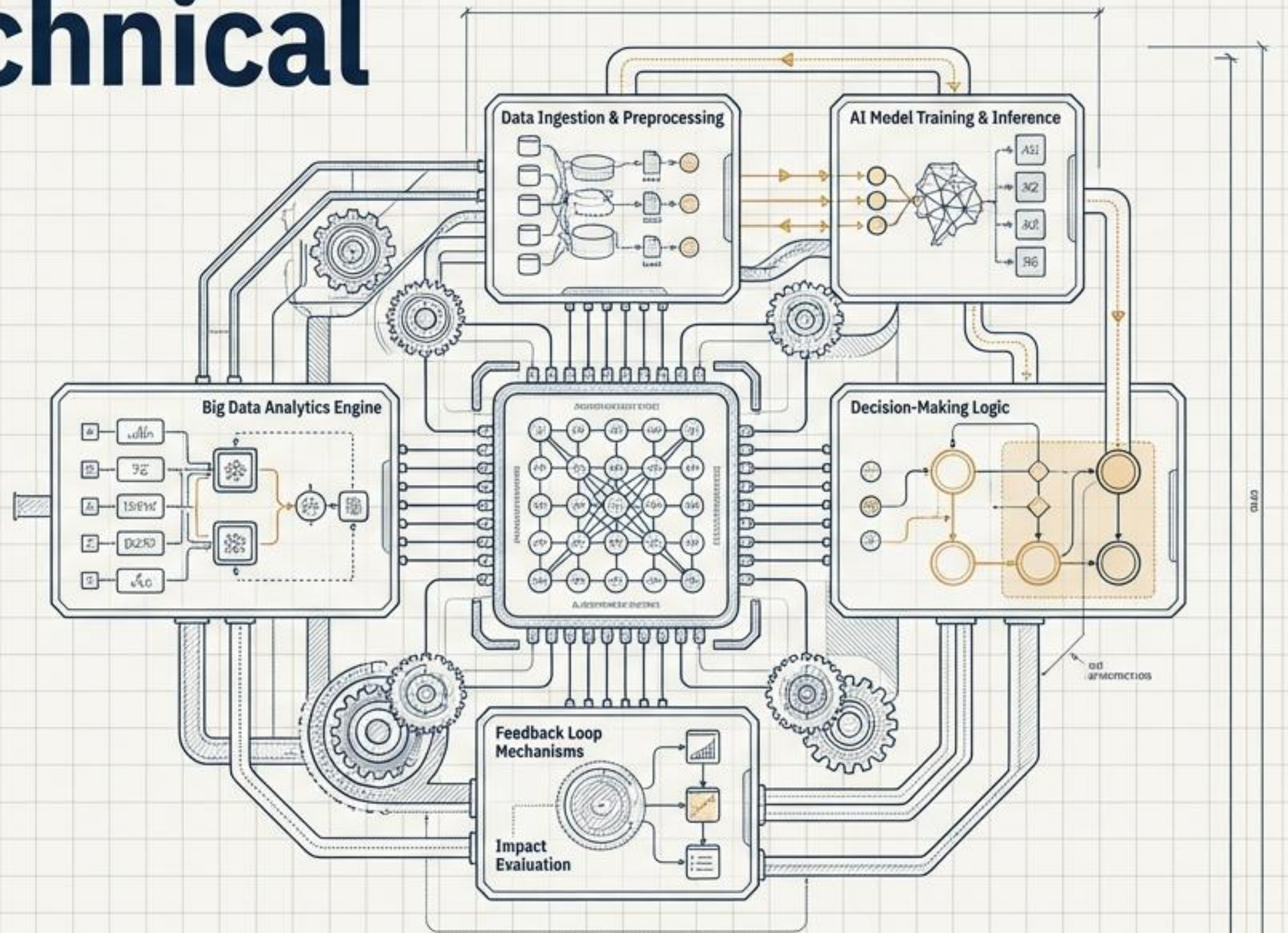


# The Socio-Technical Blueprint

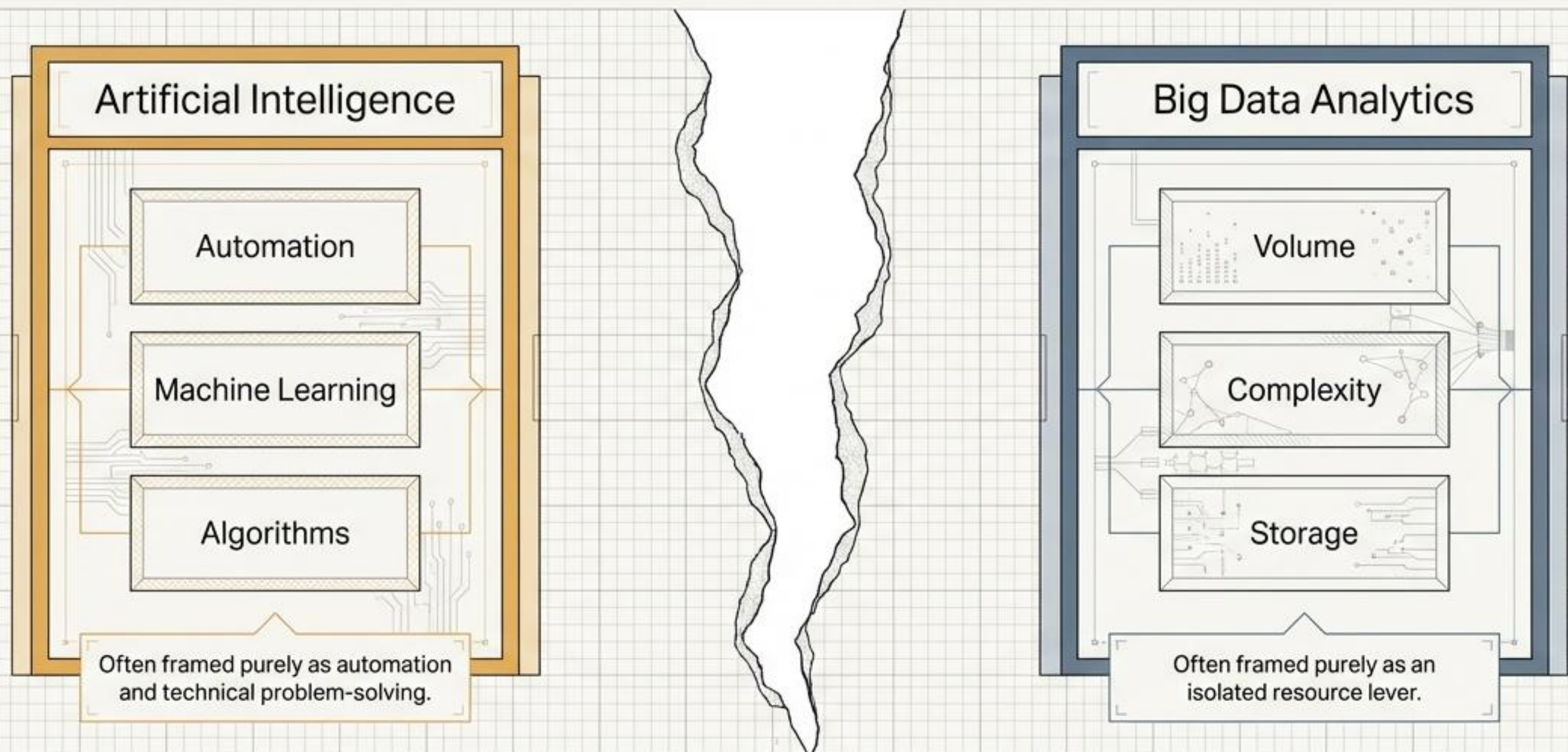
Unifying Artificial Intelligence and Big Data Analytics into a singular framework for Algorithmic Decision-Making Systems (ADMS).



A conceptual synthesis for IS practitioners and researchers to identify blind spots, map feedback loops, and evaluate the true impacts of intelligent computing.

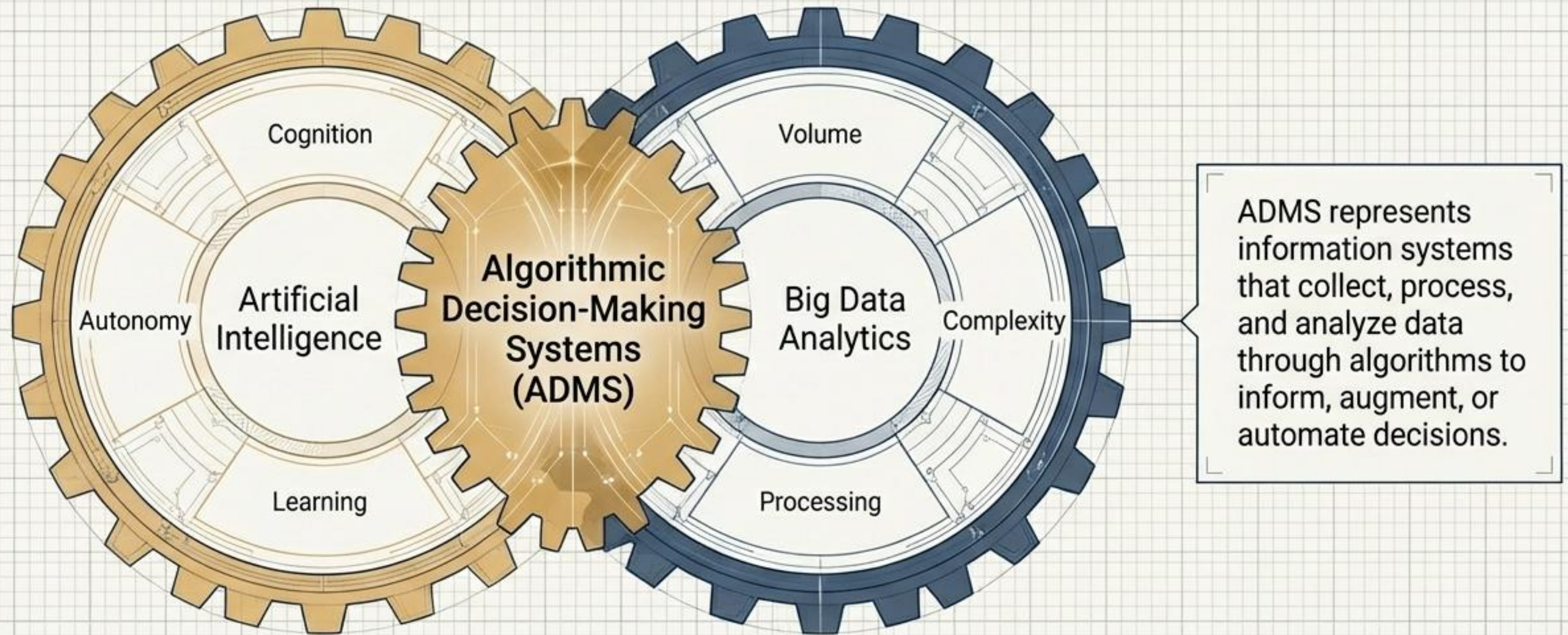


# The Fragmentation Problem creates dangerous blind spots



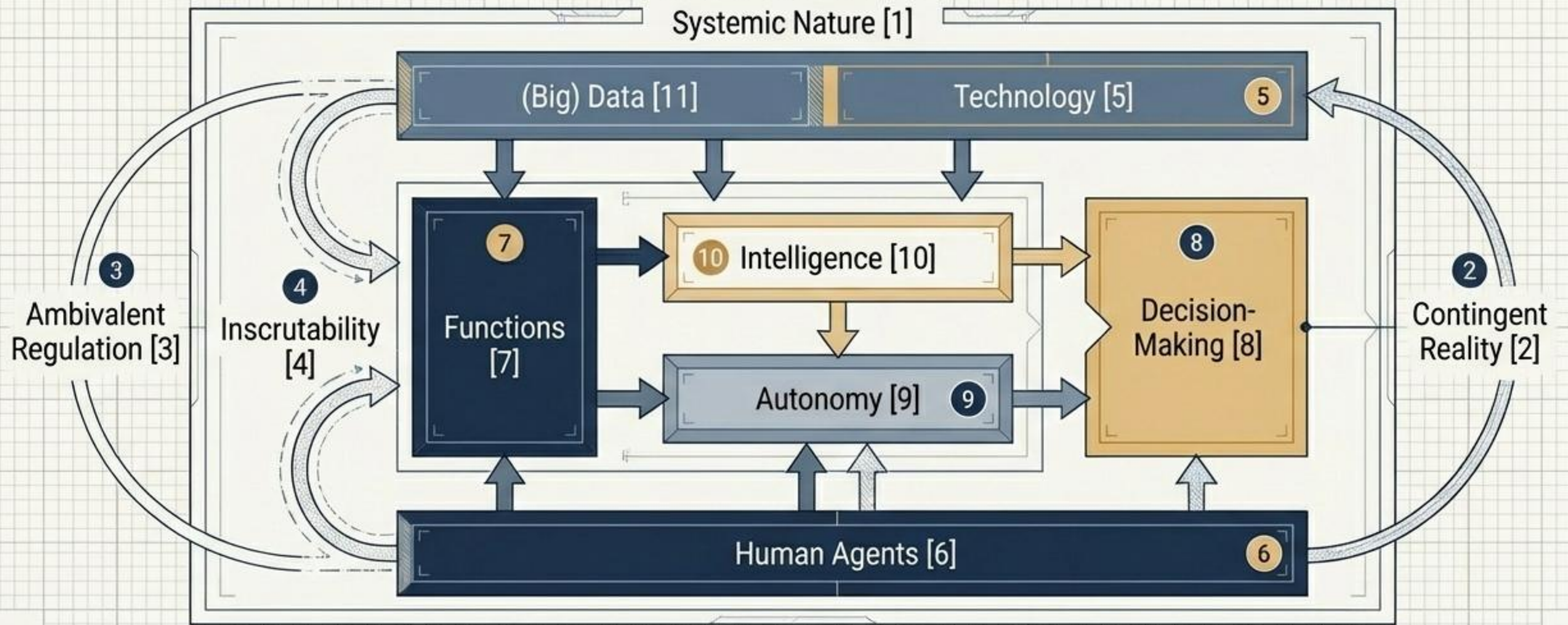
By isolating these concepts and focusing solely on technical capabilities, we ignore the human implications. This narrow perspective limits theoretical research and masks unjustified, unfair, discriminatory, and other harmful effects that emerge when these technologies interact in the real world.

# ADMS: The unifying engine of modern computing



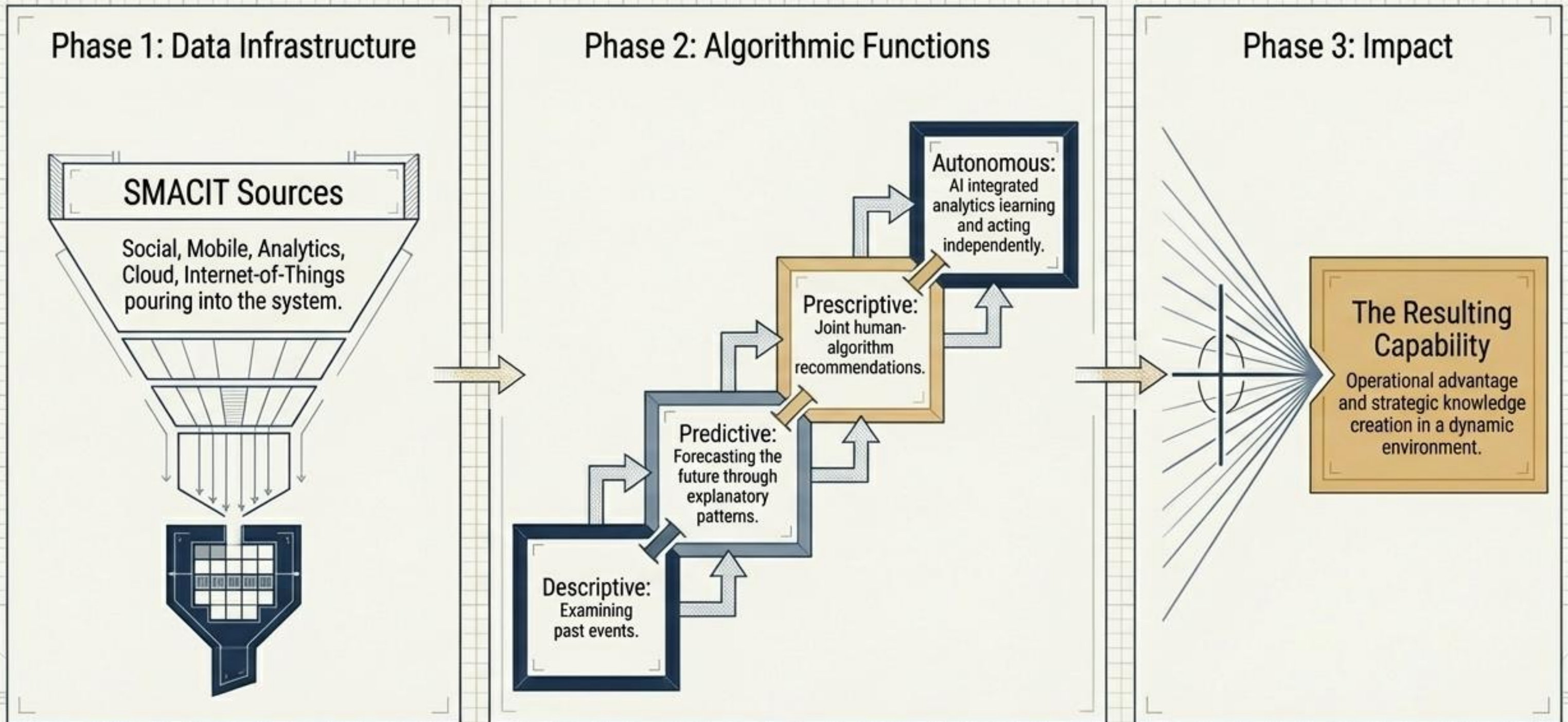
Core Principle: AI and BDA are not just parallel trends; they are interweaving capabilities. The merging of machines' cognitive abilities with voluminous data fundamentally changes how value is created.

# The Anatomy of an Algorithmic Decision-Making System



ADMS is not a linear tool; it is a continuous arrangement of interrelated, interdependent components where outputs constantly rewrite the inputs.

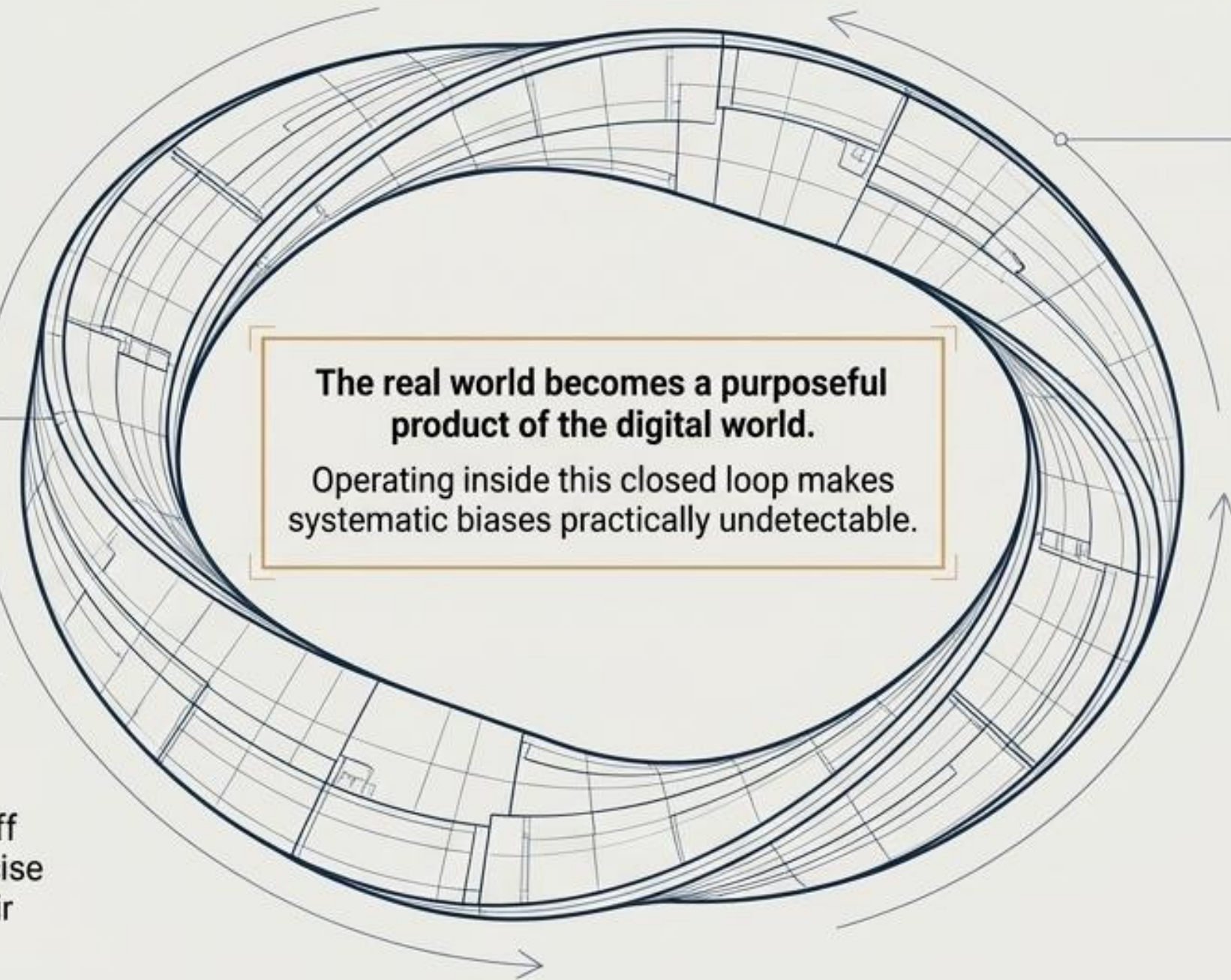
# The Core Engine: Converting complex data into decisive action



# The Agency Spectrum: Mapping human-machine interaction

<b>Socio-Technical State</b>	<b>System Dynamics</b>
<b>Points of Reference</b> (Mimicry)	Algorithms are modeled on human cognitive functions. Designers attempt to replicate human logic in the artificial realm.
<b>Complementary</b> (Augmentation)	<b>Creates Metahuman systems.</b> Humans provide strategic knowledge and interpretation; algorithms provide scale and speed.
<b>Controllers vs. Controlled</b> (Governance)	Humans set the possibility space. AI is restricted by boundaries (envelopment), but autonomy slowly allows algorithms to dictate human workflows.
<b>Competing</b> (Supersession)	AI emulating or outperforming human labor. Autonomous agents taking over tasks formally undertaken by humans.

# The Unseen Loops: Inscrutability and Contingent Reality



**The real world becomes a purposeful product of the digital world.**  
Operating inside this closed loop makes systematic biases practically undetectable.

## Contingent Reality

Algorithms working inductively from data.

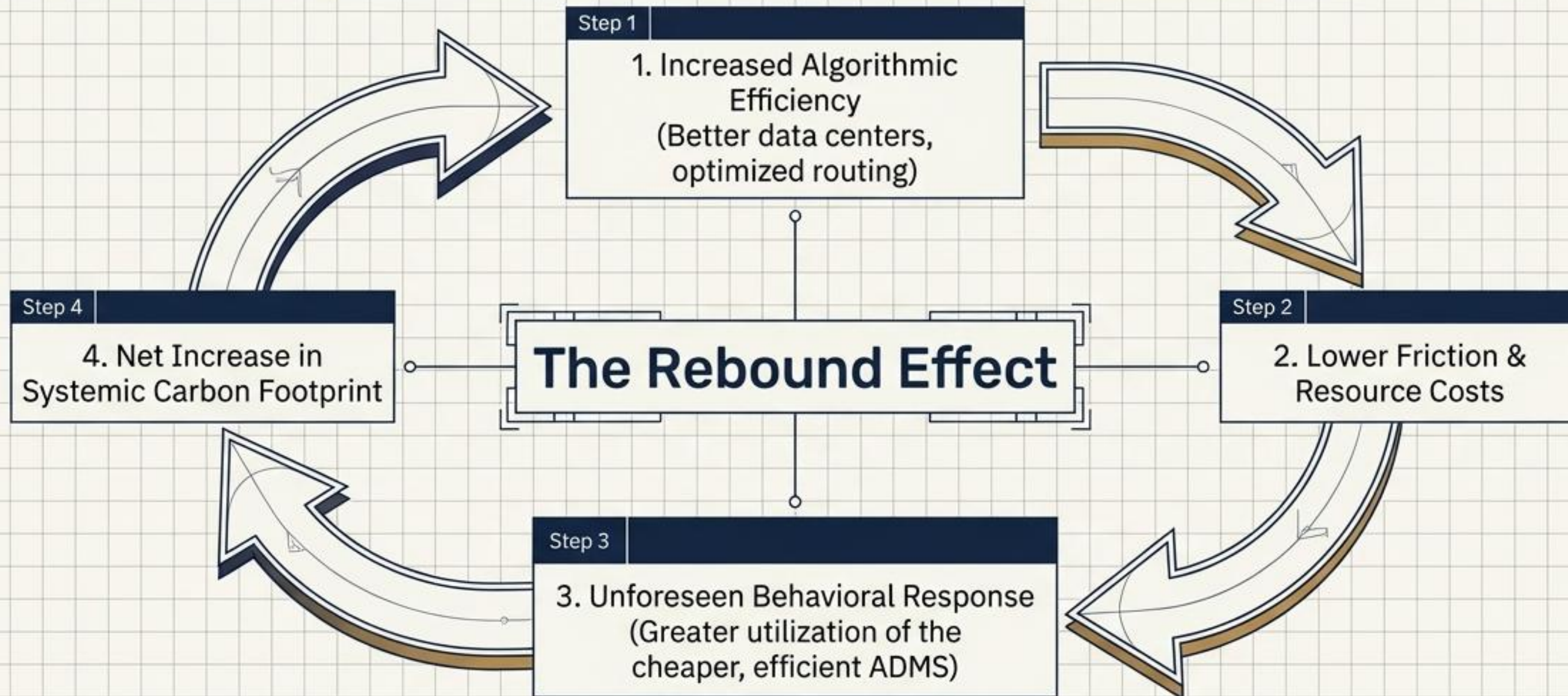
Computing processes do not just represent reality; they actively participate in and shape it.

## Inscrutability

Driven by opacity, transparency, explainability, and interpretability.

The explainability-accuracy tradeoff means we often rely on highly precise models without understanding their potentially faulty reasoning.

# Application: The Sustainability Paradox



Artificial evaluation of technical efficiency looks successful on paper, but ignoring the Systemic Nature and human behavioral responses leads to paradoxically higher overall emissions.

# The E-Waste Blindspot: How missing data creates false realities

## The ADMS View (Representational Bias)



Algorithms compute environmental assessments based solely on available domestic data in wealthy nations, declaring a "green success".

## The **Ground Truth** (Algorithmic Pollution)



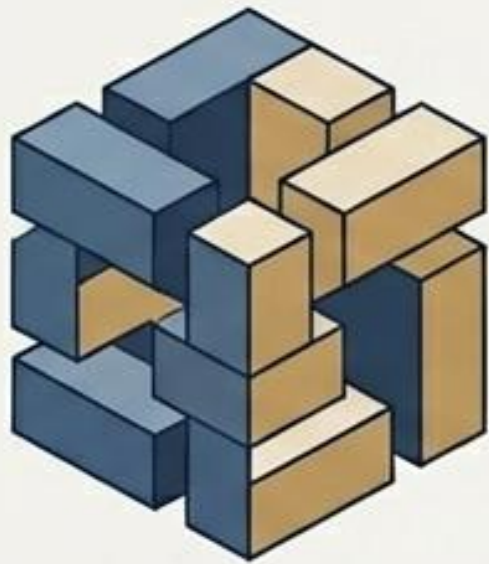
Lack of global data coverage means the system is blind to the toxic recycling transboundary movement and severe health issues created in poorer regions.

### KEY INSIGHT

An ADMS is only as ethical as its empirical representation. Missing data doesn't just mean a blank spot; it shapes a world where localized successes mask global catastrophes.

# The Holistic Mandate for Future Systems

## Technical Accuracy



## Socio-Technical Accountability



Evaluating purely on technical performance, algorithmic accuracy, and isolated efficiency.

Designing for inscrutability, tracking systemic rebound effects, and auditing for representational gaps in data.

The future of information systems requires moving beyond measuring how well an algorithm computes. We must take accountability for the reality it constructs.