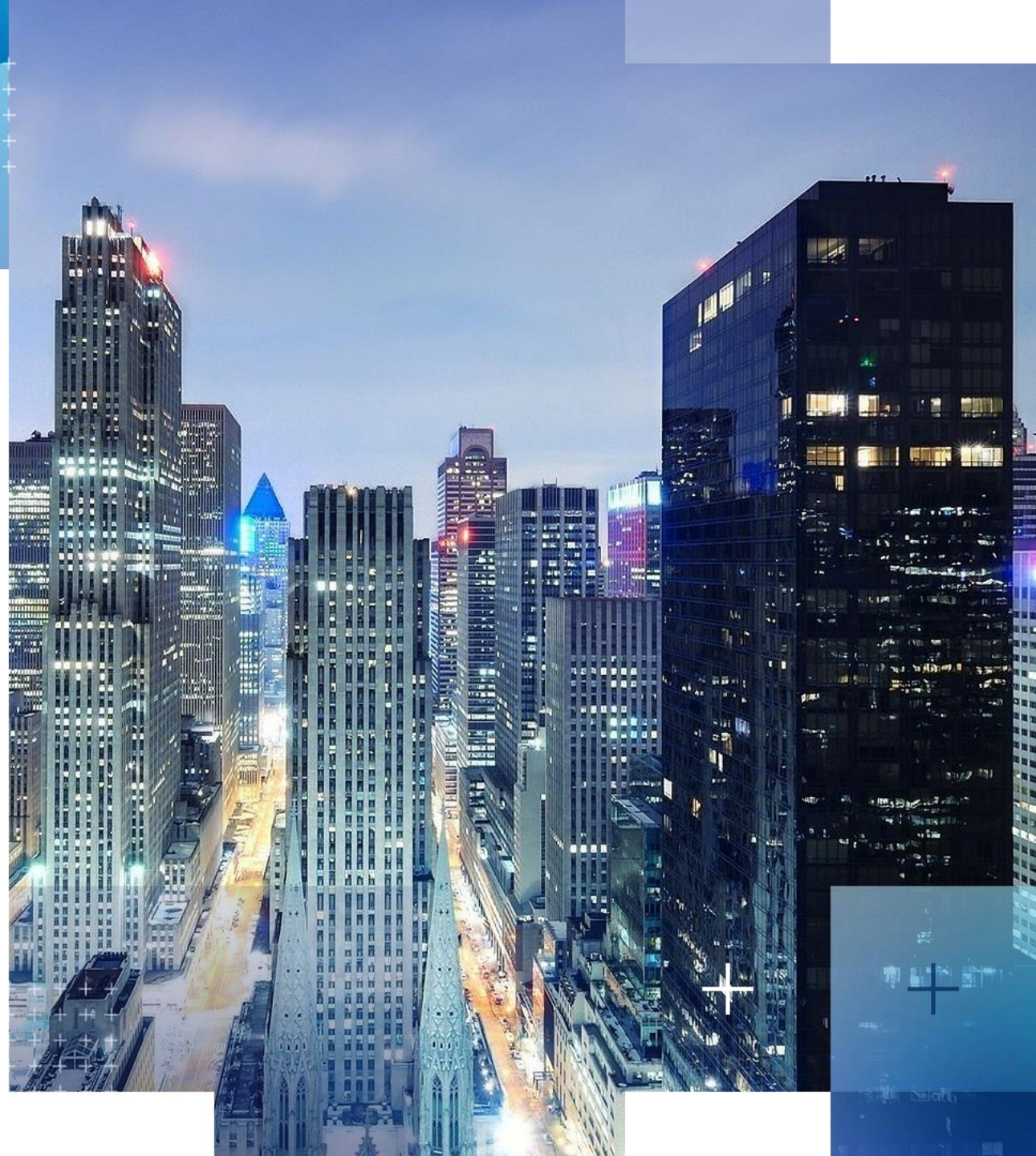
Digital Twins and Using Data to Reduce the Performance Gap

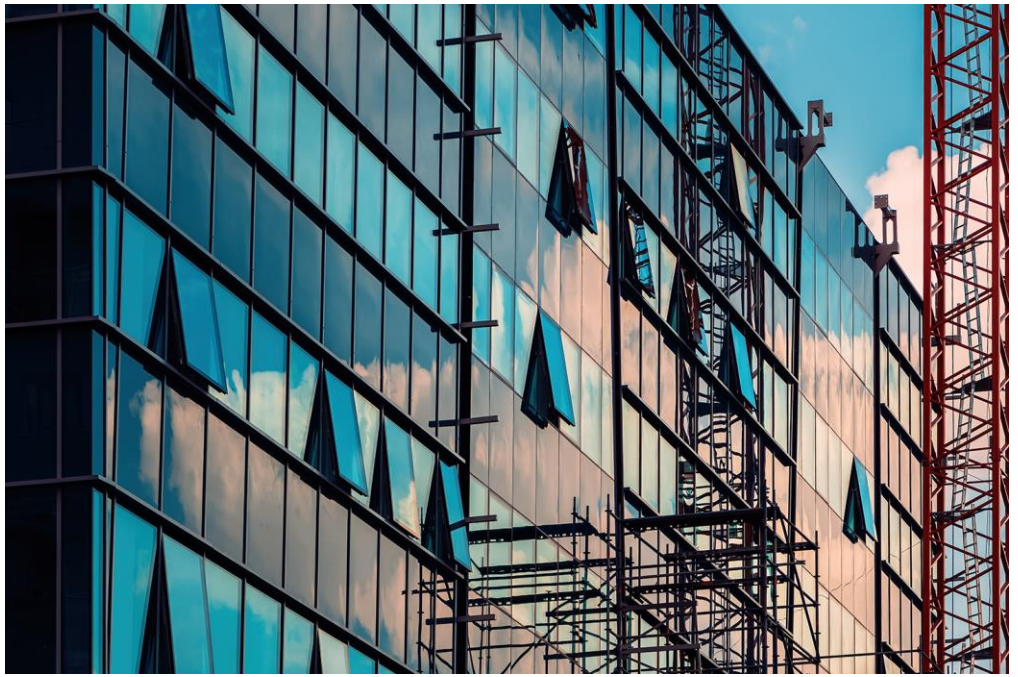
CITA Automation Series - Green Automation: Streamlining Sustainability, Automating Building Compliance

Ian Pyburn



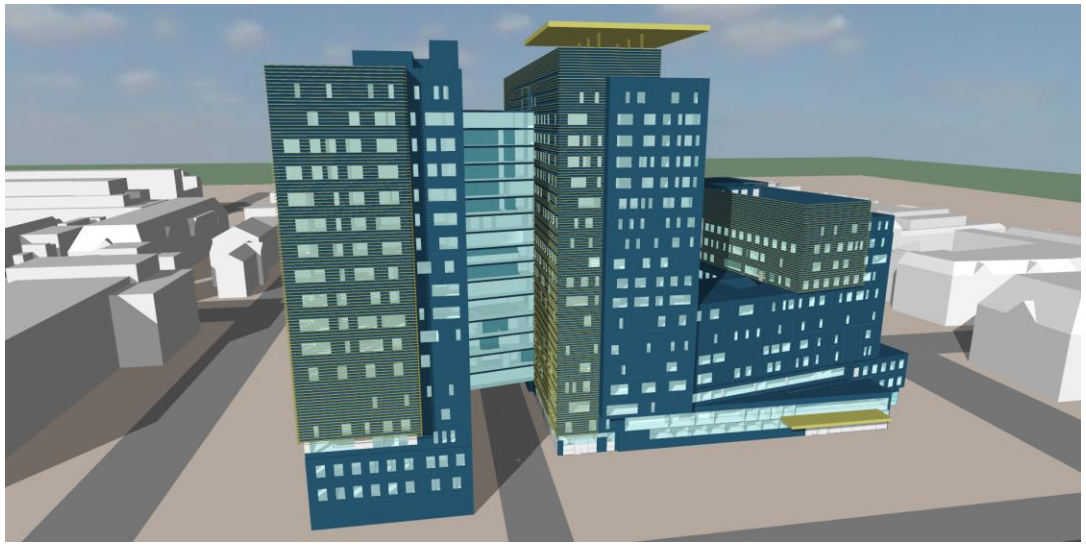
Impact of Data & the Performance Gap on green buildings

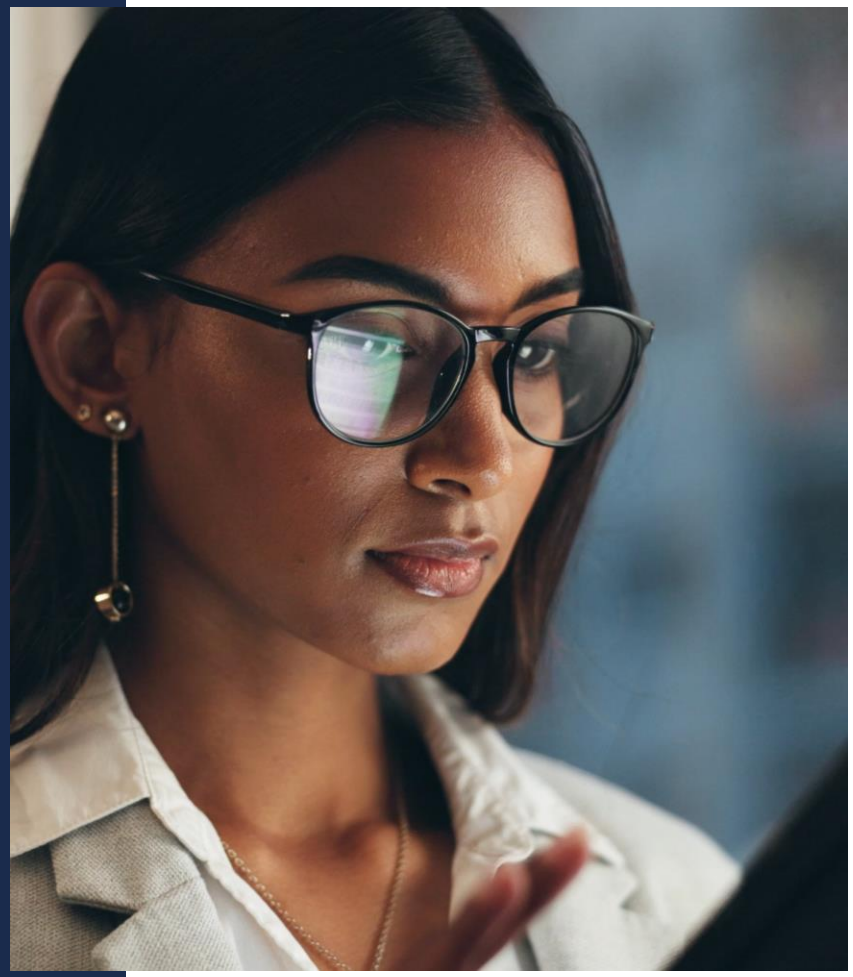
- Average performance gap: 20–50% more energy in operation than predicted at design (*European Commission, BPIE, UK Better Buildings Partnership*).
- Facility managers: 30% of their time just gathering and reporting compliance data (*Verdantix, 2022*).
- 70% of building data goes unused due to silos, poor integration, or lack of analytics (*McKinsey*).
- Integrated digital building data can cut reporting time by 60% and unlock 10–20% in operational energy savings (*World Green Building Council*).



Modern Challenges for compliance in buildings

- Compliance demands are rising, but too often reporting is reactive and disconnected from actual building performance.
- Aging BMS systems and data challenges
- Daily inefficiencies create energy, carbon & cost waste
- Competing priorities across multiple stakeholders involved in the decision making process

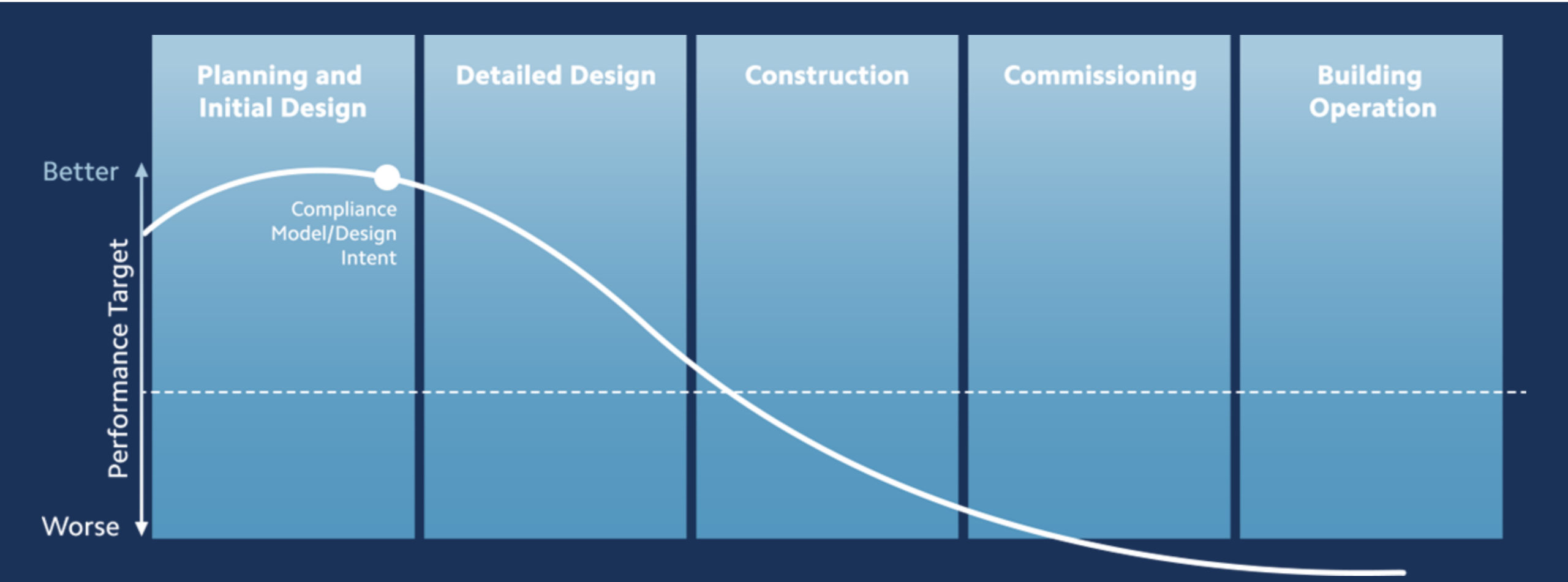




Making Good Decisions

- Digital twins + automation can bridge this gap
- Digital twin technology is key
- Data vs actionable information
- Optimise building & system operation
- Reduce performance gap of facilities while balancing other priorities, e.g.
  - Need to keep energy intensive equipment running
  - Support occupant health & wellbeing

Performance Gap Explained: Building Operation Drift



Buildings don’t perform to their design intent and sometimes perform worse than even the minimal design targets

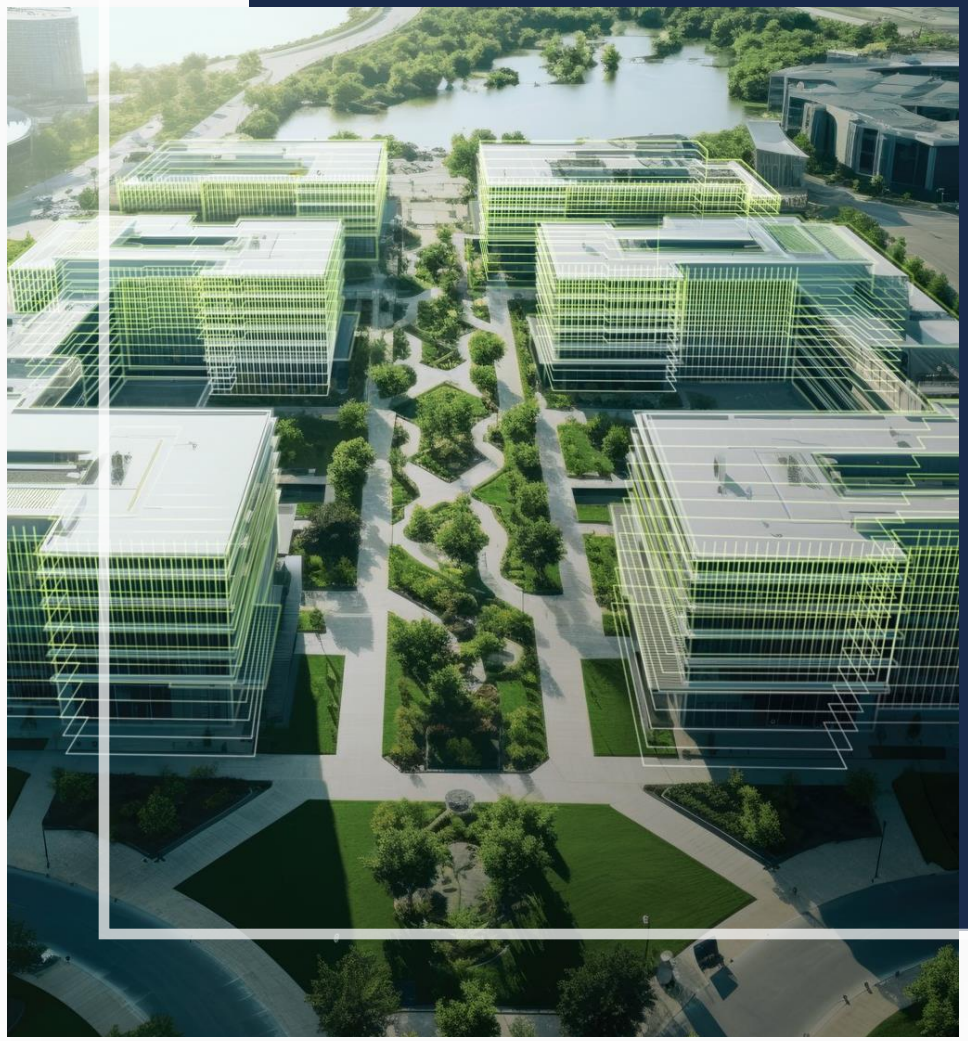
The problem with buildings

- 90% of our time is spent indoors with different operating habits than intended
- Complex, dynamic assets with shifting requirements (hourly, daily)
- Buildings designed for energy, but controlled for comfort or productivity

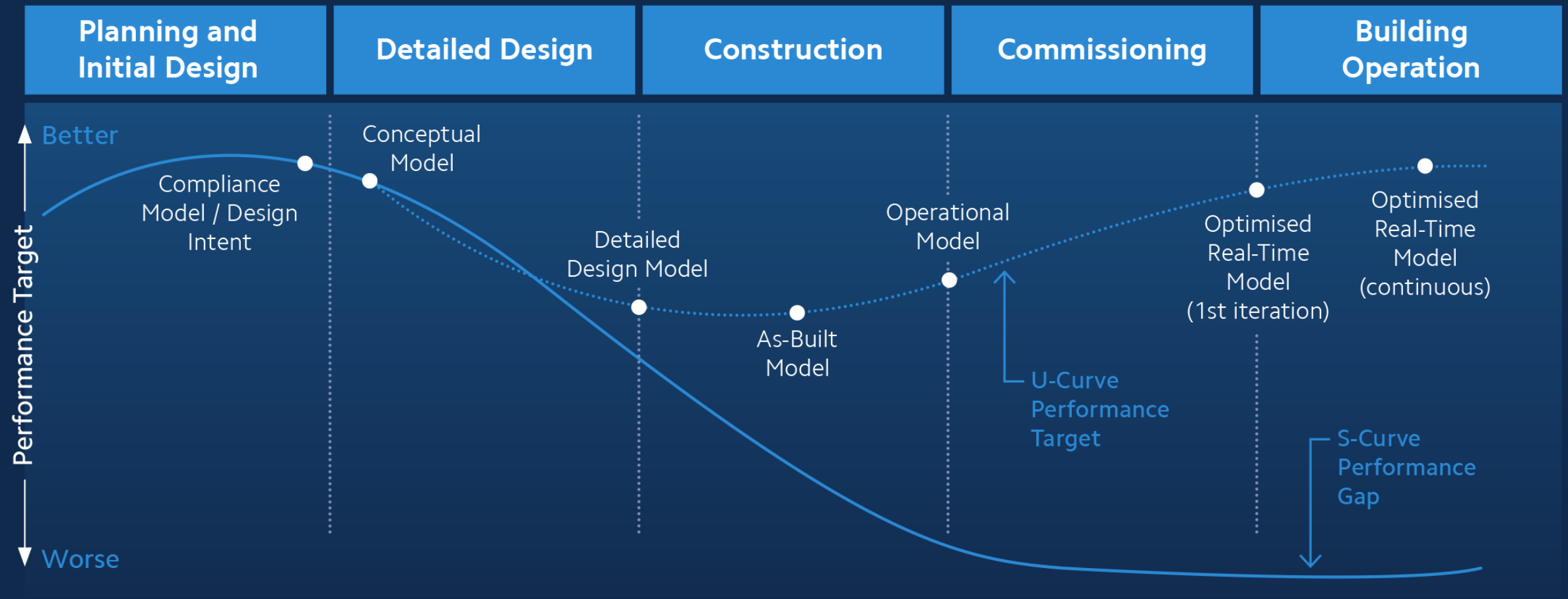
The Data Trap

- Siloed systems
- Poor data quality
- Manual reporting

It is not just technical—it's also procedural



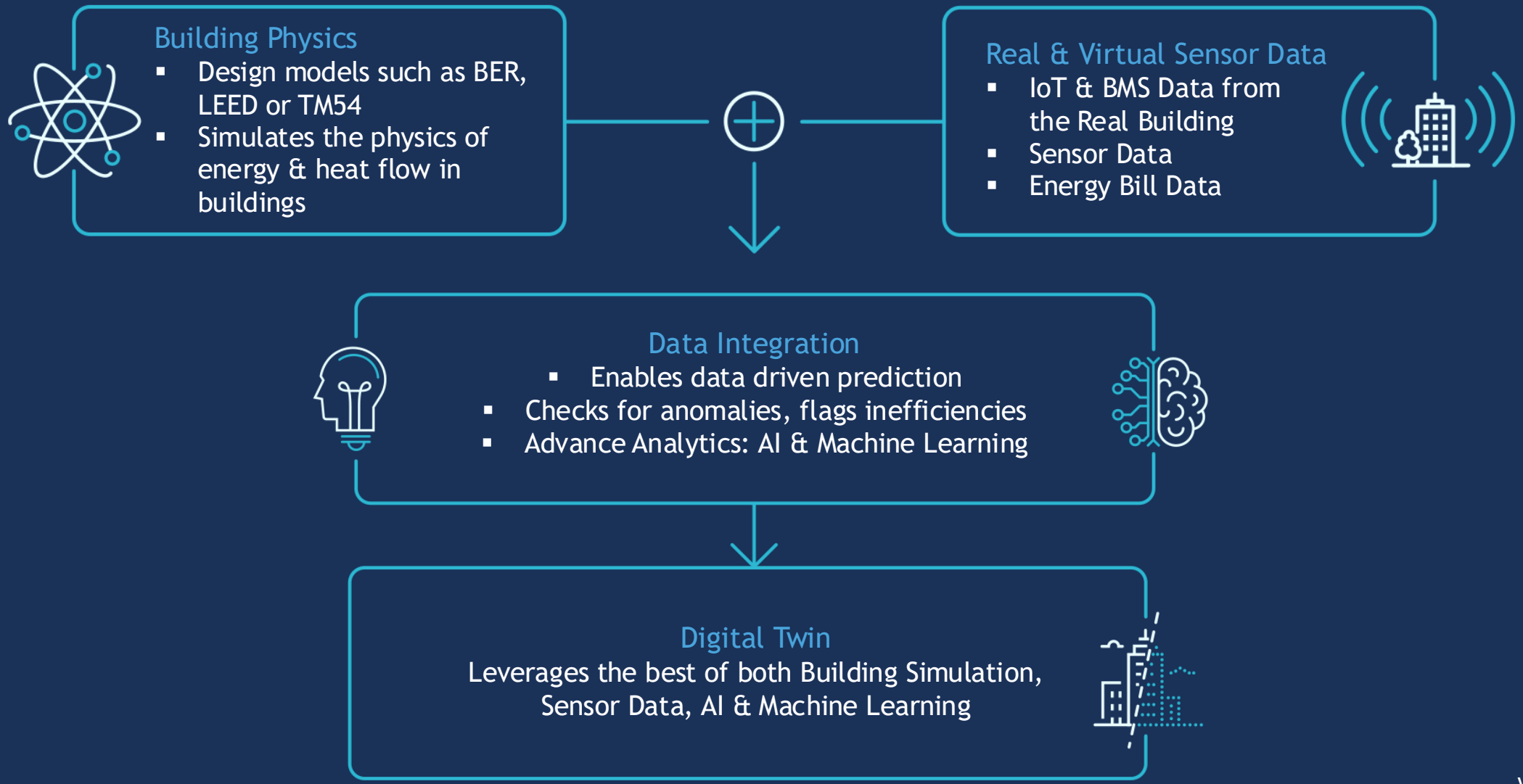
How Digital Twin and Data can optimise



IES Performance Digital Twin

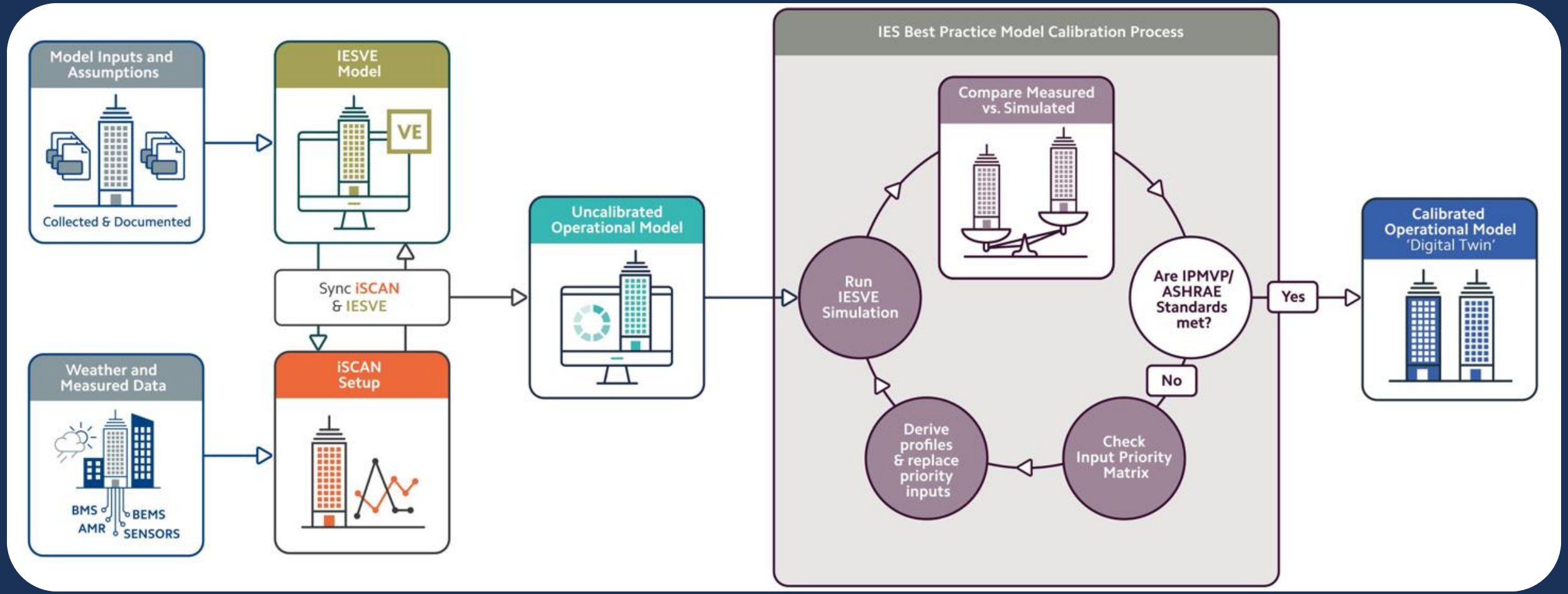
- Includes energy simulation
- Not just Asset Management or BIM assets
- Real-time digital replica and integrates real-time data
- Responds & behaves like the real building
- **Accurately predicts impact of changes to minimise building drift and optimise operation**

Digital Twin Workflow



Calibration against real performance

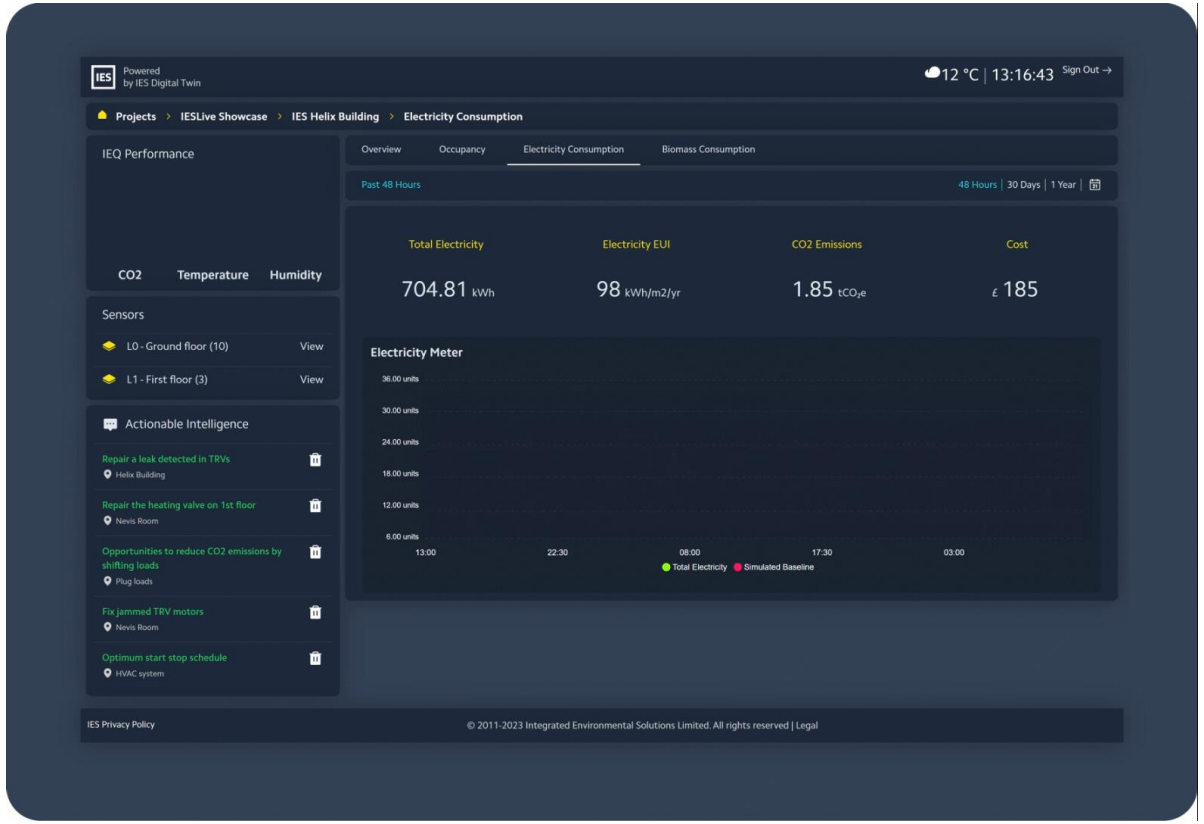
Aligning Measured and Simulated Models



Operational Optimisation and Performance Gap Reduction

Provides data platforms for finance, sustainability & facilities teams to reduce operational drift and lowers operational energy costs:

- Quick energy/cost/carbon wins with low capital outlay
- Simple BMS control adjustments
- Set-point testing and HVAC scheduling
- Behavioural changes
- Maintenance



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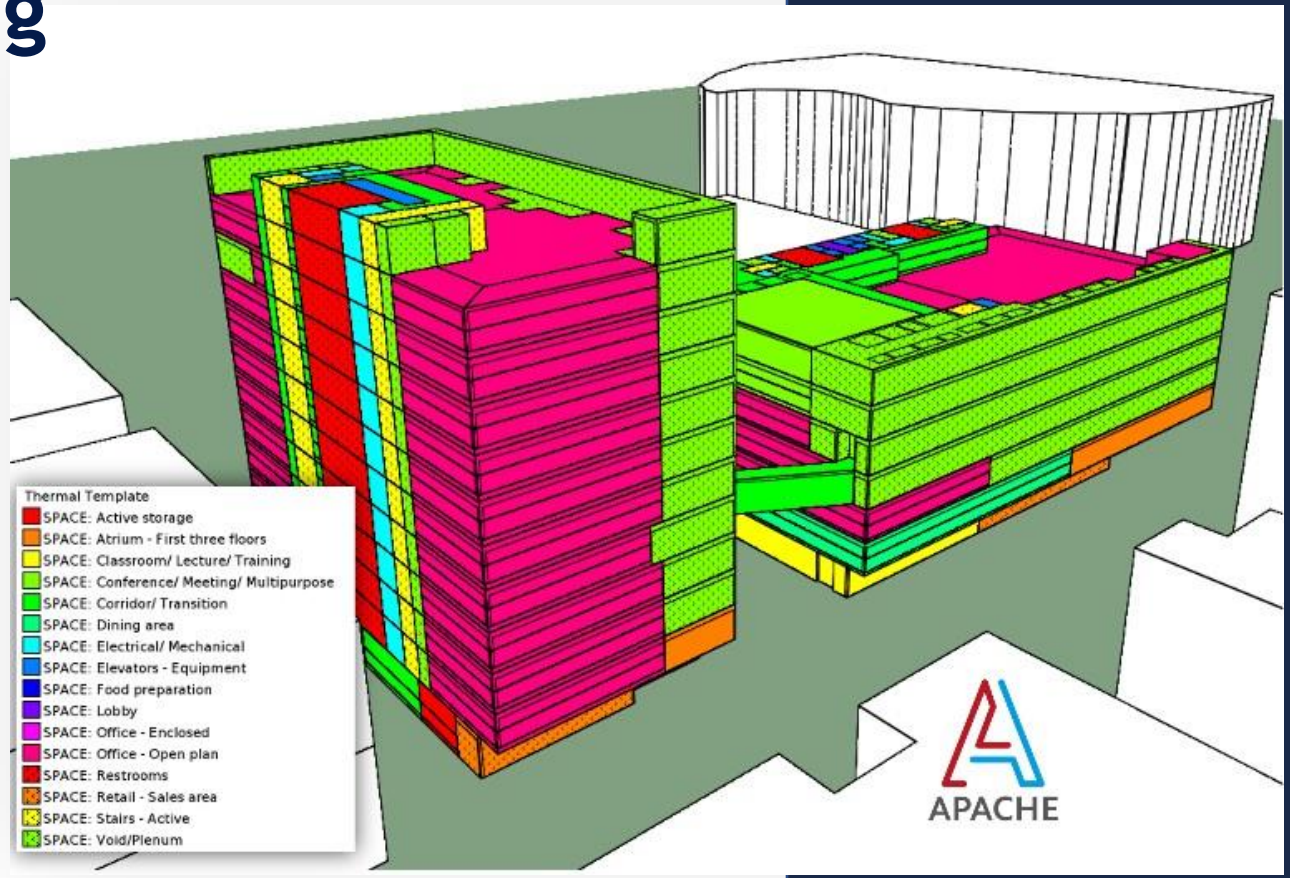
Long-Term Net-Zero Planning

- Weather and climate scenarios
- Operational changes
- Occupancy changes
- Fabric Upgrades
- Technology and conditioning replacements
- Adding Renewables
- District Energy Projects



Global Software Company providing Digital Twin & Data Technology Trusted by Organisations Worldwide

JOHN LEWIS & PARTNERS

NHS SCOTLAND

TOYOTA

Walmart

CBRE

AIRBUS

University of Glasgow

ARUP

Building and Construction Authority

Jacobs

Morrisons

MOTT MACDONALD

BURO HAPPOLD

AECOM

ATKINS

Stantec

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Enabling Quick Wins

United Warehouse

- ~£13k saved at first-pass by just looking at operation
- ROI in under 12 Months
- List of prioritised operational savings actions
- Delivered with detailed ROI impacts to empower the client engineering team

1 George's Quay

- €108k reduction in annual energy spend
- 302 tonnes of carbon saved
- Simple BMS control adjustments
- Low capital outlay

Enabling Quick Wins

Riverside Museum

- £52.3k annual savings
- 26% gas savings
- 18% electricity savings
- Less than 6 months payback period

Bart's Health, NHS Trust

- 22.5% reduction in Gas Demand
- 30% reduction Electrical Energy
- 28% savings in Energy Spend
- 27% reduction in CO2 Emissions
- Strategic review of Energy Management & Data Acquisition

Developing Solutions Aligned to your Objectives

Morrisons Phase 1

- >£80,000 savings identified
- ROI less than 1 year
- Verified ‘quick win’ action list
- Proposed Heat pump proven to be unsuitable for site demand needs

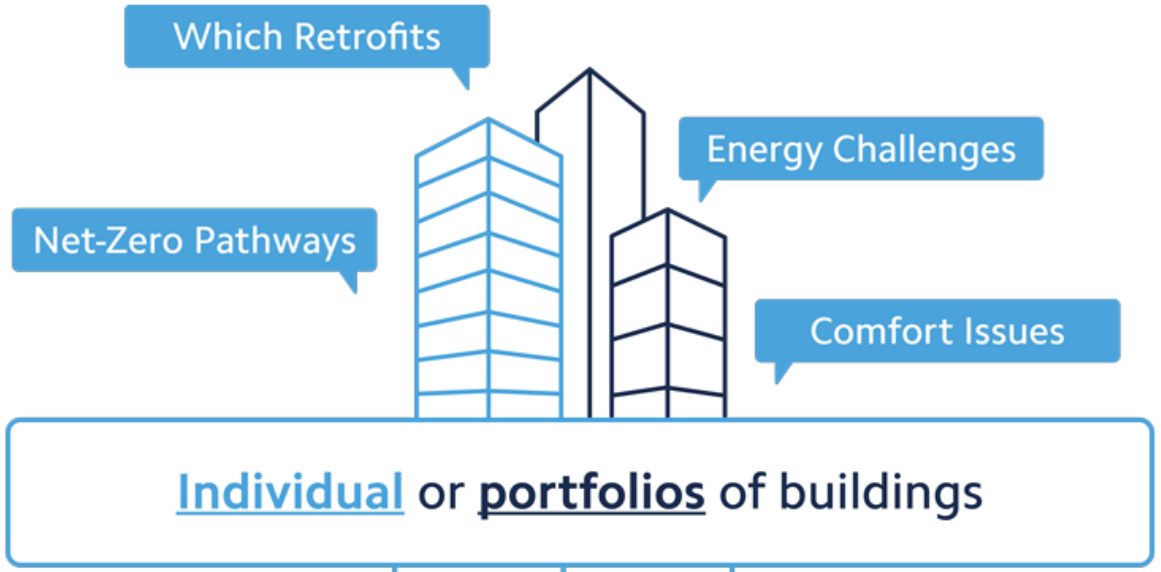
Irish Life (4 Buildings)

- Progress to 51% carbon reduction target tracked
- Energy/Water use analysis across 9 sites
- Decarbonisation Pathways visualised for engagement

Future of Automated Compliance

- Compliance will evolve from static documentation to continuous performance insights powered by live data. (e.g. NABERS)
- Integrated digital twins and AI will automatically collect, verify, and report sustainability metrics in real time.
- Unified data ecosystems: Connected platforms will eliminate silos, creating a single source of data for buildings.
- **Hopefully**, compliance will no longer be about ticking boxes — it will measure tangible progress toward net-zero performance.

Digital Twins and Operational Data: Who Benefits?



Sustainability/Capital Projects

- Engineering Grade Data
- Net-Zero Project Tracking
- Shared Reporting & Performance Dashboards

Finance Department

- De-risk Capital Investments
- Maximise ROI
- Reduce Energy Costs

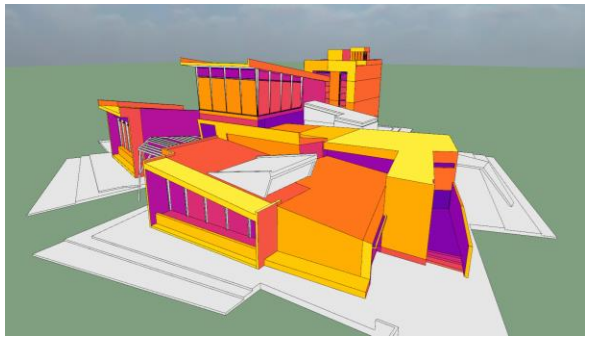
Energy/Facilities Teams

- Single Pane Data Visibility
- Real-time Health & Comfort Insights
- Operational Improvement Suggestions with Tracking

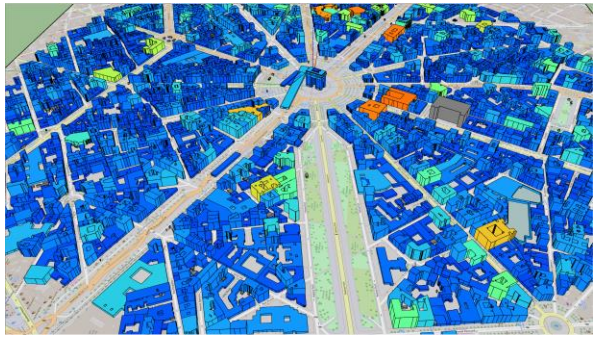
Thank you, any Questions?

Our Software:

VE New Design & Retrofit



iCD Scalable Energy Analysis



LIVE Building Data, Cost & Energy Management

TaP Green Building Assessment Management

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