organization wide shared vendor contracts; Purchase (assets, spare parts, services), Lease/Rental, Labor, Asset Warranty
- Organization wide shared **Inventory (equipment spare parts** and repairable assets), Inside and Outside Services, Tools (calibrated, heavy equipment, charge-backs)
- **Maintenance planning** and scheduling, **Routes**, Safety Plans, Preventive & Predictive Maintenance, and **Work completion, Labor, Materials, Services,** and Tools tracking, Resource Management
- Service Desk ticketing for maintenance work, internal IT support (like Heat tickets), purchasing
- Mobile Device Usage – live and off-line
- Barcoding and QR coding
- Bi-directional interfacing with multiple other database driven systems; Financial, HR, Time Reporting, Asset meter data
- Robust Reporting – end user developed, standard by IBM, custom built
- Dashboards with KPIs, Reports, Asset statuses, etc.
- GIS Mapping interface for locations, work scheduling, etc.
- **Labor crafts**, crews, certifications/qualifications
- Business process workflow review and approval processes capable
- IBM Created add-ons: Health, Safety & Environment; Transportation; Utilities; Linear Assets; Spatial (GIS)

## CARMA Features Currently Being Used

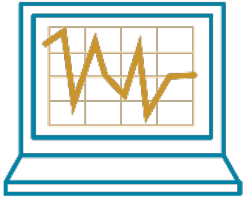
- **Locations & Assets tracking**
- Double entry of **Purchase Orders between CARMA and financial system, Receiving, Vendor list**
- Some sites **Inventory (equipment spare parts)**
- **Maintenance Planning, Routes, Preventive Maintenance, Work Completion with Labor and some materials**
- Single direction **interface between financial system and between time reporting system**
- Some **reporting**, most still Excel data dumps
- **Labor crafts**



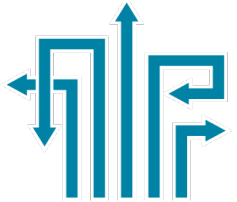
# Current Challenges



Lack of singular, approved enterprise vision for future CARMA use



Inconsistent enterprise data, data organization, and enterprise CARMA business processes



Decentralized and competing needs



Independent and duplicative data silos



Resourcing, support, communication, and training issues





# CARMA Strategic Plan

- Fall 2020 RLT Meeting Action Item – Develop plan to improve CARMA data
- Cross directorate team developed scope of work for a Strategic Plan for the future of CARMA
- Contractor hired to facilitate Strategic Plan development
  - Conducted in four phases
    - Phase 1: Document Current use and Assess Internal Reclamation Feedback
    - Phase 2: Peer Benchmarking
    - Phase 3: Improvement Alternatives
    - Phase 4: Develop Strategic Plan and Recommendation for Selected Alternative



# Phase 1 (Current CARMA Usage)

- Reviewed existing CARMA documentation and business practices
- Over 100 employees (field to HQ) offered interviews (69 accepted)

## Findings from interviews:

- CARMA business objectives and IT management practices are not organized for optimal value
- Desire for additional Maximo features
- Lack of technical support and training
- Absence of leadership engagement/championship



# Phase 2 – Peer Benchmarking

- Ten Utilities participated in a survey and interviews
- Findings from Benchmarking:
  - Reclamation's challenges are not unique
  - Reclamation uses less of IBM Maximo's capabilities than most peers
  - Reclamation invests much less in its system than all peers interviewed

ONTARIO POWER  
GENERATION

Manitoba  
Hydro

NEW YORK  
STATE OF  
OPPORTUNITY  
NY Power  
Authority

US Army Corps  
of Engineers®

SRT  
SALT RIVER PROJECT



CHELAN COUNTY

TVA

aps®

DUKE ENERGY®



Southern  
Company







# Phase 2 – Peer Benchmarking

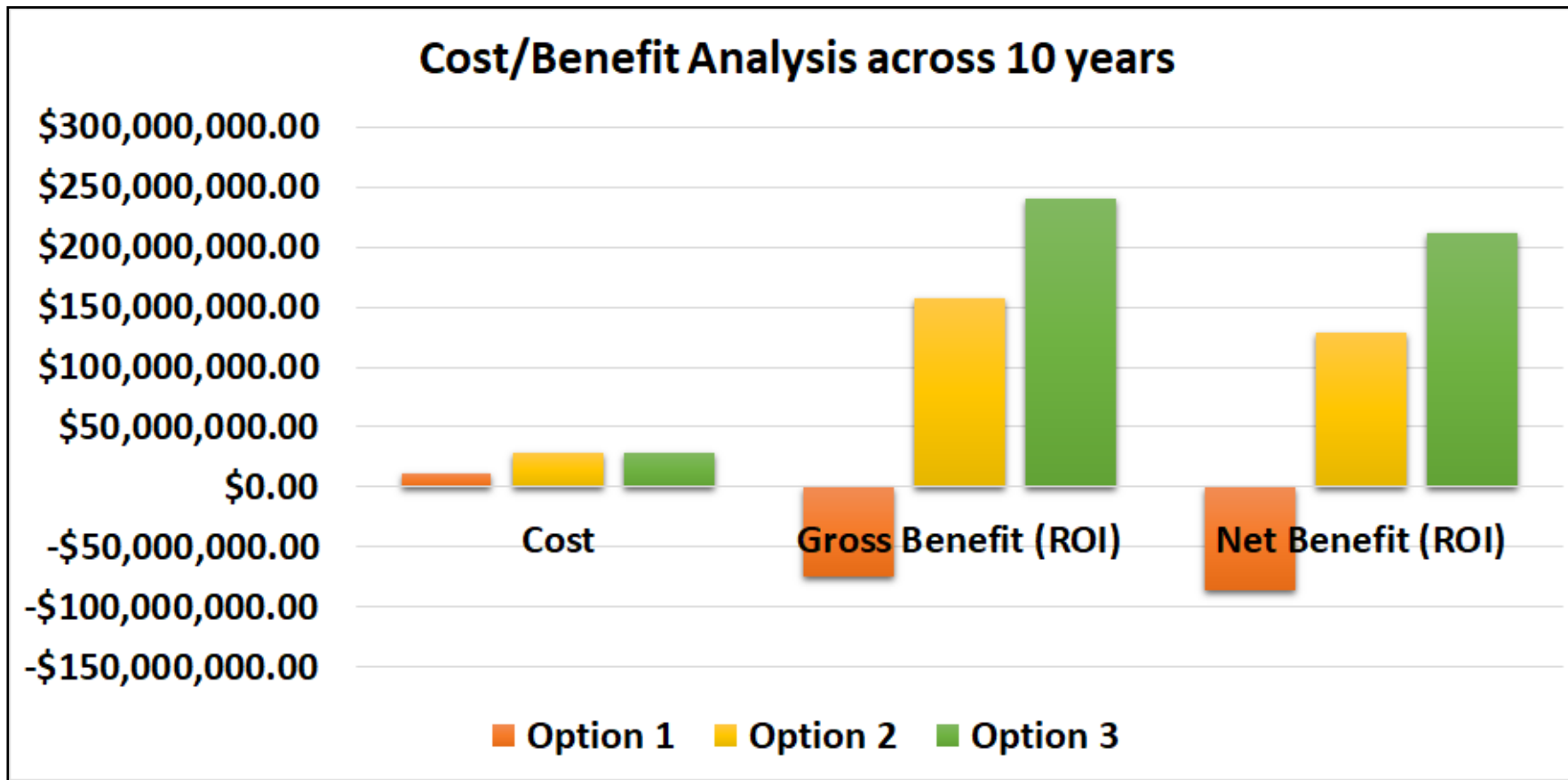
Maximo Add-on Usage									
	HSSE	Transportation	Utilities	Linear	Spatial	Mobile	Gaant Scheduling	Work Centers/ Inspections	KPIs & Dashboards
RECLAMATION	N	N	N	N	N	N	N	N	N
APS	Y	N	Y	N	Y	Y	Y	N	Y
CHELAN	N	N	Y	N	N	Y	Y	Y	Y
SOUTHERN	Y	N	N	N	Y	Y	Y	N	Y
DUKE	N	Y	N	N	Y	Y	Y	N	Y
NYPA	Y	Y	N	N	N	Y	Y	Y	Y
TVA	N	Y	N	N	N	Y	Y	N	N
USACE	N	N	N	N	N	Y	Y	N	N
SALT RIVER	Y	N	Y	Y	Y	Y	Y	N	N



# Phase 3 – Proposed Alternatives

 <b>Option 1: Status Quo</b>	<b>Option 2: Patch Things</b>	<b>Option 3: Improve with CARMA 2.0</b>	
<b>Advantages</b> 	Minimal disruption to users	Remedies some current issues and limitations  Provides some of what current users need	Potential to remedy <b>ALL</b> current issues and limitations  Manageable with offline disruption – all changes implemented at one time  Potential to meet <b>ALL</b> current business needs
<b>Disadvantages</b> 	Continues current issues and limitations  Does not provide what current users need	Significant and ongoing disruption to users  Does <b>NOT</b> meet all current business needs	Significant organizational change for users, but it is a 1-time event.  

# Cost vs Benefit of Proposed Options



	Option 1	Option 2	Option 3
Cost	\$11 M	\$29 M	\$29 M
Gross Benefit (ROI)	-\$75 M	\$157 M	\$241 M
Net Benefit (ROI)	-\$86 M	\$128 M	\$212 M



# Recommendation: CARMA 2.0

- Less effort for field staff (mobile solutions, common maintenance)
- Better data for improved risk informed decision making
- Ability to perform trending analyses on equipment
- Visibility on condition and total cost of ownership of all assets across Reclamation
- Lower long-term costs for Reclamation (more efficiencies)
- Less work for developers and trainers
- Absorb several aging IT applications (DSIS/PRIS, Mechanical Database, PI)
- Cost savings of ~\$200M over 10 years



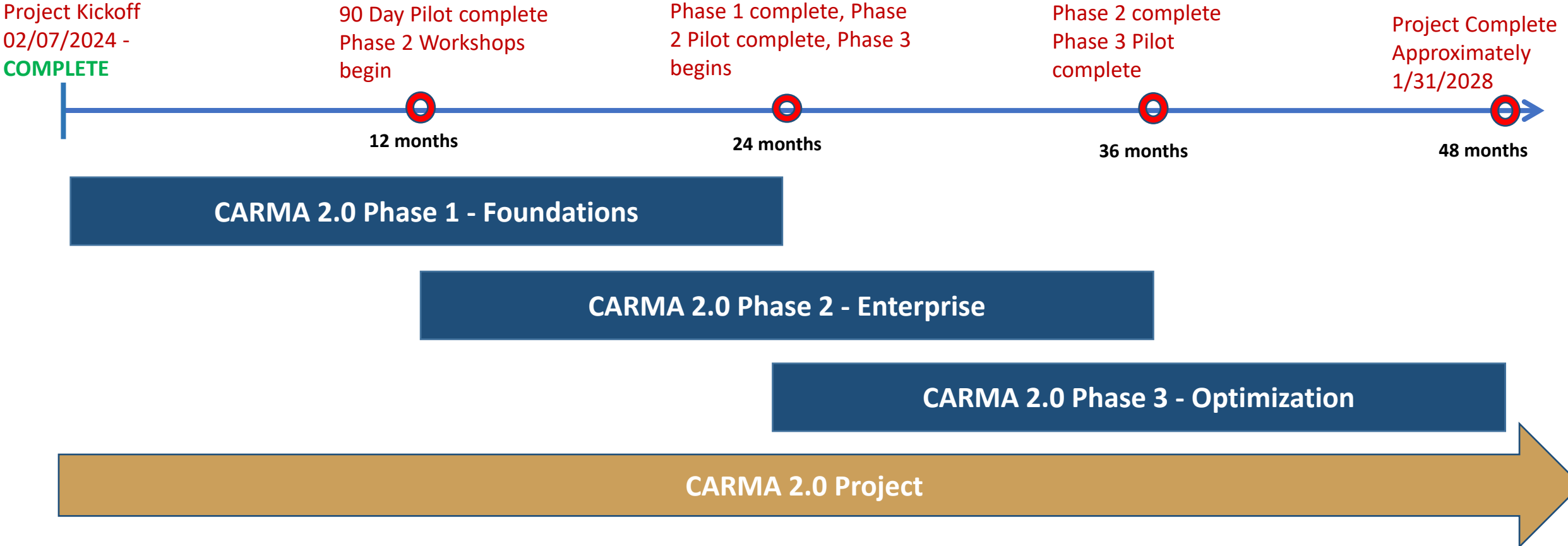
# CARMA 2.0 Strategy

- Less effort for use
- Better data
- Visibility of assets
- Lower long-term costs
- Improved Asset Management Maturity Level
- Enter once, use everywhere





# CARMA 2.0 Project Schedule



## Trusted Experience

- 25+ Years Maximo Experience
- Elite Maximo Skills – Avg Consultant Exp 12+ years
- More than 3,000 successful Maximo implementations and integrations projects

## Integrated Solution Provider

- Experienced at providing all aspects of the Maximo solution – Software, Hosting, Consulting

## Value Add Offerings – Improved Time to Value

- Advanced Asset Management (AAM), RulesManager Studio/MaxAssist, OMNI, RulesManager for Maximo Mobile



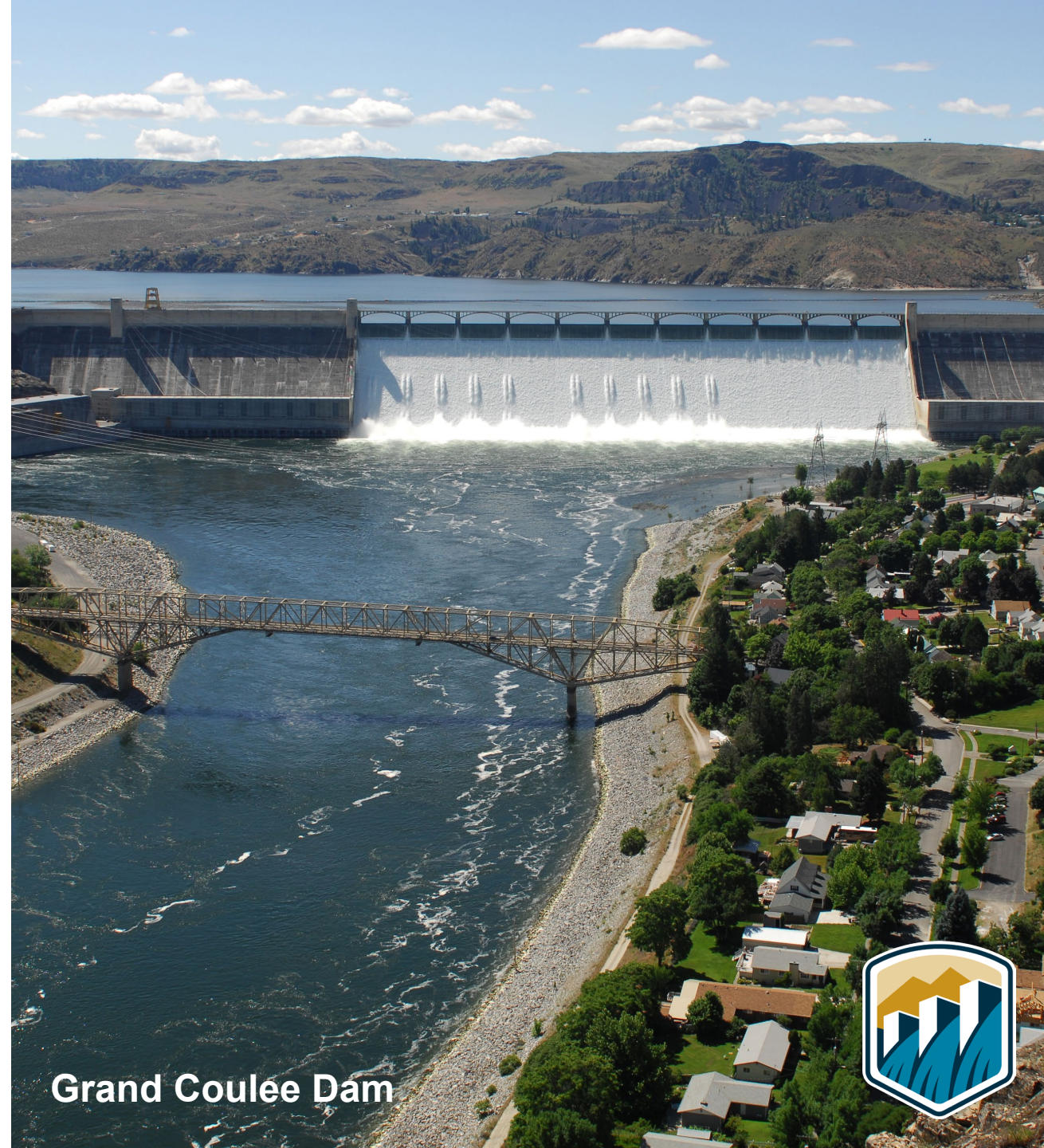
# Phase 1: Foundation Goals

- MAS 8 (or 9) in the Reclamation Cloud
- Standardize data architecture and business processes across all regions and facilities
- Data quality improvements
- Add GIS and other data integration capabilities
- Robust reporting and dashboards for summary data



# Phase 2: Enterprise Goals

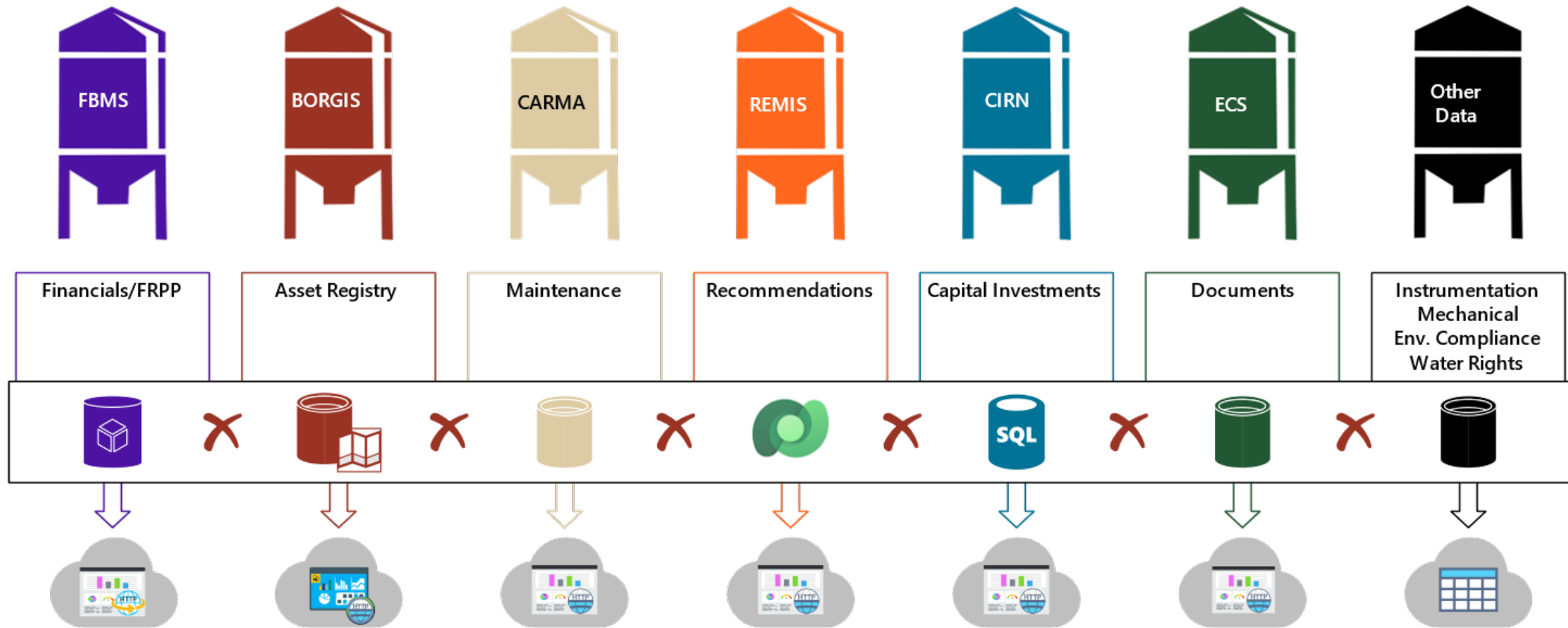
1. Builds upon the Phase 1 re-implementation data governance and architecture and emphasizes scaling across Reclamation
2. Demonstrate new capabilities that Reclamation personnel can use to support manual and paper-based processes:
  - a) Condition Assessments, Reviews, Inspections – electronic-based forms
  - b) Integrations (passing data back and forth) with Asset Registry (GIS), DSIS, PRIS, CIRN, etc. – no more double and triple entry of same information into multiple places



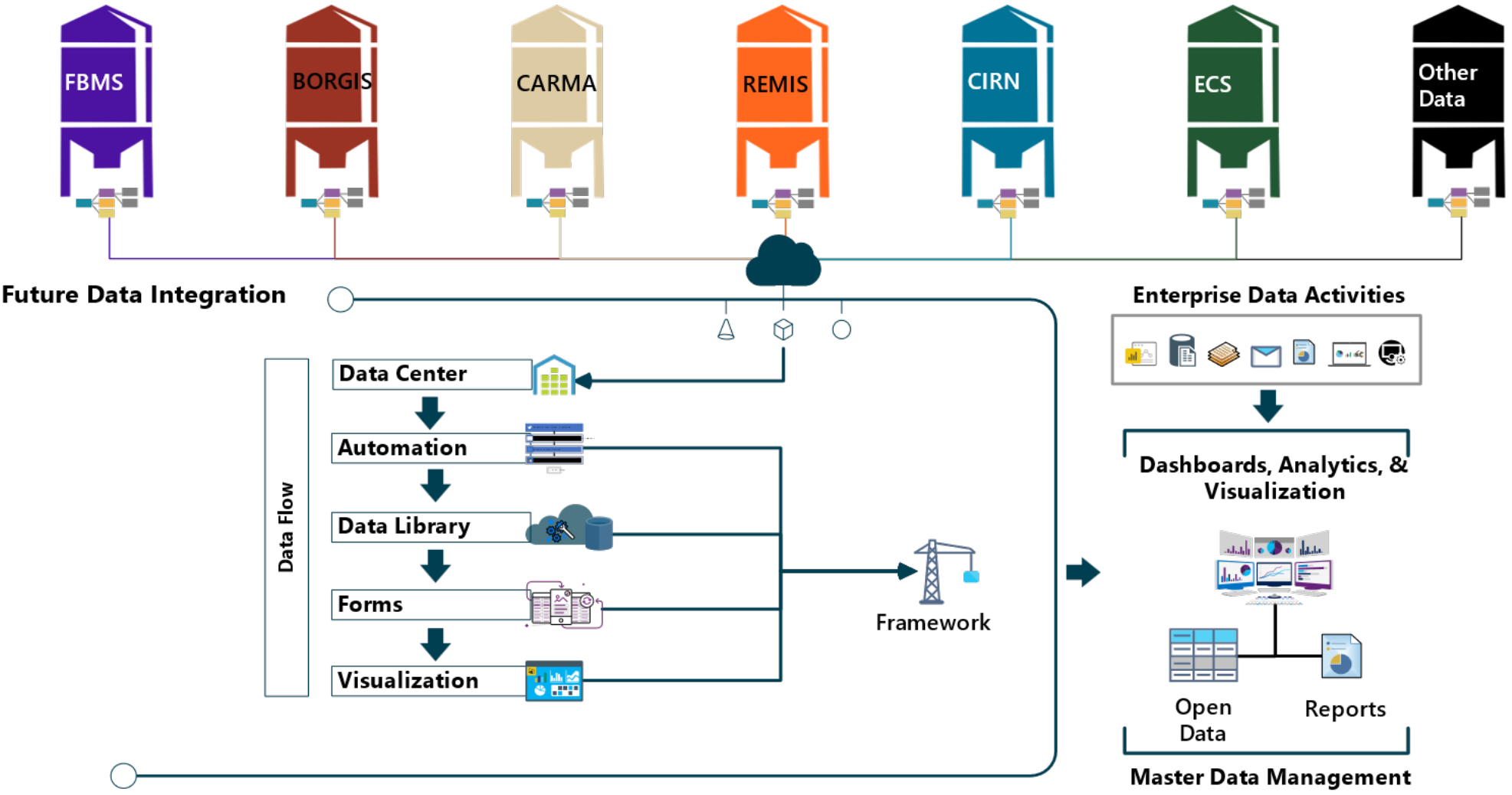
Grand Coulee Dam



# Evaluating Enterprise Data Integration



# Where would we like to be?



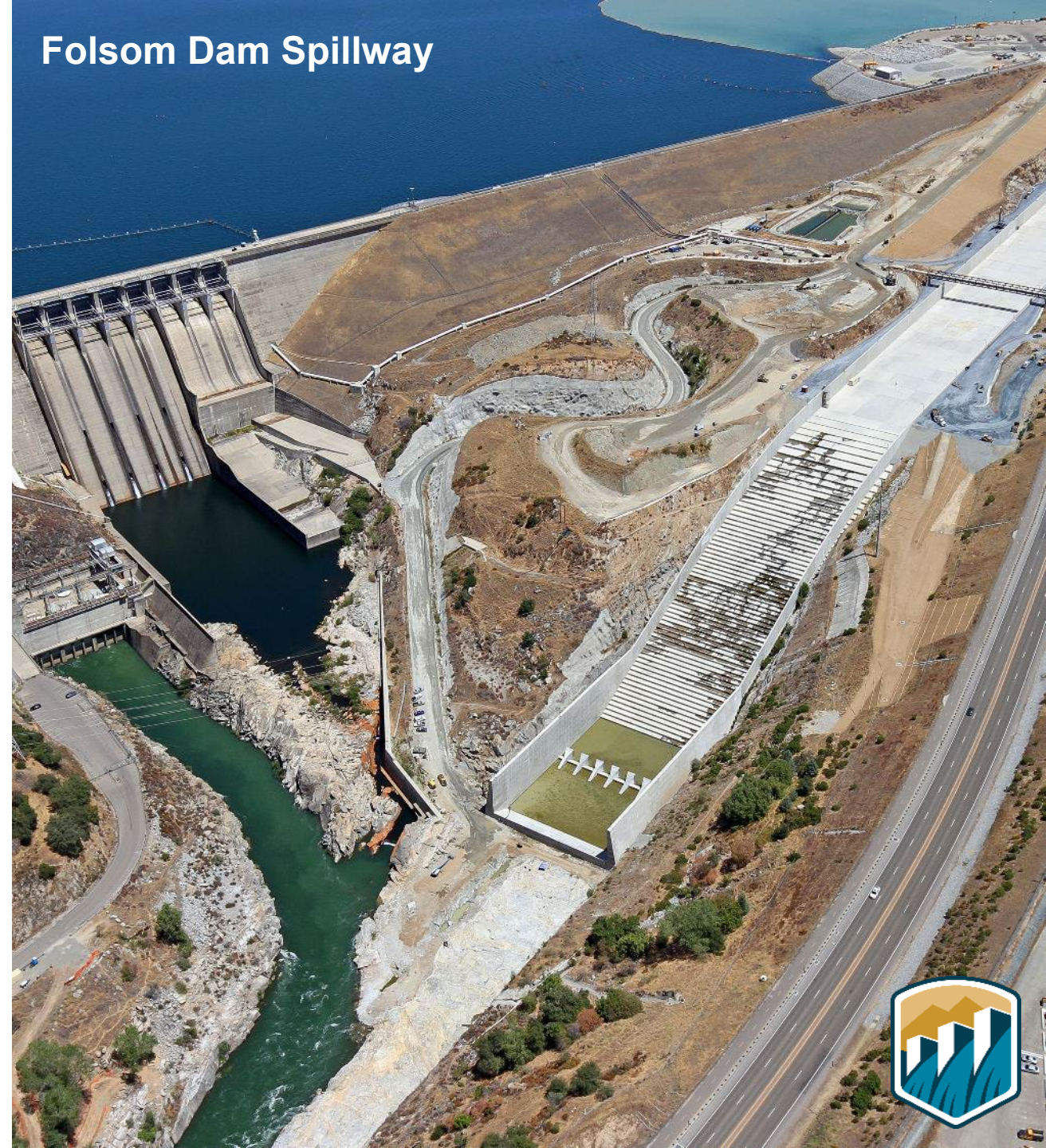
# Phase 2 Outcomes & Events

- **New Users in CARMA**
  - Dam Safety
  - Water O&M
  - Recreation/Lands
  - Regional offices
  - Area offices
  - Field offices
- **Database Integration**
  - Asset Registry (ArcGIS)
  - PRIS/DSIS (Recommendations)
  - CIRN (Investment Needs)
  - HydroAMP (Hydropower Condition)
  - POMTS (Power Operations Data)
- **Additional IBM Maximo Features**
  - Electronic inspection forms
  - Meter, Condition Monitoring, and Condition Assessment (Inspection) based Preventive Maintenance
- **Workshops for Phase 3**
  - Power BI Dashboards & Reporting
  - SCADA data tracking and Historian integration with CARMA
  - IBM Monitor, Prediction, and Health, Safety, and Environmental add-on applications



# What have we accomplished (so far)?

- Finalized Phase 1 schedule, including 35+ weeks of focused workshops
- Revisions to Location hierarchy for a significant number of major asset types
- Business process standardization (priority/criticality, universal failure hierarchy, etc.)
- Agreement on key asset data required to effectively manage, track, and report on our assets
- Stakeholder engagement to ensure project visibility and understanding







Why do we think we'll be successful?

## Our People

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- ✓ Leadership Support
- ✓ Unified Vision
- ✓ Dedicated Teams and Staff
- ✓ Strong Partnerships
- ✓ The Will to Be Better



Reuben Vidaurrazaga

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Asset Management Division

Dam Safety and Infrastructure

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