Water Data Spectrum

Presentation to the California Water Quality Monitoring Council

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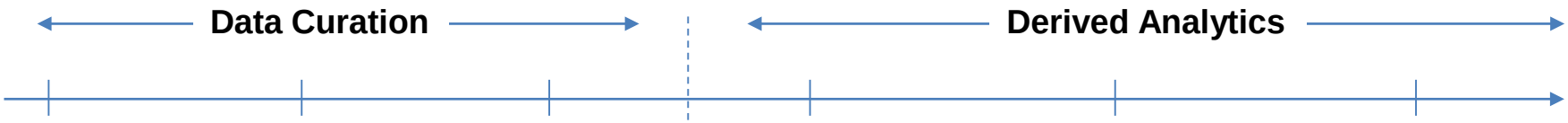
CA Water Data: Spectrum
From Data to Derived Analytics



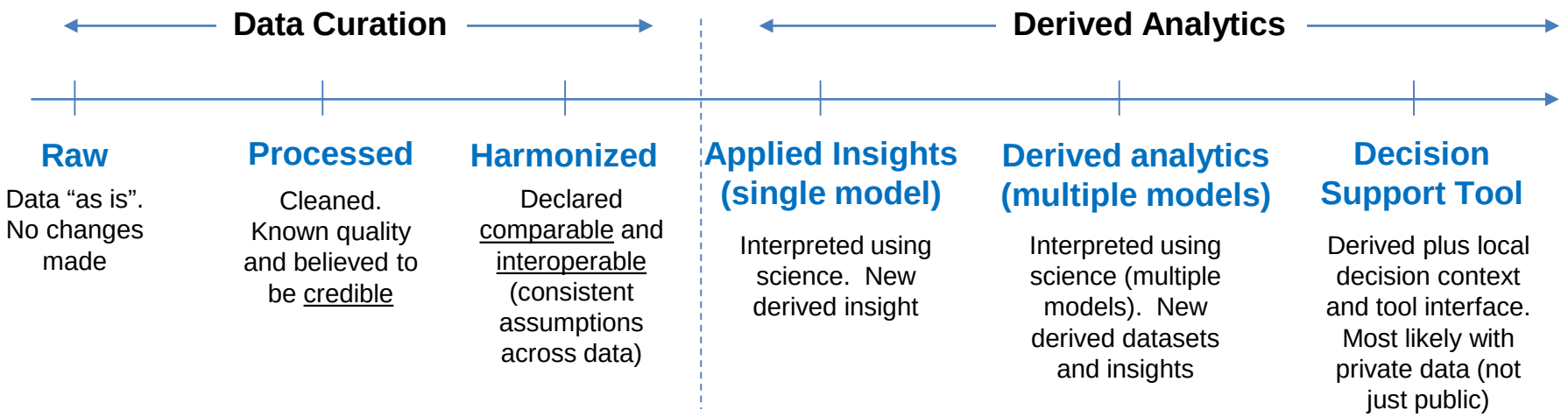
Raw	Processed	Harmonized	Applied Insights (single model)	Derived analytics (multiple models)	Decision Support Tool
Data "as is". No changes made	Cleaned. Known quality and believed to be credible	Declared comparable and interoperable (consistent assumptions across data)	Interpreted using science. New derived insight	Interpreted using science (multiple models). New derived datasets and insights	Derived plus local decision context and tool interface. Most likely with private data (not just public)

Examples

Groundwater					
GW tabular data (local well data)	Graphs of water levels over time	DWR CASGEM public portal (maps/visuals)	GW contour maps (GICIMA)	Conjunctive water use for GW/SW (texture model, numerical model)	TBD: Flood-MAR DST to estimate GW recharge via flood waters
Water Quality					
Water sample	WQ report	MyWaterQuality.ca.gov	WQ/ ecological mapping	Environmental flow/ ecology/ quality	TBD: Environmental flows DST to optimize strategies (WQ/eflows benefits)

CA Water Quality Monitoring Council
What role should it play along the spectrum?

For Discussion



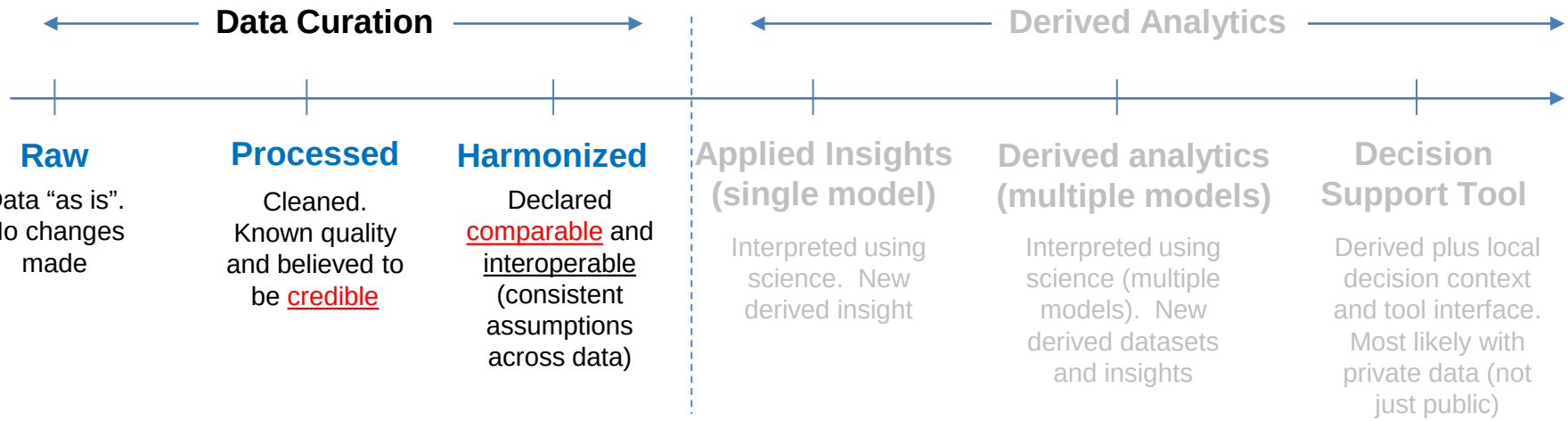
Key Questions:

1) Where should the Council play? How far to the right? Note: Moving further to the right increases costs, value, and risks (at varying levels)

2) How should the Council best handle data curation challenges given monitoring done by many players at state/regional/local levels?

3) How should Council address derived analytics, given desire to inform "management decisions"?

Environmental Data
The 5 C's of Data Curation



5 C's of Data Curation

1. Credible. Believed to be usable and reliable. Key concept: "authoritative" datasets
2. Comparable. Can be used in combination with other relevant datasets
3. Complete. Creates a full set of data in a defined area (e.g. complete local dataset)
4. Comprehensive. Creates a set of data that spans all areas or regions (e.g. state and local)
5. Cost-Effective. Data is collected and made discoverable/accessible/usable at low cost

CA Water Quality Monitoring Council
Five Strategic Focus Areas

For Discussion

The Top 5 Areas Where the CA Water Quality Monitoring Council has Expertise and can Add Value to the State

1. The Council is a vehicle for determining if water quality monitoring programs are designed and implemented to adequately address management questions in an efficient and cost-effective manner. Complete Cost Effective

2. The Council establishes guidance on data quality and method consistency for established monitoring programs across the state. Comparable Credible

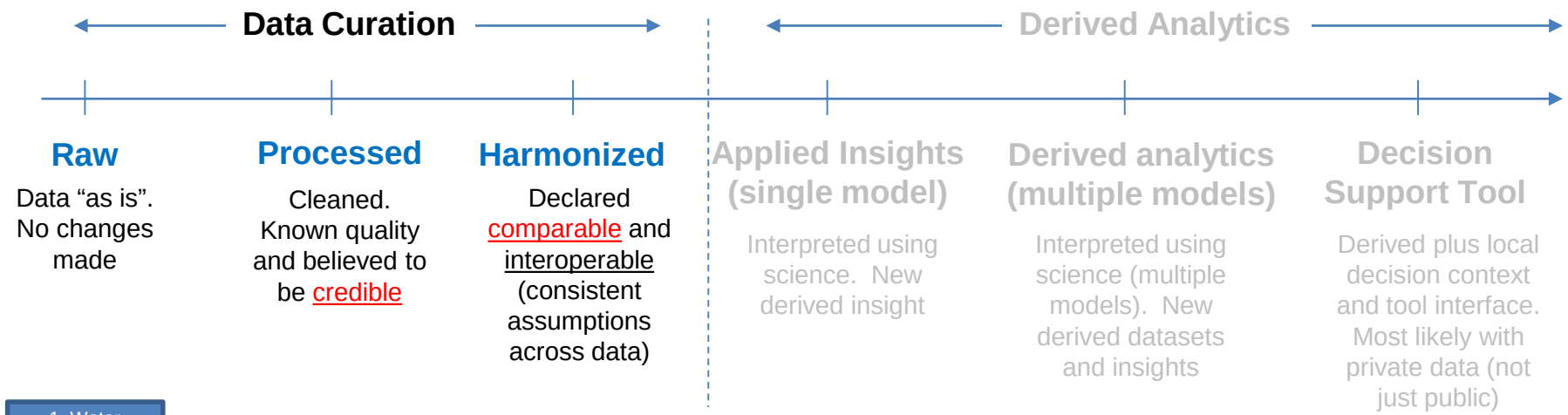
3. The Council can identify where data interpretation thresholds are needed and help provide recommendations on what those thresholds could be. Credible

4. The Council can identify emerging methods and technologies and offer guidance on how those should be developed to answer current and future management questions. Credible Comprehensive

5. The Council can link the disparate monitoring programs from local and regional entities that conduct the majority of monitoring across the state. Complete Comprehensive

Council's Five Strategic Focus Areas Possible Placement Along the Spectrum?

For Discussion



1. Water quality monitoring programs are efficient and cost effective → Aspirational (Council is not doing harmonizing?)
2. Guidance on data quality and method consistency
3. Data interpretation thresholds
4. Emerging methods and technologies
5. Link the disparate monitoring programs

Key Question: What value/positive impact could the Council create with a tightly focused effort on derived analytics?

Executive Order N-10-19

For Discussion

"..shall together prepare a **water resilience portfolio** that meets the needs of California's communities, economy and environment through the 21st century."

EXECUTIVE DEPARTMENT
STATE OF CALIFORNIA

Executive Order N-10-19

WHEREAS, water is a human right, and is central to California's strength and vitality; and

WHEREAS, we face a range of existing water challenges, including unsafe drinking water across the state, major flood risks that threaten public safety, severely depleted groundwater aquifers, agricultural communities coping with uncertain water supplies, and native fish populations threatened with extinction; and

WHEREAS, climate change is having a profound impact on water and other resources, making the climate warmer and more variable, which reduces mountain snowpack, intensifies drought and wildfires, and drives shorter, more intense wet seasons that worsen flooding; and

WHEREAS, California continues to grow, with our population projected to grow to 50 million over the next several decades and our economic activities expanding as the world's fifth largest economy; and

WHEREAS, the future prosperity of our communities and the health of our environment depend on tackling pressing current water challenges while positioning California to meet broad water needs through the 21st century; and

WHEREAS, many state programs, policies and investments are being implemented, such as the Sustainable Groundwater Management Act and new urban water efficiency standards, that can be built upon to meet these evolving challenges; and

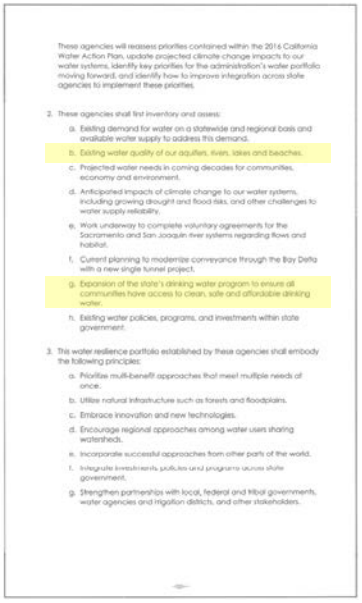
WHEREAS, providing clean, dependable water supplies to communities, agriculture, and industry while restoring and maintaining the health of our watersheds is both necessary and possible; and

WHEREAS, achieving this goal requires a broad portfolio of collaborative strategies between government, sovereign tribes, local communities, water agencies, irrigation districts, environmental conservationists, academia, business and labor leaders, and other stakeholders.

NOW, THEREFORE, I, GAVIN NEWSOM, Governor of the State of California, by virtue of the power and authority vested in me by the Constitution and the statutes of the State of California, do hereby issue this Order to become effectively immediately.

IT IS HEREBY ORDERED THAT:

1. The California Natural Resources Agency, the California Environmental Protection Agency, the California Department of Food and Agriculture, in consultation with the Department of Finance, shall together prepare a water resilience portfolio that meets the needs of California's communities, economy, and environment through the 21st century.



These agencies will reassess priorities contained within the 2016 California Water Action Plan, update projected climate change impacts to our water systems, identify key priorities for the administration's water portfolio moving forward, and identify how to improve integration across state agencies to implement these priorities.

2. These agencies shall first inventory and assess:
   a. Existing demand for water on a statewide and regional basis and available water supply to address this demand.
   b. Existing water quality of our aquifers, rivers, lakes and beaches.
   c. Projected water needs in coming decades for communities, economy and environment.
   d. Anticipated impacts of climate change to our water systems, including growing drought and flood risks, and other challenges to water supply reliability.
   e. Work underway to complete voluntary agreements for the Sacramento and San Joaquin river systems regarding flows and habitat.
   f. Current planning to modernize conveyance through the Bay Delta with a new single tunnel project.
   g. Expansion of the state's drinking water program to ensure all communities have access to clean, safe and affordable drinking water.
   h. Existing water policies, programs, and investments within state government.

3. This water resilience portfolio established by these agencies shall embody the following principles:
   a. Prioritize multi-benefit approaches that meet multiple needs at once.
   b. Utilize natural infrastructure such as forests and floodplains.
   c. Embrace innovation and new technologies.
   d. Encourage regional approaches among water users sharing watersheds.
   e. Incorporate successful approaches from other parts of the world.
   f. Integrate investments, policies and programs across state government.
   g. Strengthen partnerships with local, federal and tribal governments, water agencies and irrigation districts, and other stakeholders.

4. These agencies shall conduct extensive outreach to inform this process, including to other state agencies, sovereign tribes, federal and local government, local water agencies, agricultural groups, environmental justice and environmental conservation organizations, local and statewide business leaders, academic experts and other stakeholders.

IT IS FURTHER ORDERED that as soon as hereafter possible, this Order shall be filed with the Office of the Secretary of State and that widespread publicity and notice shall be given to this Order.

This Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its departments, agencies, or other entities, its officers or employees, or any other person.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 29th day of April 2019.

GAVIN NEWSOM
Governor of California

ATTEST:

ALEX PADILLA
Secretary of State

Most notable sections of EO for the Council

2b. Existing water quality of our aquifers, rivers, lakes and beaches
2g. Expansion of the state's drinking water program to ensure all communities have access to clean, safe and affordable drinking water

Does 2b and 2g require greater effort on harmonized water quality data? Does a "water resilience portfolio" and "identify key priorities" suggest that some sort of derived analytics is required?

CA Water Quality Monitoring Council
How do we transform data into information (and more)?

The Council "…plays an important role **in turning data** from multiple programs into comparable information to inform management decisions"

"…but data itself is not useful unless
it can be analyzed and **transformed into information**."

But how do you get all the way from data to **better outcomes**?

What's needed:
Translate data into better outcomes

Data → **Knowledge** → **Insight** → **Action** → **Better Outcomes**

Data → **Knowledge**

Science

Knowledge → **Insight**

Visualization

Insight → **Action**

Decision Context

Key Question for Council:
Do you compile and curate list of key management decisions? If not the Council, then who?

Action → **Better Outcomes**

End Users

Key Question for Council:
Is there direct interaction between Council and end users? Who do end users work with today?

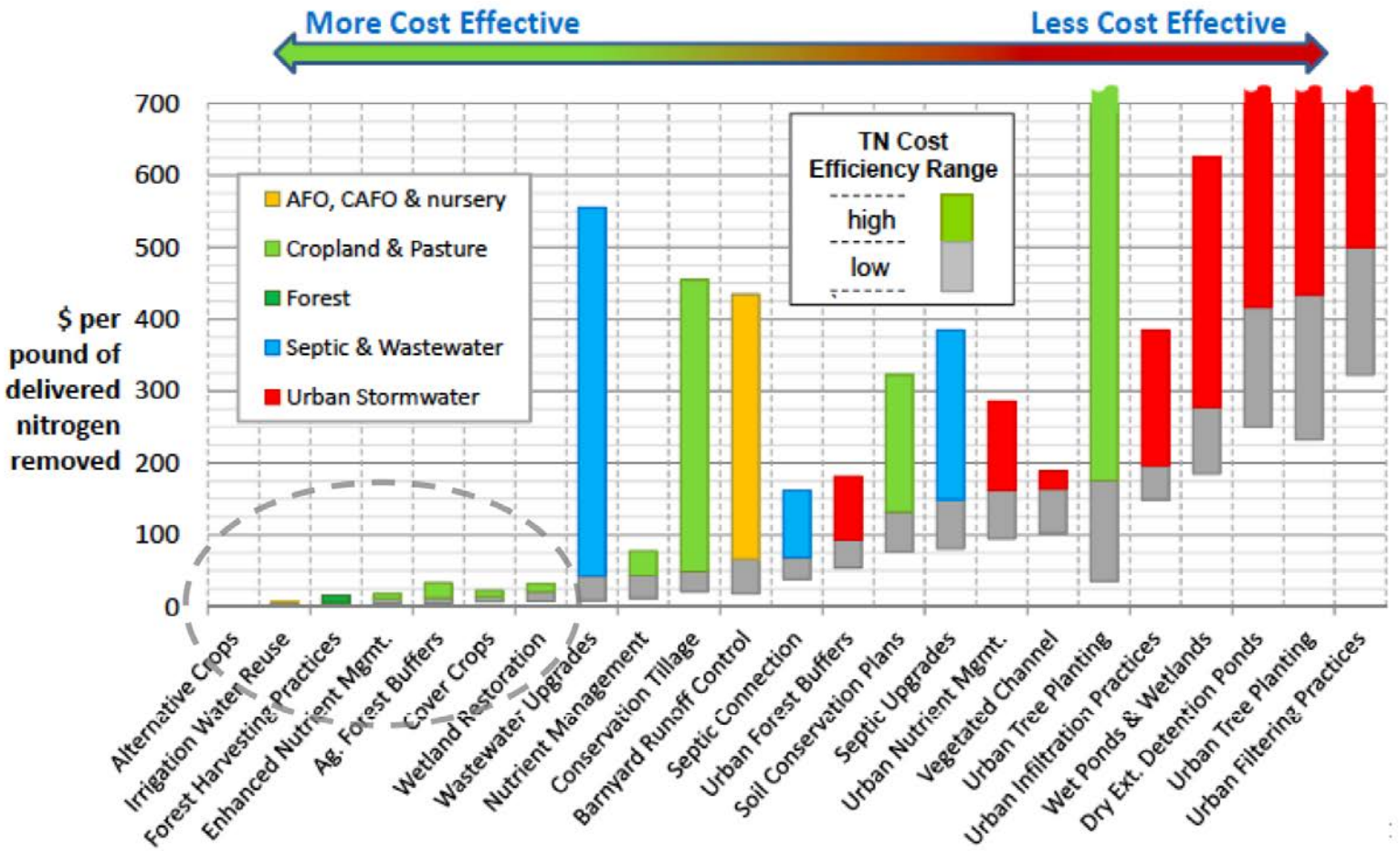
Water Quality
Potential for Decision Support Tool?

- **Solutions**. Focused on identifying best actions that most cost effectively improve water quality
- **Scenarios.** Allow unlimited scenarios, with user adjustable parameters (given varying assumptions)
- **Portfolio**. Enables comparisons of full portfolio of possible actions, across both where and when
- **Multi-benefit.** Allows true multi-benefit assessments, including ecological, social, financials, etc.
- **Decisions.** Is used by local stakeholders for actual "management decisions" (Data → Better Outcomes)
- **Monitoring.** Allows for ongoing monitoring and verification to ensure actual outcomes matched estimates

Results in a water quality use case success story that creates greater demand and "pull" for data coordination and applied science (across state/regional/local monitoring organizations)

Appendix

Water Quality
Possible strategies to include in a DST?



Source: Maryland Department of Environment Study, 2013
Source: Agricultural BMP Handbook for Minnesota, 2012