

# Finding Efficiencies in Using AI in Day-to-Day Operations

## From Data Overload to Actionable Insights in Building Performance

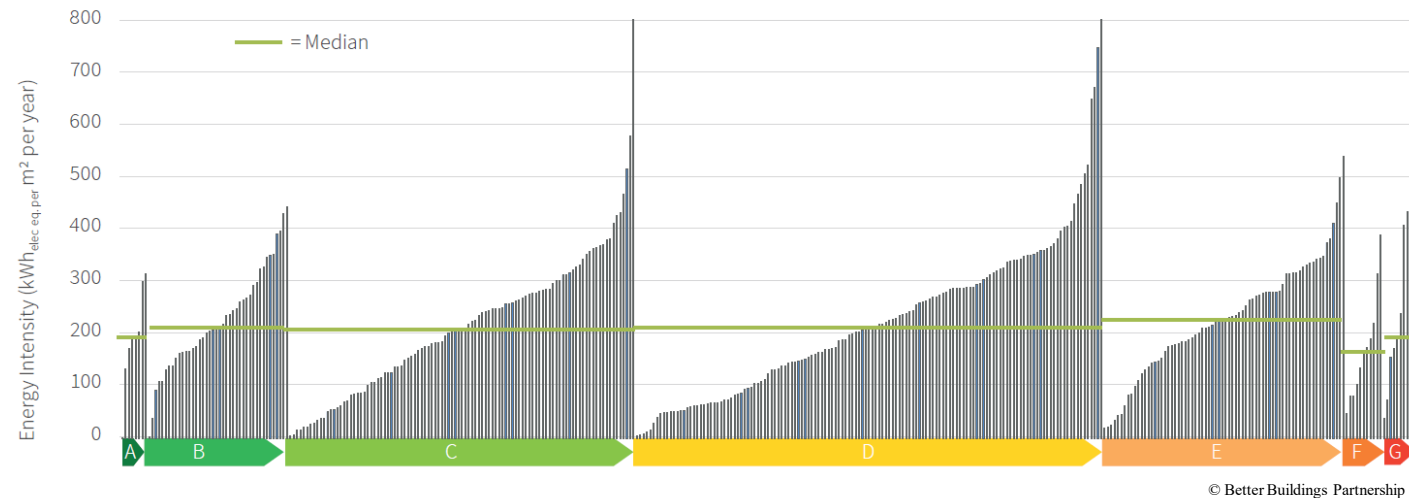
UKSPA Autumn Conference 2025

Ant Marsh, Senior Engineer, Arup

# Why Buildings Underperform

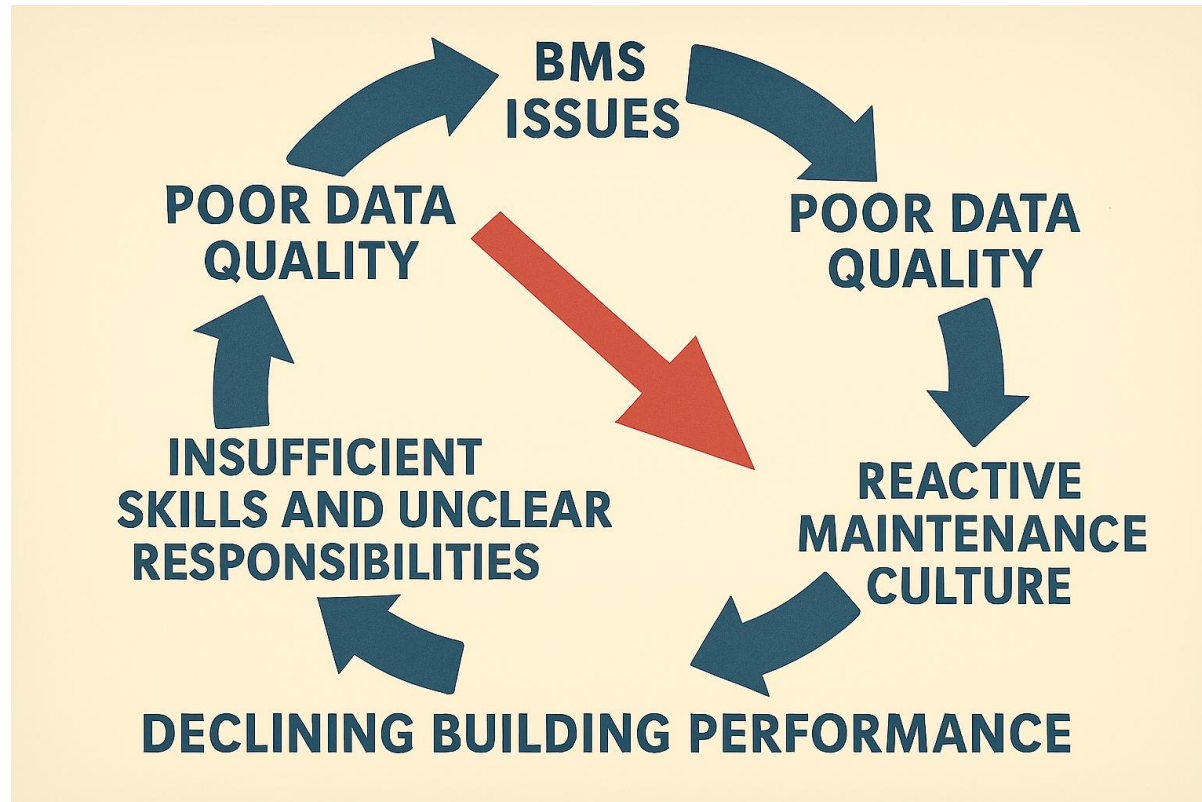
## Focus Moving to *Actual Energy Performance*

- No correlation between EPCs and actual energy use
- F rated buildings have the lowest average energy use!
- Developers, Investors & Occupants increasingly asking for *actual* performance



# Common Causes of Underperformance

Focus on Operational Factors



- BMS issues
- Poor data quality
- Reactive maintenance culture
- Energy management gaps
- Insufficient skills and unclear responsibilities

# Data Overload

So much data, not so much insight

- Modern buildings generate terabytes of data from sensors, meters, and IoT devices

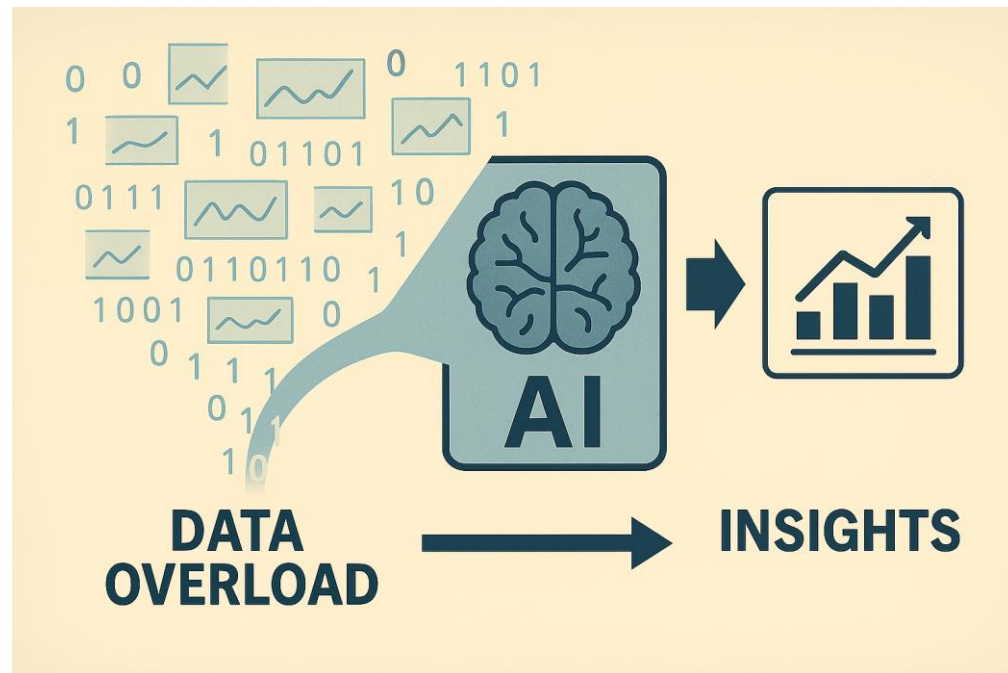
*Challenge*

*Turning raw data into  
meaningful insights*



# Where AI Can Help

What's AI good at, and humans normally not so good at!

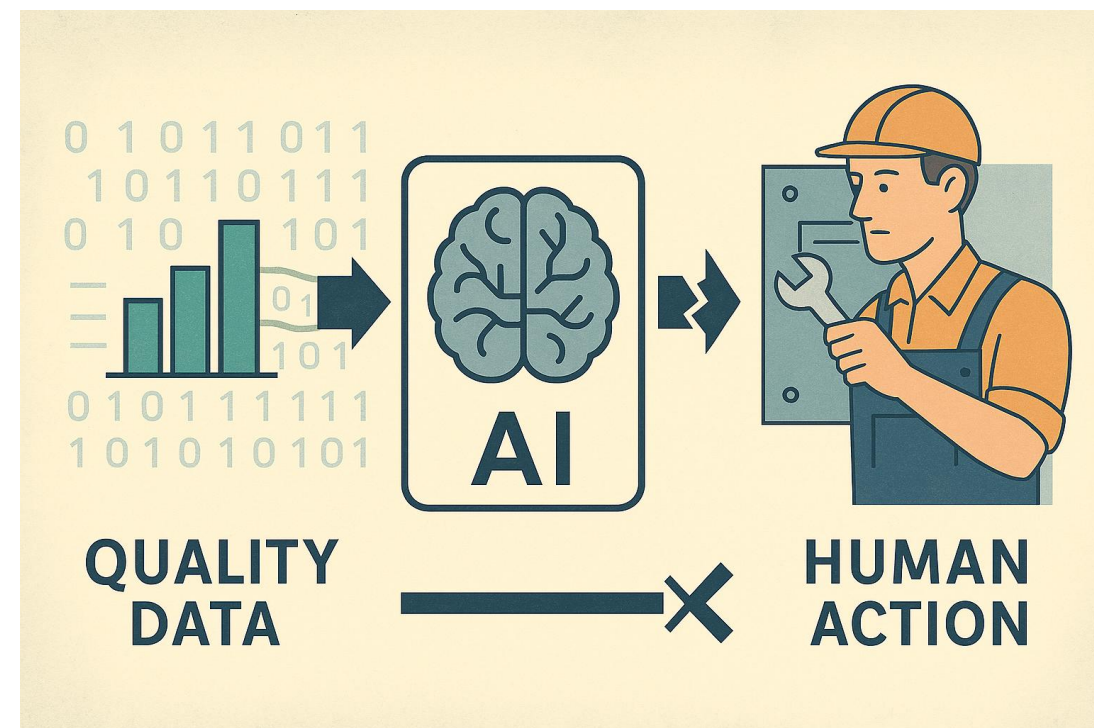


- **Synthesises massive datasets** quickly and accurately, turning raw data into actionable insights
- Detects **subtle patterns** and anomalies humans often miss
- **Predicts failures** before they occur using historical and live data
- **Optimises energy use** dynamically based on occupancy and conditions
- Improve **occupant comfort** without manual intervention
- Operates **continuously and at scale**, unlike human monitoring

# AI Opportunities vs. Limitations

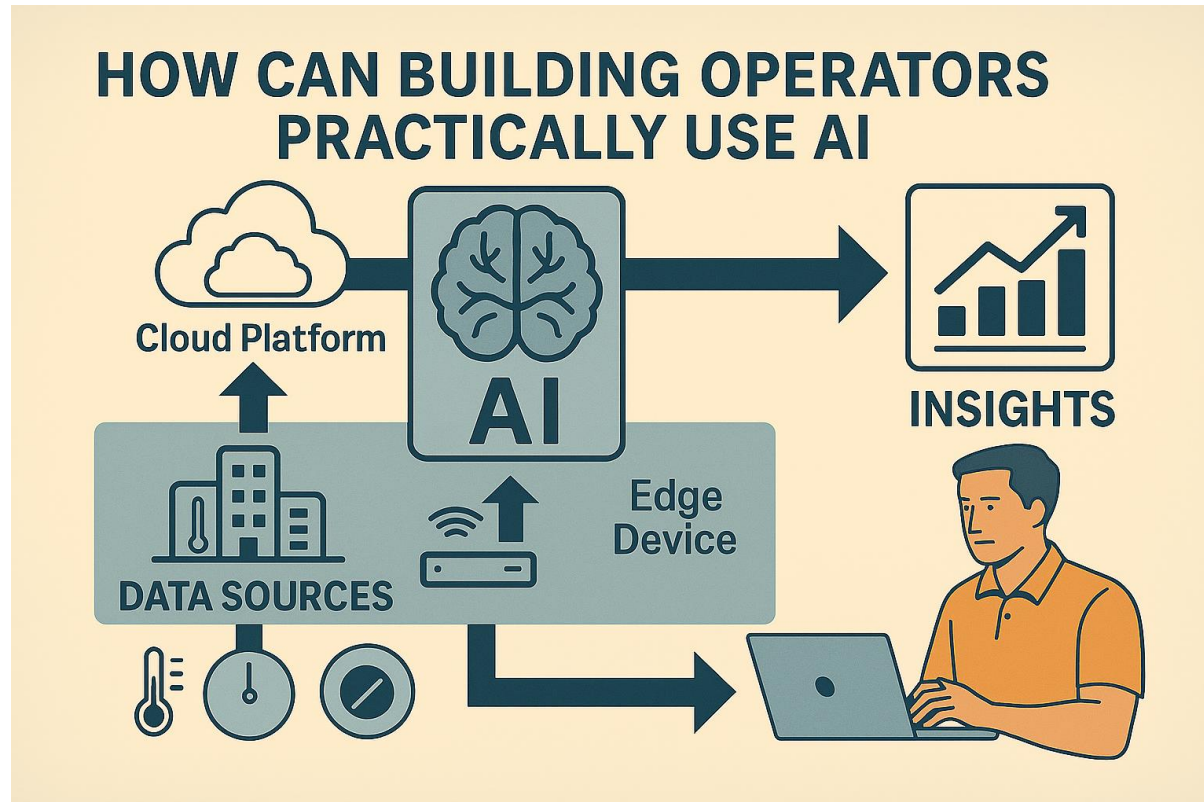
## What AI can and can't do

- AI can **recommend actions**, but **cannot fix physical issues**
- Garbage in = Garbage out: **poor data quality undermines AI**
- Requires **skilled teams** with **effective processes** to act on insights



# Employing AI

How can you make use of AI

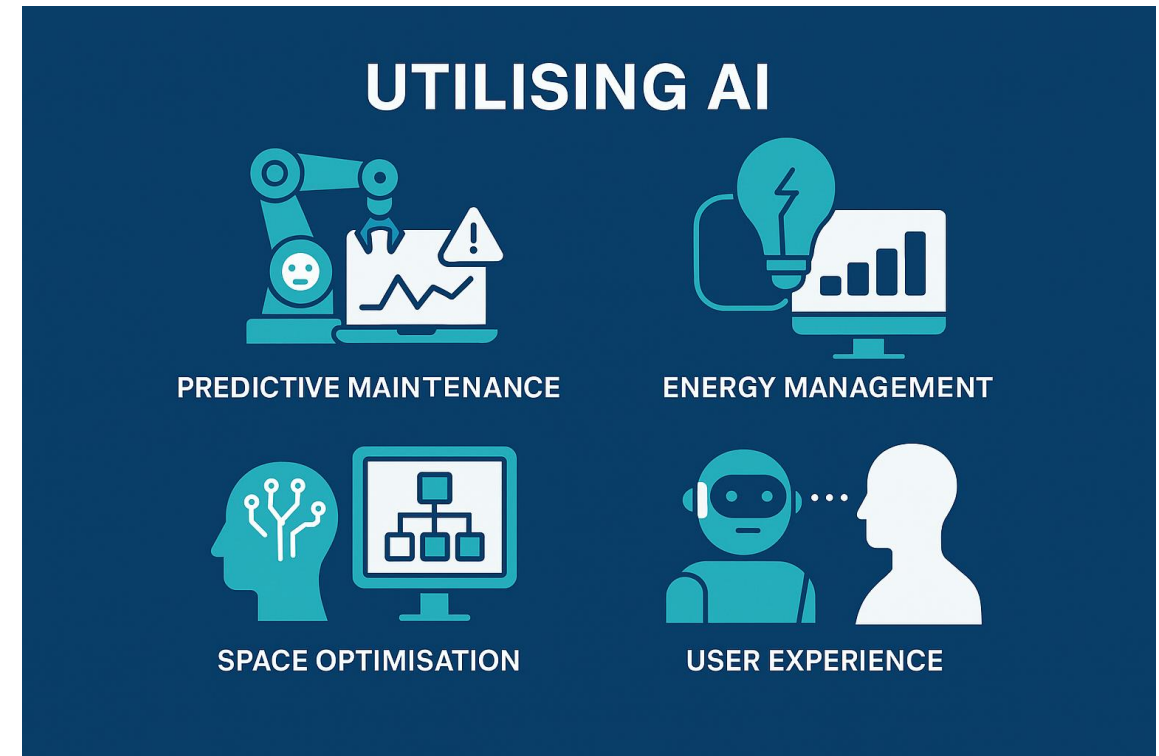


- **Analytics Platform** on Top of BMS
- **AI Embedded** in the BMS
- **Edge AI** Devices
- **Digital Twin** Integration
- **Hybrid** Approach

# Utilising AI

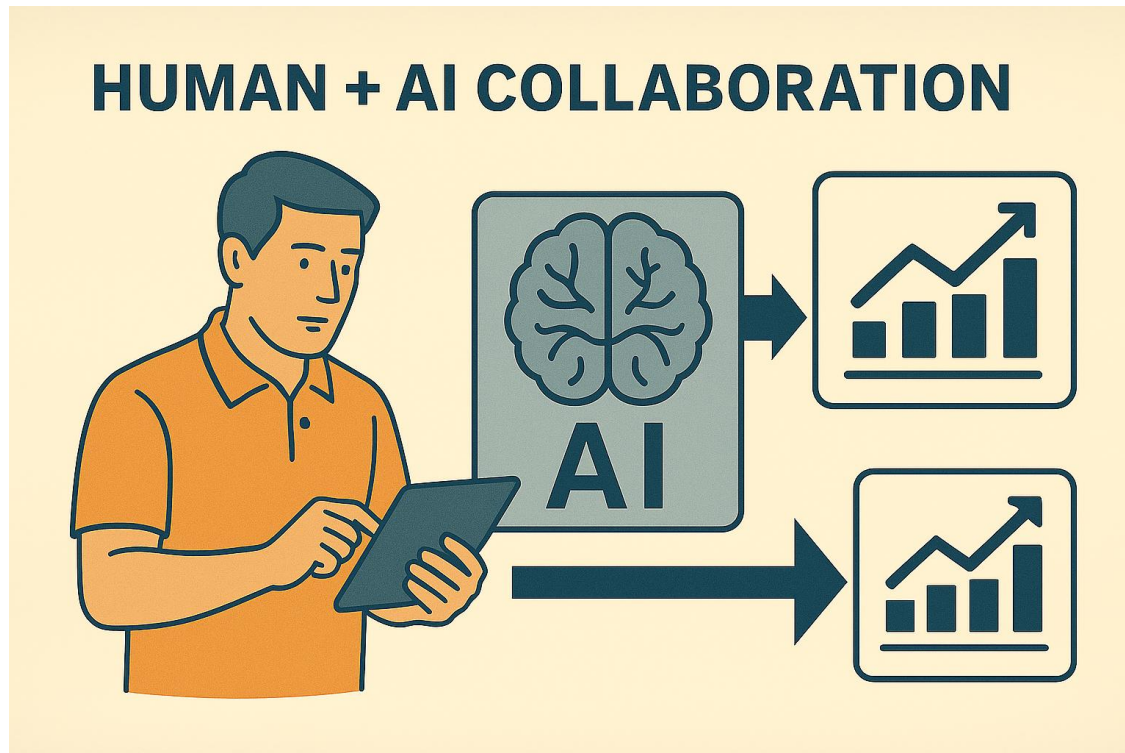
## Real-World Examples of AI Improving Building Performance

- AI-generated insight summaries across **hundreds of analytics rules**
- AI-assisted **condition-based maintenance** for FCUs
- AI-driven **prediction & triage** of failing PIC valves
- AI **forecasting** for energy procurement



# Human + AI Collaboration

Augmentation not replacement



- **AI augments decision-making**, not replaces it
- **Skilled operators essential** for implementing recommendations
- **Training and change management critical**

# Risks & Caveats

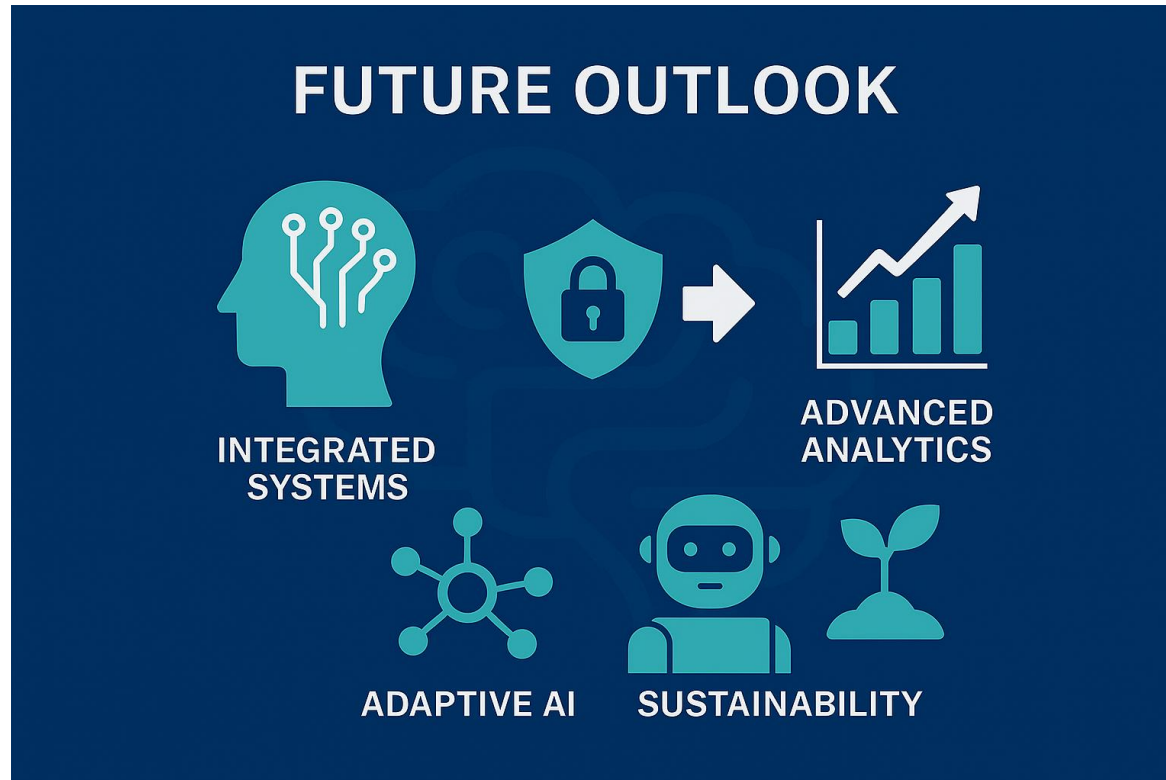
Potential downsides too...

- **Data integrity:**  
sensors/meters must be calibrated
- **Cybersecurity** for connected systems
- **Ethical and operational** considerations



# Future Outlook

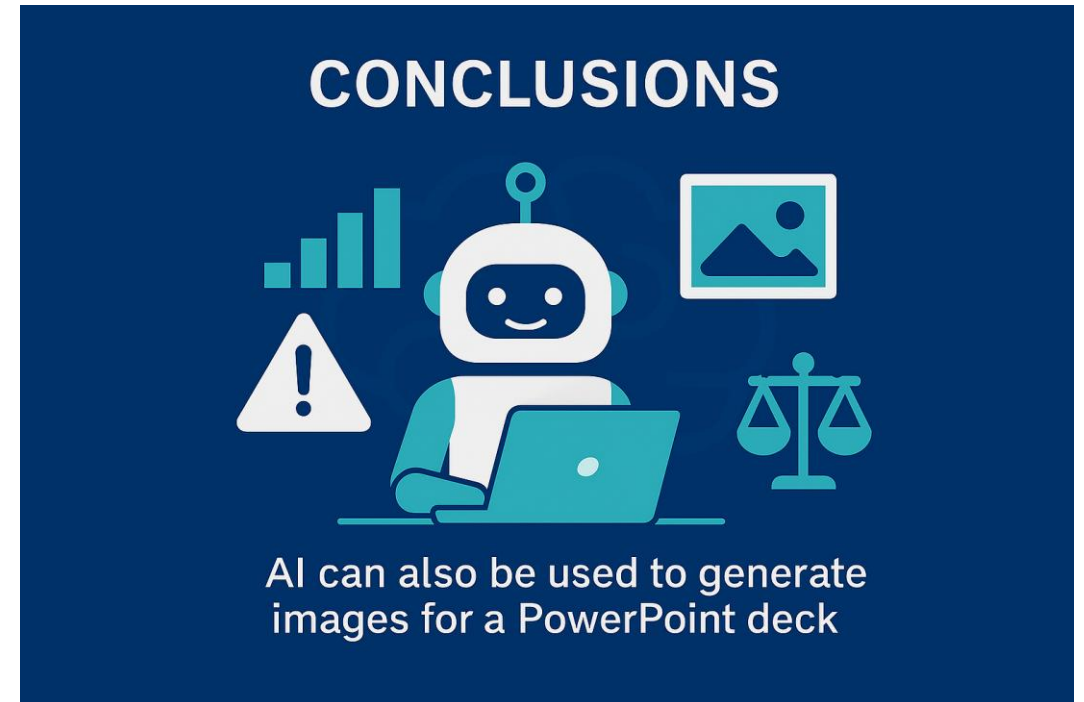
Where AI can take us



- Move towards **autonomous buildings**
- Integration with **digital twins** and **generative AI**
- **Continuous optimisation** for net-zero goals

# Conclusions

- AI offers huge potential for efficiency
- Success depends on:
  - Accurate, reliable data
  - Skilled human intervention
- AI can recommend, but humans must act



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