



The 23rd International Asset Facility and Maintenance Management Conference

Enabling the Digital Backbone – An Infrastructure-Driven Digital Twinning Model in a Smart Industrial City

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Riyadh, KSA

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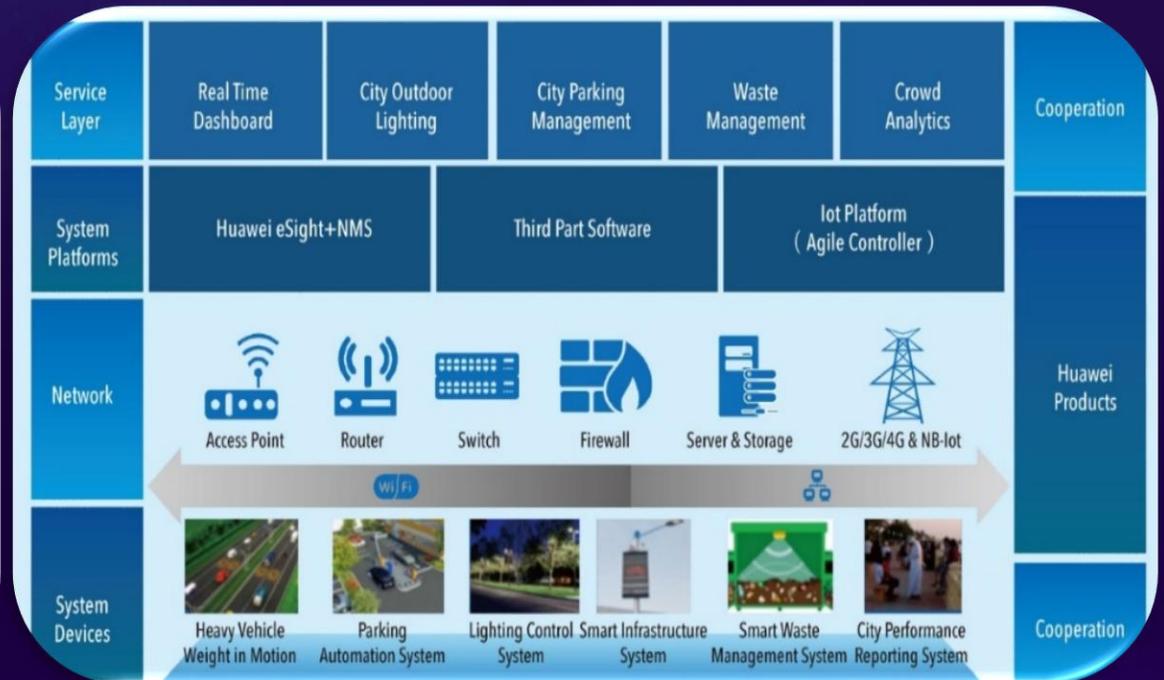
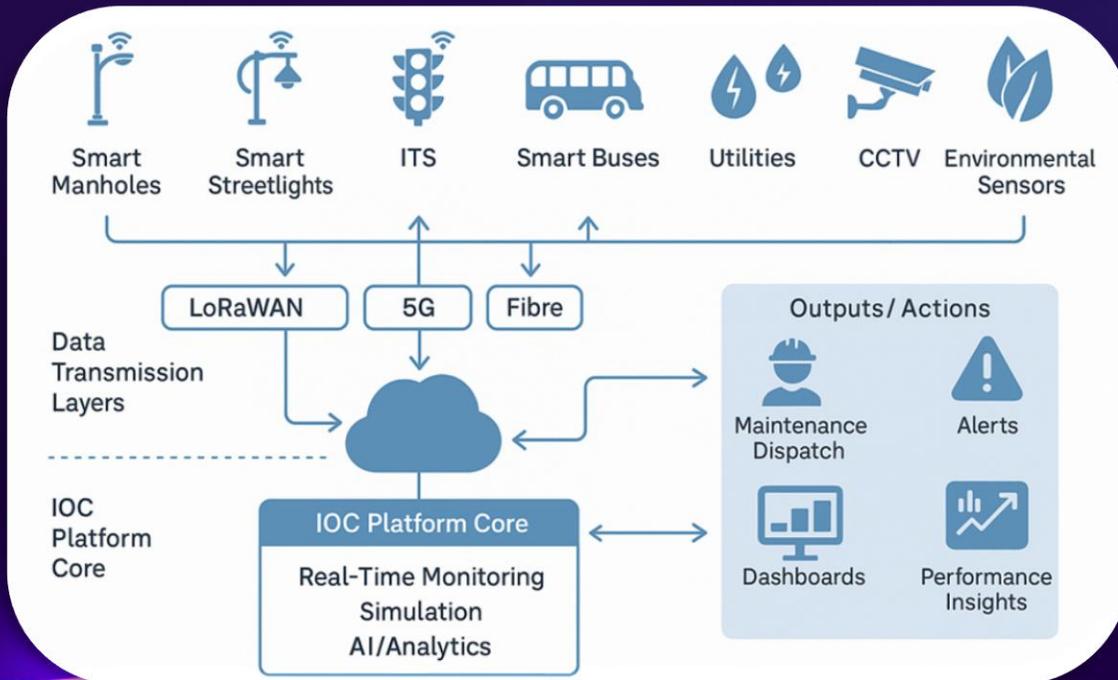
Vision 2030 and RC Yanbu's Smart City Mandate

- ❑ Vision 2030 Goals: Sustainability | Digital Economy | Efficiency
- ❑ RC Yanbu - Model Smart Industrial City
- ❑ Integrated Asset & Facility Management Framework



The Digital Backbone Concept

- ❑ Fibre Optics | 5G | IoT | Edge Computing | Cloud
- ❑ Unified Data Ecosystem → Digital Twin
- ❑ From Physical Assets to Digital Intelligence



The Intelligent Operation Center (IOC)

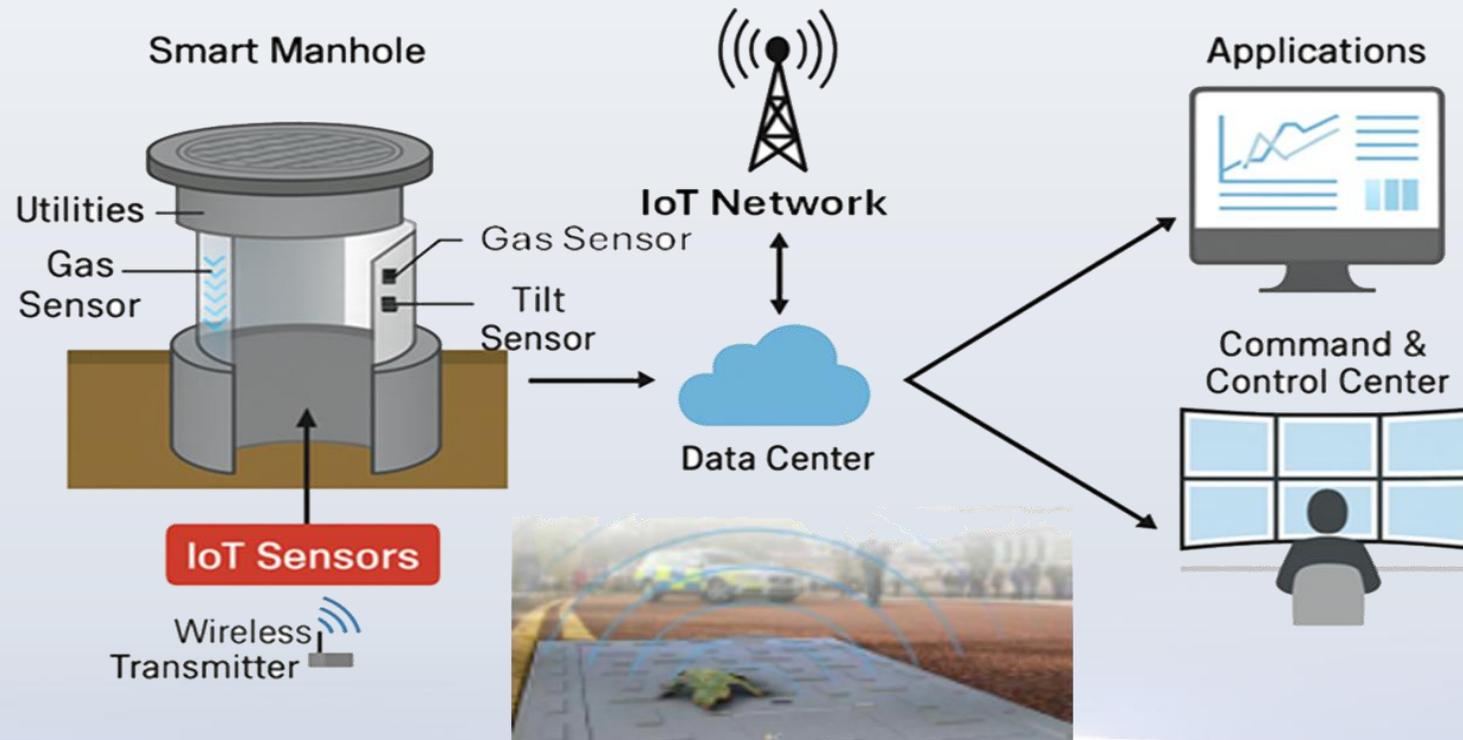
- ❑ Real-Time Monitoring | Predictive Analytics
- ❑ Cross-Sector Integration | Emergency Response
- ❑ Command → Control → Insight



Integrated Command & Control Architecture

Use Case 1: Smart Manholes

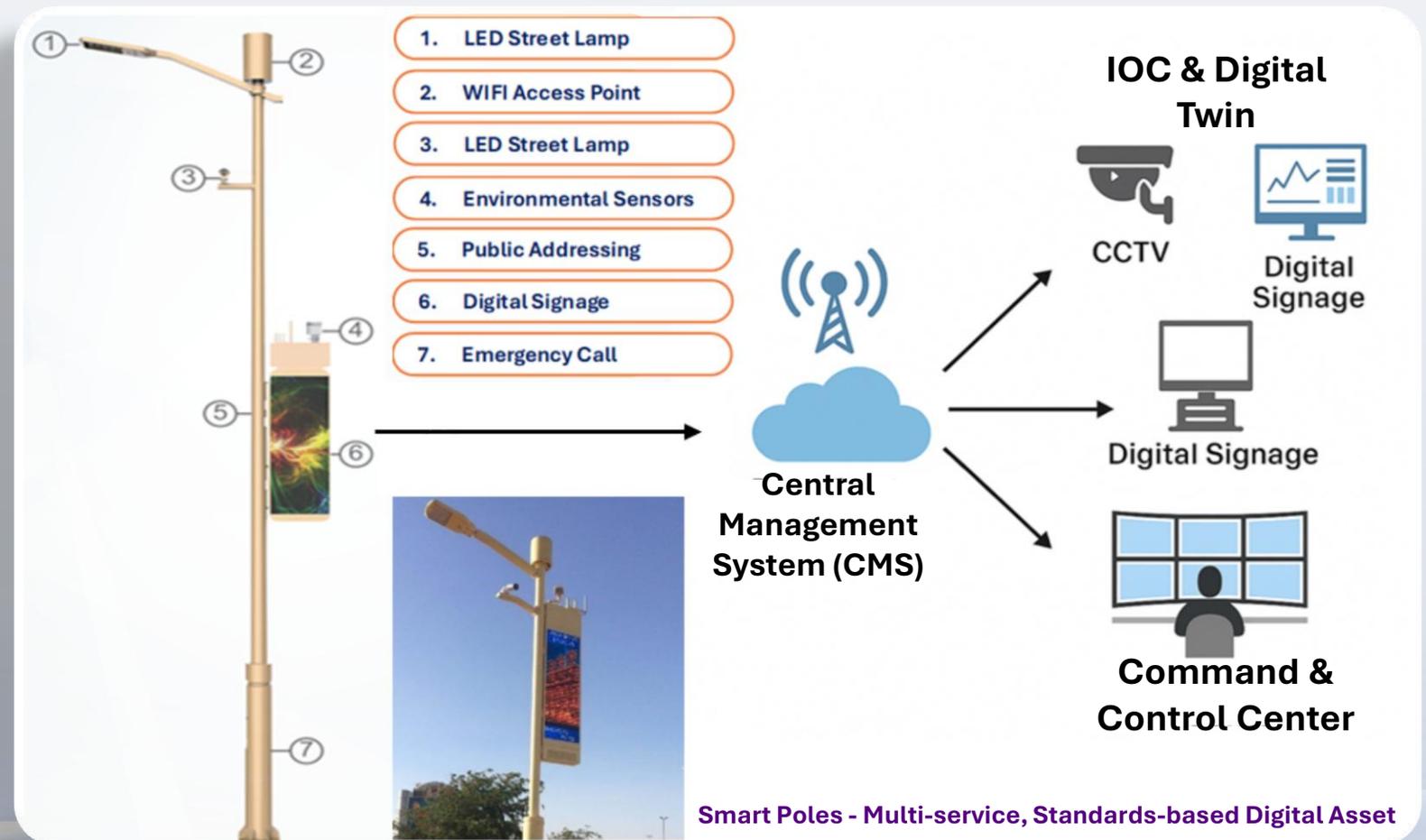
- ❑ IoT Sensors (H₂S, CH₄, Tilt, Water Ingress)
- ❑ Predictive Maintenance & Worker Safety
- ❑ Real-Time Alerts to IOC



Smart Manhole Cover System Architecture

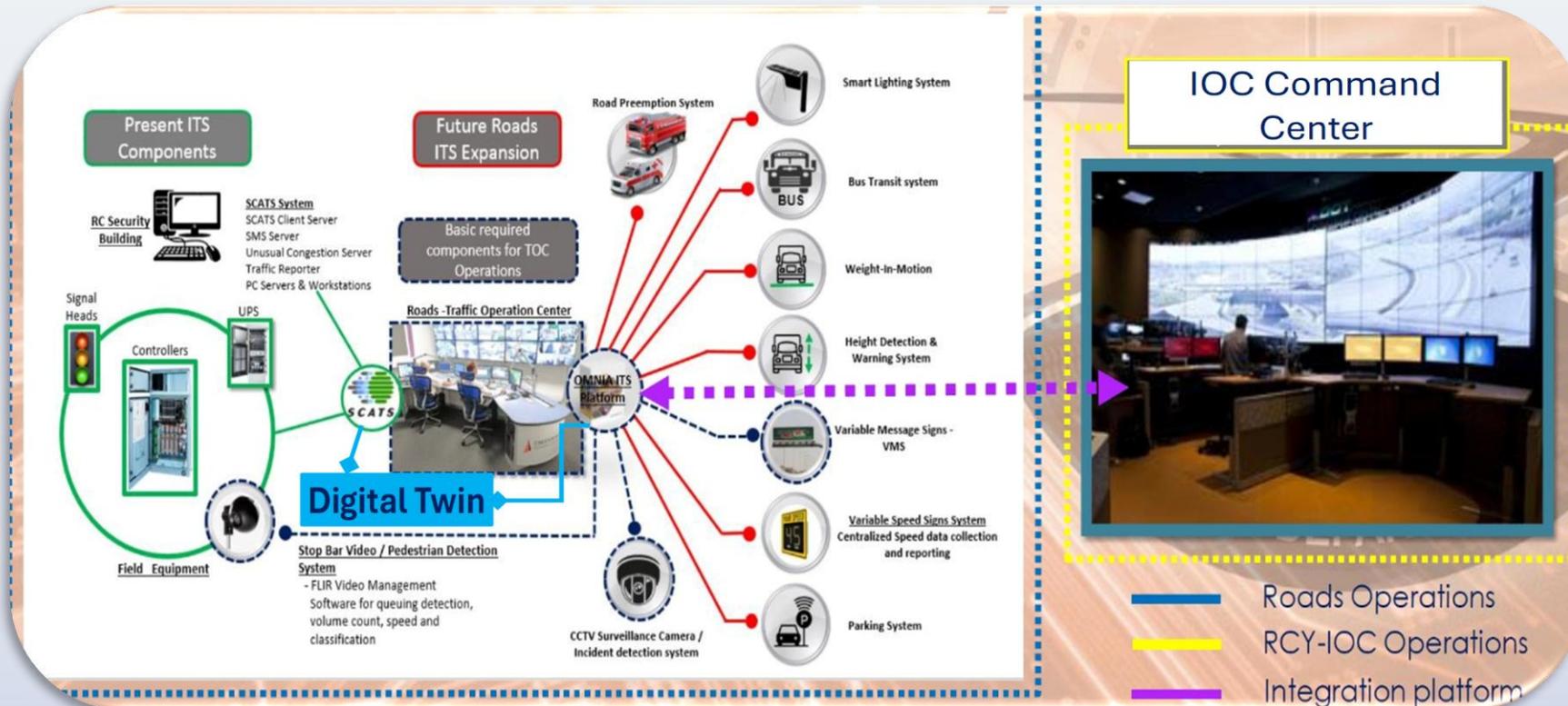
Use Case 2: Smart Poles (Connected Urban Services)

- ❑ RTU-based LED lighting & Modular Pole Architecture
- ❑ Adaptive Dimming | Energy Metering | Remote Fault Alerts
- ❑ Integration with IOC & Digital Twin



Use Case 3: Intelligent Traffic System (ITS)

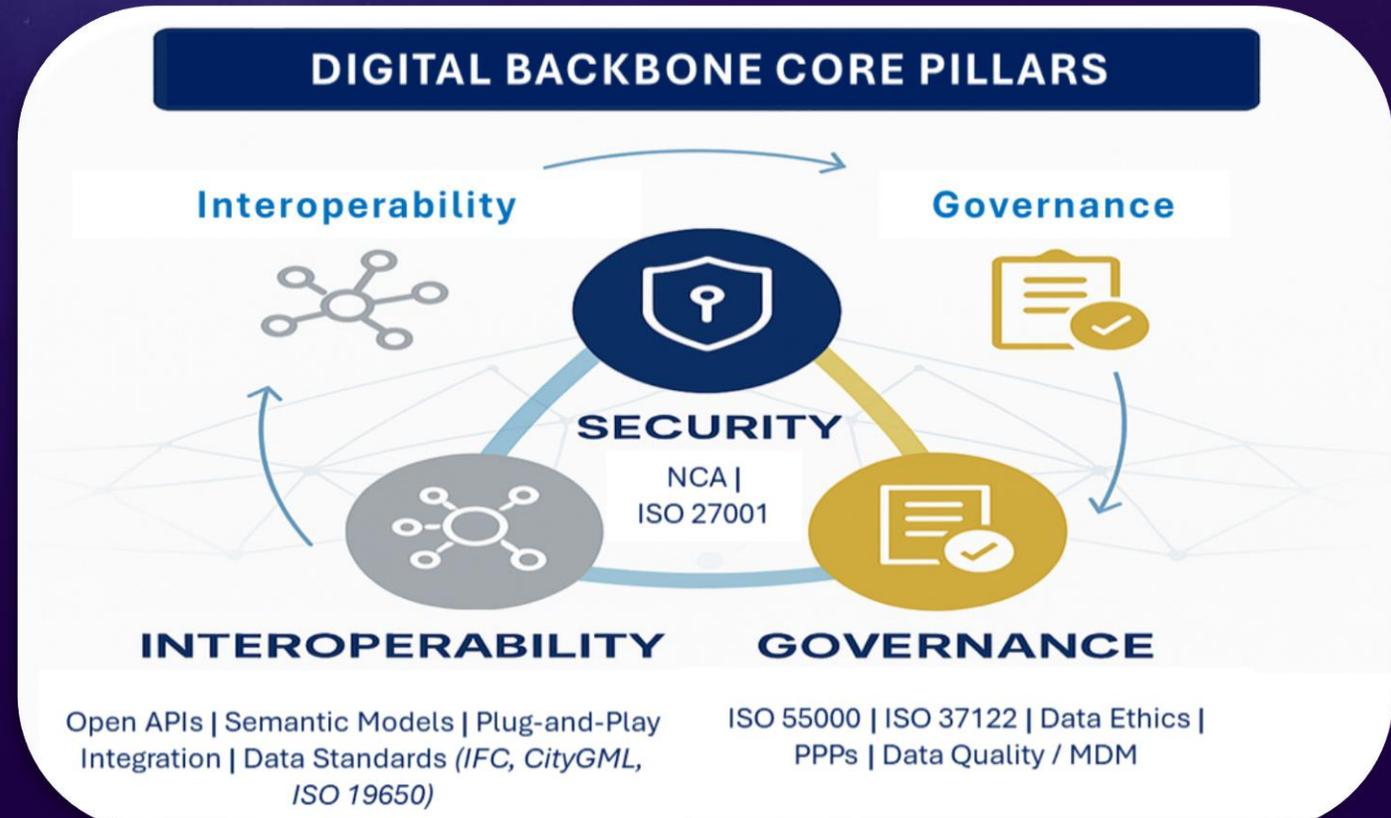
- ❑ SCATS 6 Adaptive Signal Control
- ❑ Tyco Eclipse Intersection Controllers
- ❑ Integration with IOC & Mobility Digital Twin



Intelligent Traffic System – SCATS & Tyco Eclipse Integration

Key Enablers: Interoperability | Security | Governance

- ❑ ISO 55000 & 37120/22 – Data Governance & Standardization
- ❑ NCA & ISO 27001 – Cybersecurity Controls
- ❑ Open APIs + Common Data Models – Interoperability Framework
- ❑ Public - Private Partnerships



Foundation for Smart, Safe and Sustainable Operations

The Real Benefits of IOC Integration

Turning Data into Decisions – The Heart of the Smart City



- ❑ <5 – minute coordinated emergency response
- ❑ Unified development and planning across department
- ❑ Big data-driven decision-making and resource allocation
- ❑ Integrated asset lifecycle management and predictive maintenance
- ❑ Enhanced situational awareness and faster problem resolution

 **Turning Data into Decisions**



Challenges and Lessons Learned

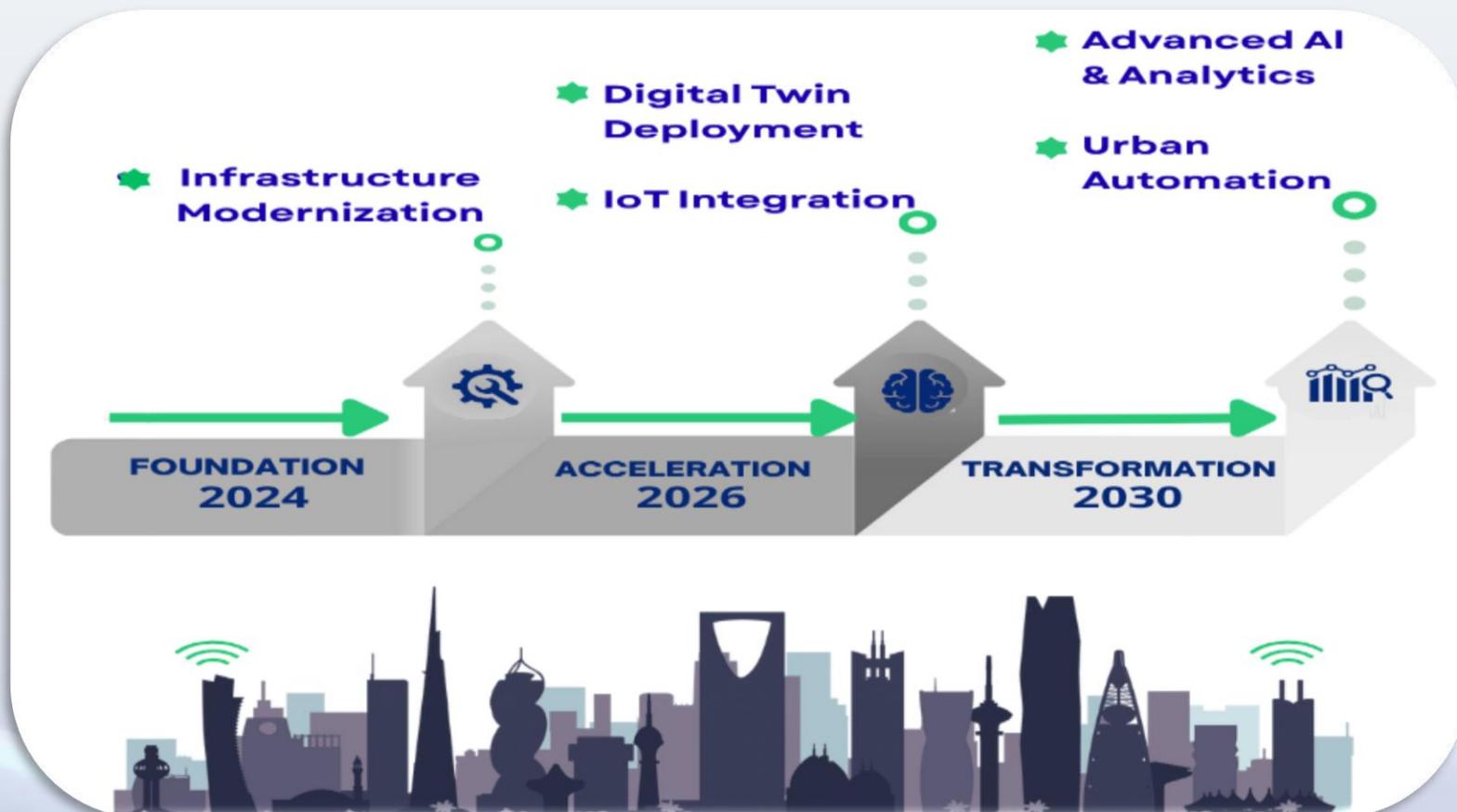
- ❑ Legacy System Integration | Data Silos
- ❑ Skills Development & Change Management
- ❑ Agile Delivery | Vendor Partnerships



3-Step Journey Path

Conclusion & Future Outlook

- ❑ Expansion to All Utilities, Waste, Urban Planning and Environmental
- ❑ AI & Machine Learning for Predictive Operations
- ❑ Vision 2030 – Smart Industrial City Model



RC Yanbu Smart City Evolution Roadmap



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Smart Infrastructure | Smarter Cities | Sustainable Futures

THANK YOU!



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