Geospatial World Forum 2026

# Geospatial & AI Convergence: Engineering the Future of Liveability

Keynote Presentation - Geospatial World Forum 2026

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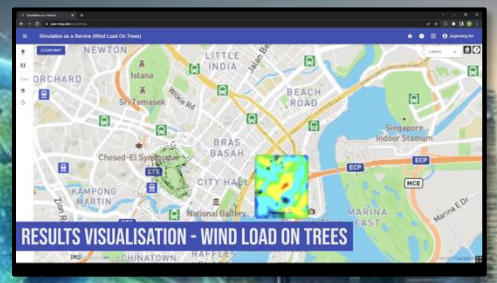
# When Geospatial, Sensors, Systems, and Building Information Converge.

# AI Comes Alive.




## Geospatial
(Context & Location)

## BIM
(Anatomy & Structure)

## Sensors/IoT
(Pulse & Real-time Data)

## Systems/OT
(Muscle & Operations)

**AI Orchestration:**
**Autonomous & Liveable City**
**"GEOAI + Physics AI"**

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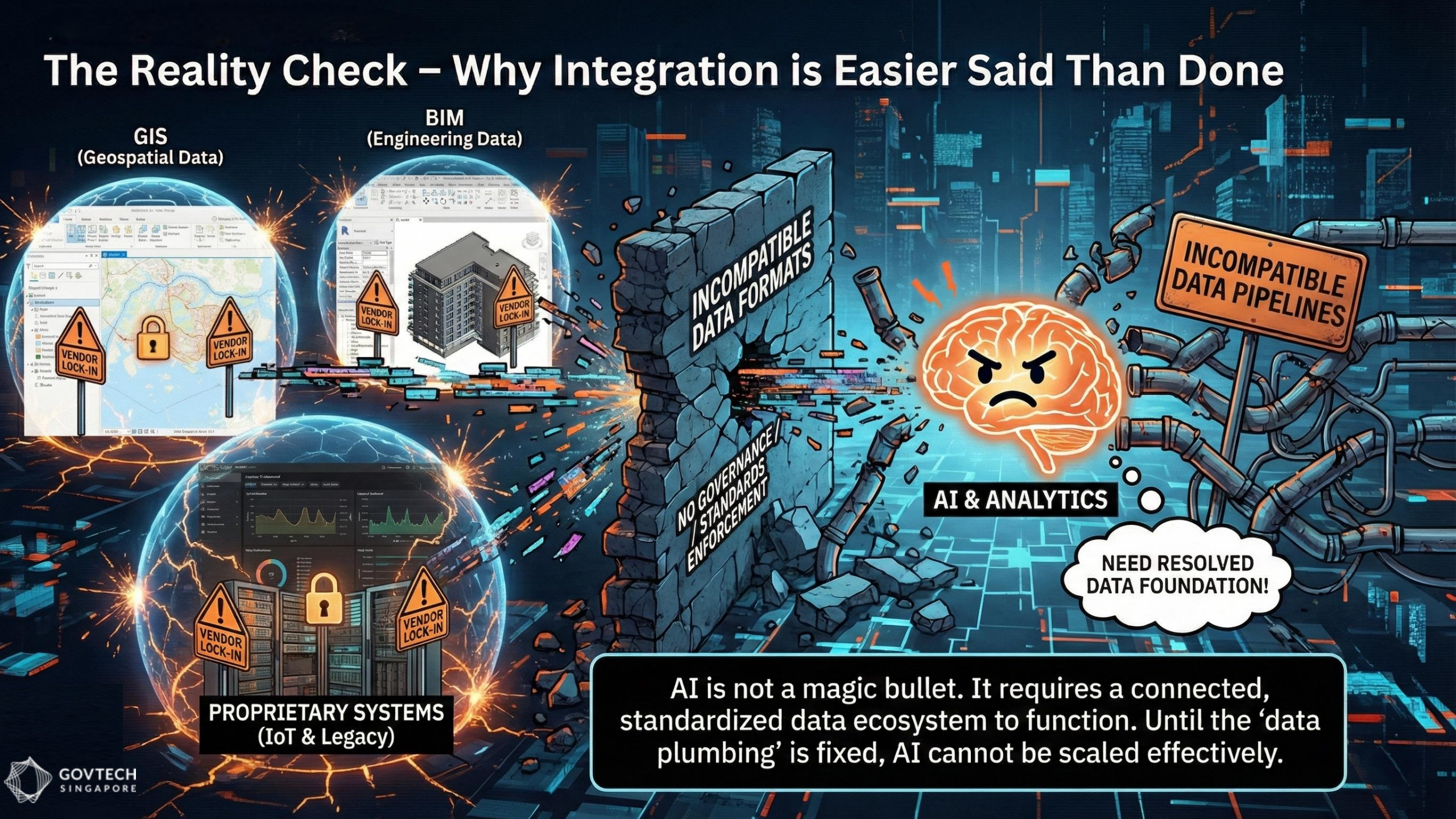
# The Reality Check – Why Integration is Easier Said Than Done




AI is not a magic bullet. It requires a connected, standardized data ecosystem to function. Until the 'data plumbing' is fixed, AI cannot be scaled effectively.

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# The Foundation - Layered Approach


**4. AI & Autonomous Services**
(Predictive & Self-Optimizing)

**3. Open Digital Platforms (ODP)**
(Interoperable & Ecosystem-Ready)

**2. Integrated Data**
(BIM/GIS Fusion & Virtual Singapore)

**1. Governance/Standards**
(Institutional Alignment & Policies)

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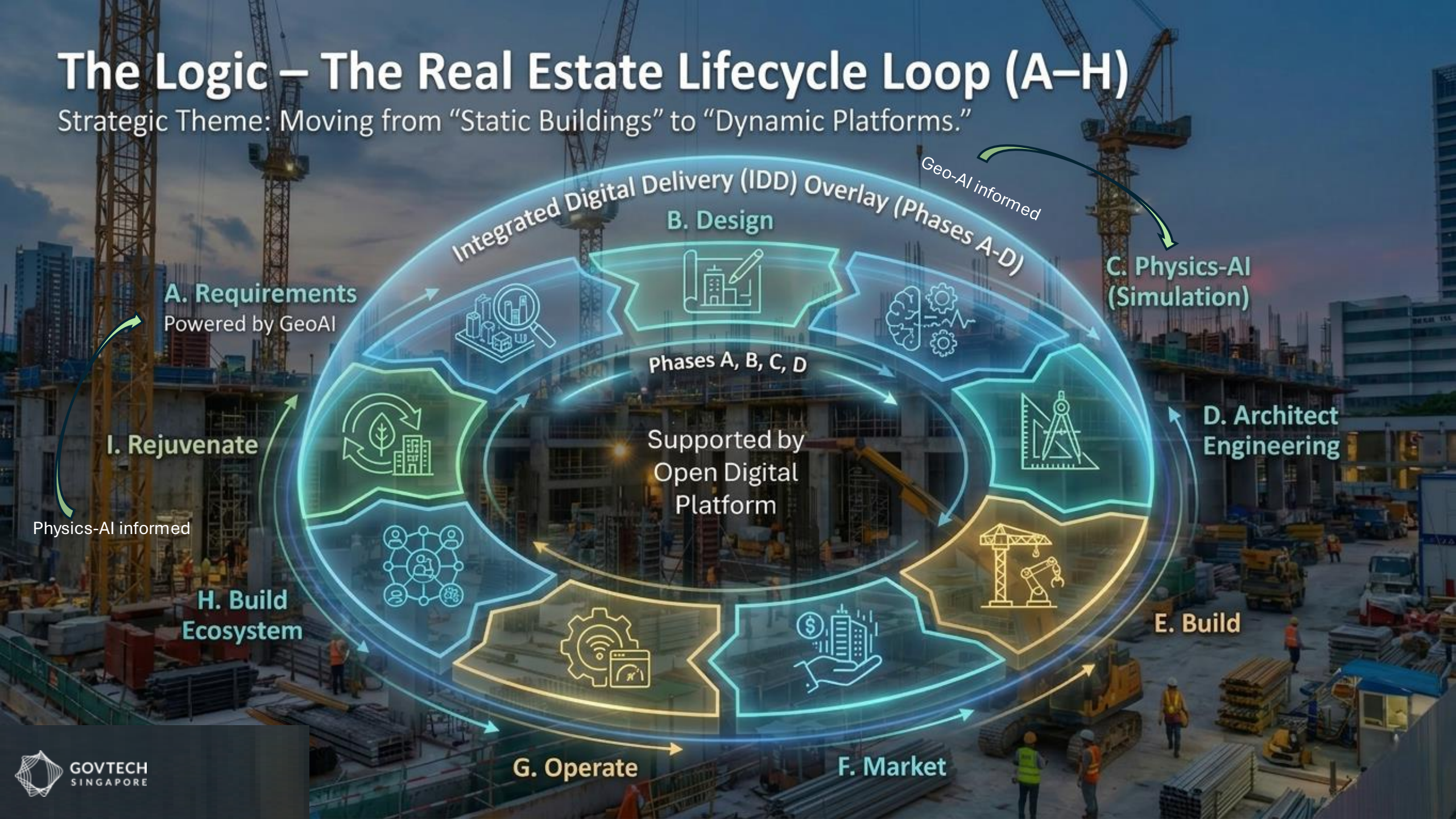
*Technology scales only on a stable institutional foundation.*

# The Logic – The Real Estate Lifecycle Loop (A–H)

Strategic Theme: Moving from "Static Buildings" to "Dynamic Platforms."

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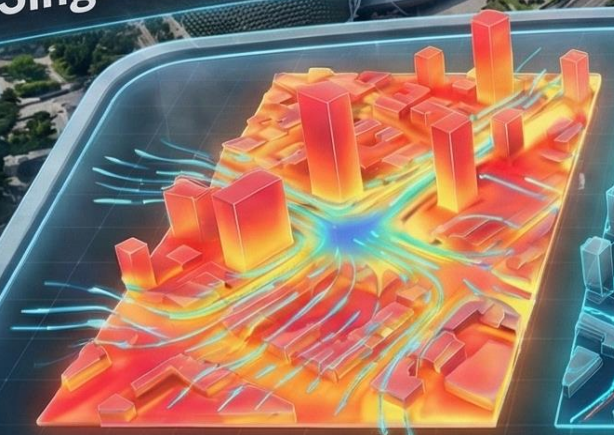
# Phase A – Requirements: The Geospatial Foundation

Digital Twin: 3D City Model as Single Source of Truth

Defining Boundary Conditions (Pre-Design)

Environmental & Social Impact Simulation



URBAN CLIMATE ANALYSIS
(Heat & Windflow)

FLOOD RESILIENCE &
WATER MANAGEMENT

SOCIAL DENSITY
& CONNECTIVITY

DATA LAYERS

- SINGAPORE
- POPULATION
- CLIMATE RESILIENCE
- DATA

Powered by GeoAI

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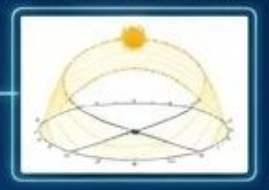
# Phase B – Design (Generative & Environmental)

## AI-Driven Optimization using Real-Time Data Streams (Heat, Solar, Density, Mobility).

**UHI MITIGATION:** Optimized
(Cooling Corridors Active)

**SOLAR GAIN:** Balanced
(Dynamic Shading Integrated)



LIVE ENVIRONMENTAL DATA

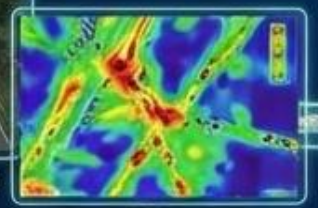
real weather radar


**ROUTE FINDING:** Enhanced
(Pedestrian Connectivity +30%)

**SPACE UTILIZATION:**
Adaptive |Flexible Layouts)

REAL-TIME MOBILITY & ROUTE DATA

Real-time traffic camera



Dynamic heatmap

DYNAMIC DENSITY & SPACE USAGE

**FOUNDATION LAYER**
(Integrated Real-Time Data Aggregation)

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# Physics-AI: Traditional vs. Large Physics Models (LPM)

Moving from Visual Twins to Behavioral Twins.

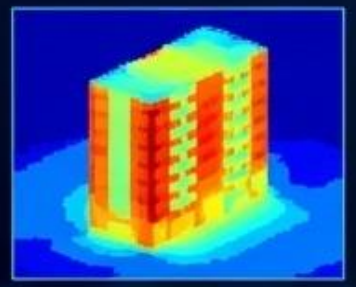
## TRADITIONAL SIMULATION (CFD/FEA)

TIME: HOURS/DAYS PER ITERATION

PROCESS: SILOED, DOCUMENT-HEAVY

25%

PROCESSING...



REAL TIME INTERACTION

STATIC SNAPSHOT (VISUAL TWIN)

## THE SHIFT

From Slow, Siloed, Document-Heavy to Real-time, City-Scale, Interactive Neural Operators

## LARGE PHYSICS MODELS (LPM)

TIME: MILLISECONDS/REAL-TIME

PROCESS: INTERACTIVE, NEURAL OPERATORS

100%

INSTANT PREDICTION


DYNAMIC INTERACTION (BEHAVIORAL TWIN)

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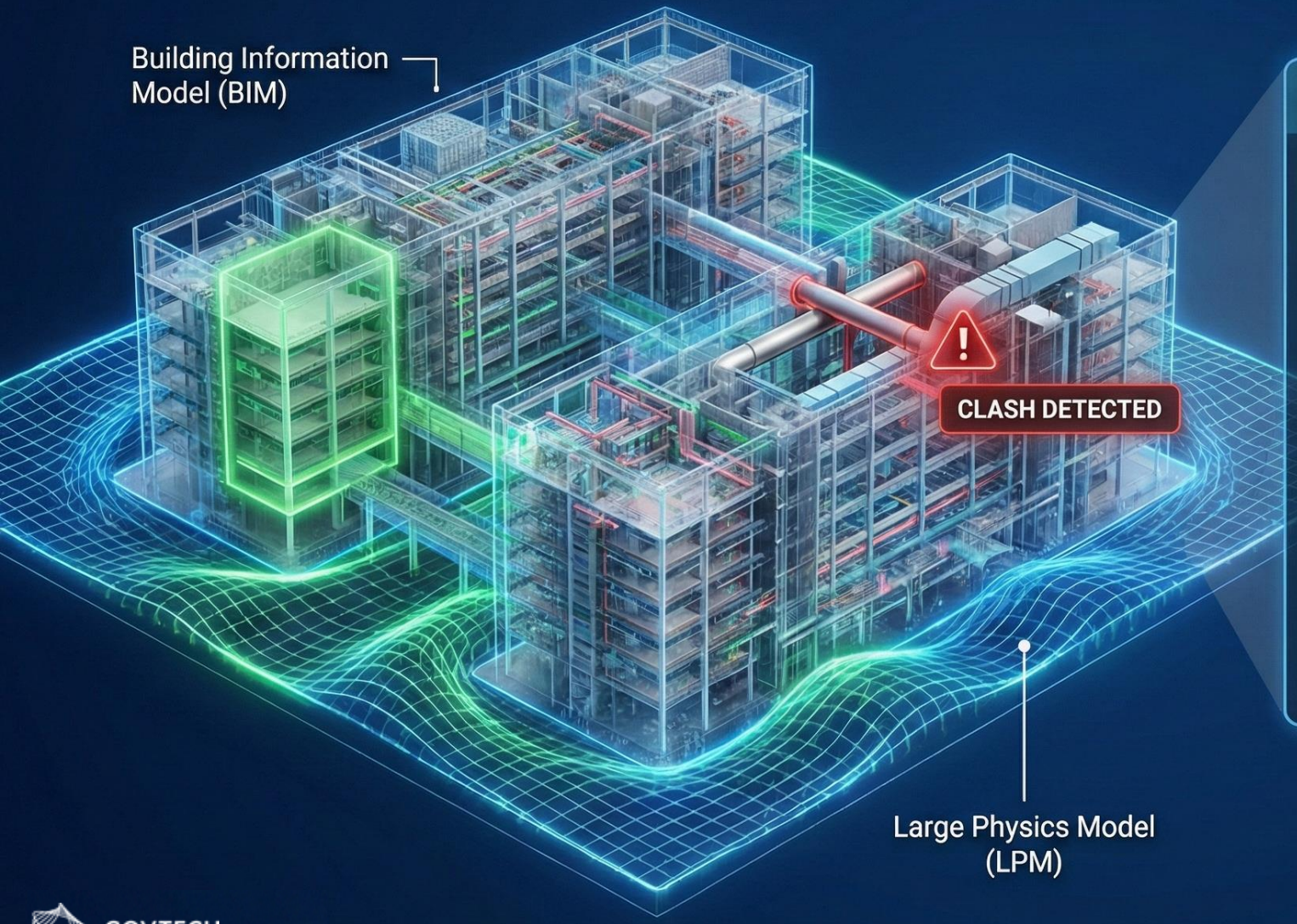
# Phase C – Architect (Precision Engineering & IDD)




## AUTOMATED COMPLIANCE & VALIDATION (AI & LPM)

| COMPLIANT SYSTEMS (Structural & Fire Safety) | NON-COMPLIANT ISSUES (MEP & Clearance) |
|---|---|
| ✓ Structural Integrity | ✗ Pipe/Duct Clash |
| ✓ Load Bearing Capacity | ✗ Headroom Clearance |
| ✓ Egress Routes | ✗ Electrical Separation |
| ✓ Fire Compartmentation | ✗ Maintenance Access |
| STATUS: **COMPLIANT** | STATUS: **NON-COMPLIANT** (Issues Detected) |

Real-time, automated detection of both compliance and non-compliance via Physics-AI.

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# Phase D & E – Construction & The Ecosystem Pivot

## PHASE D: AI-DRIVEN CONSTRUCTION


## PHASE E: THE ECOSYSTEM PIVOT (Building as a Service)


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# Phase F – Autonomous Operations (The Living Precinct)

AI Powering Liveability, Efficiency & Sustainability

## REACTIVE & MANUAL OPERATIONS
(The Oid Way)

DOWNTIME: HIGH

RESPONSE TIME: SLOW (Days)

STRVESS HUMAN FACILITIES MANAGER

Manual Manpower
(Aging Workforce)

High Carbon Footprint
(Static Usage)

SERVICE LEVEL: LOW

AI

## AI-DRIVEN AUTONOMOUS ORCHESTRATION
(The Future)

PREDICTIVE MAINTENANCE
(Zero-Downtime)

AUTOMATED RESOURCES
(Reduced Ground Manpower)

AI COMMAND CENTER

OPTIMIZED SUSTAINABILITY
(Real-Time Energy/Water Reduction)

ENHANCED LIVEABILITY
(Faster, Proactive Service)

SERVICE LEVEL: HIGH
(Solving Aging Population Issues)

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From Reactive Human Management to Proactive AI Orchestration.

# Phase H – Rejuvenate & Redevelop (Closing the Loop)


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Uplifting Older Estates through Data-Driven Interventions & Circular Economy.

# Conclusion – Converging Geospatial, Systems, and AI into a Smart City requires a layered approach


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In the era of AI, the smartest cities won't just be the ones with the best physical infrastructure—they will be the ones with the most integrated data foundation.