

# AI in Design & Construction of Healthcare Buildings

Vina Rahimian, PhD

*Co-Founder and Product Strategist  
@ AdSumma*



# The Complexity of Hospitals



## Small City

Emergency rooms, labs, pharmacies, IT rooms, etc - all with their own special systems



## Infrastructure

Miles of cables, ducts, pipes, medical gases, and backup power systems



## Constraints

Budget limitations, regulatory requirements, and tight timelines



# Why AI Fits Here?



AI excels at handling:

- Massive amounts of data
- Hundreds of constraints
- Multiple trade-offs simultaneously

# The Hospital Project Lifecycle

Phase I: Design & Planning

Phase II: Construction & Commissioning

Phase III: Operations

Phase IV: Patient Experience

# Phase I

Design & Planning

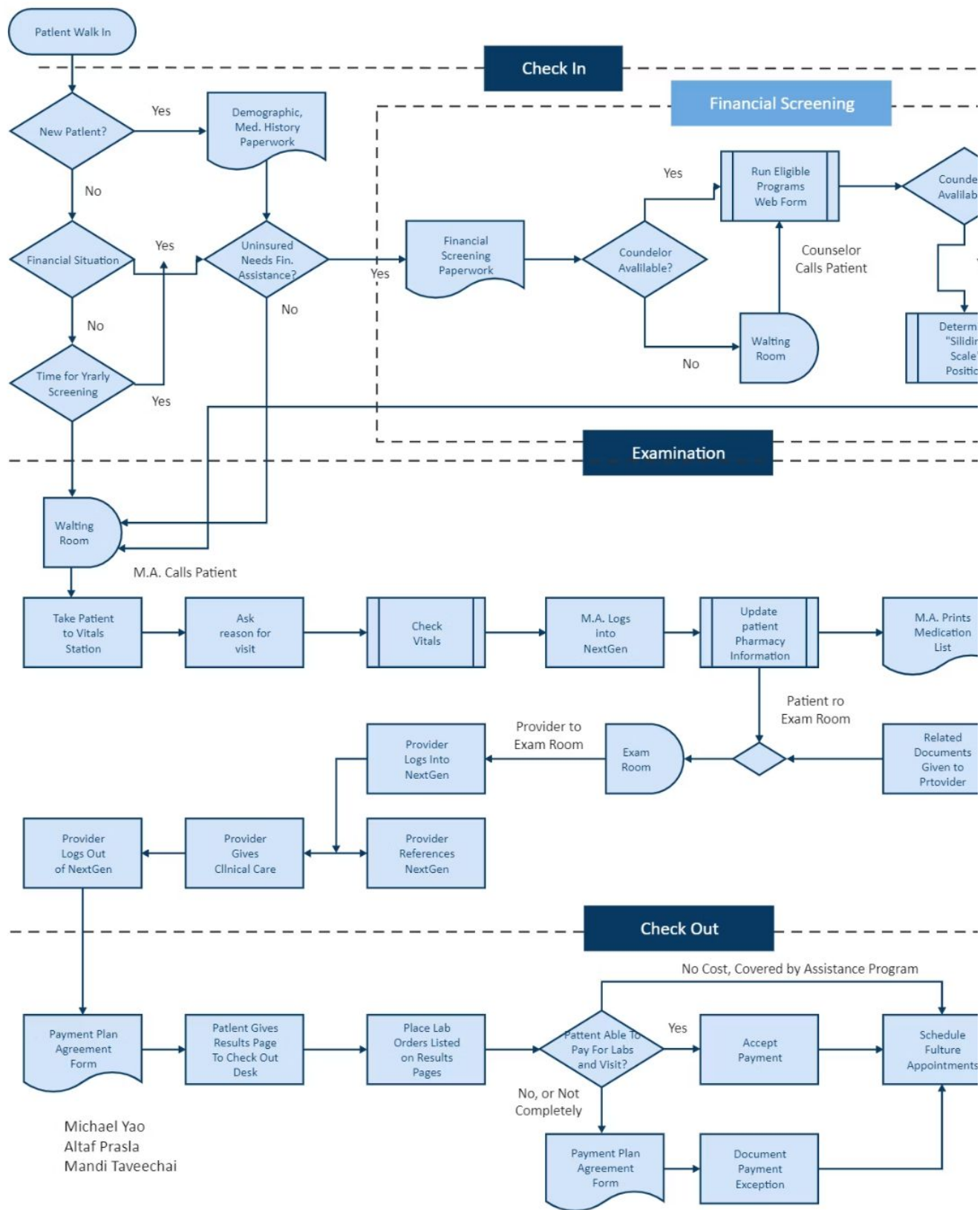


# Challenge 1: Technical Complexity & Coordination

⊗ **The Problem:** Space constraints with competing systems

✓ **AI Solution:** Generative and multi-objective optimization engines which create clash-free, code-compliant layouts





## Challenge 2: Stakeholder Workflow Alignment

❌ **The Problem:** Competing needs of different stakeholders

✅ **AI Solution:** Movement and flow simulation to identify bottlenecks and infection control issues

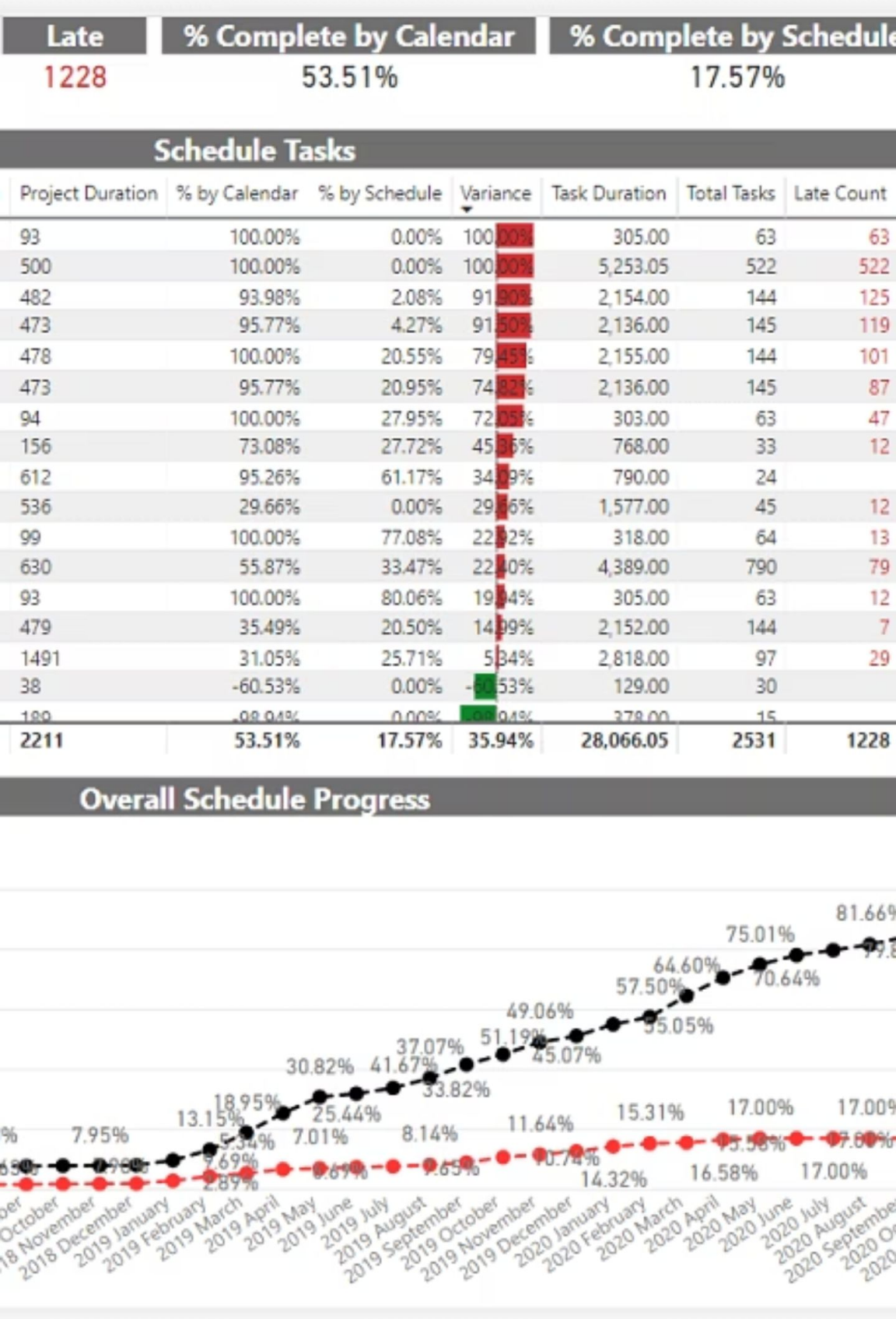


# Challenge 3: Budget Accuracy & Cost Control

⊗ **The Problem:** Cost overruns, schedule delays, change orders and scope changes, claims and contract disputes

✓ **AI Solution:** AI cost-estimation tools analyze data from past projects, local price trends, and current market conditions

AI scheduling tools simulate hundreds of build sequences to find the most efficient path







## Challenge 4: Regulations and Compliance

❌ **The Problem:** Multiple layers of regulations - accessibility, infection control, fire safety codes, etc

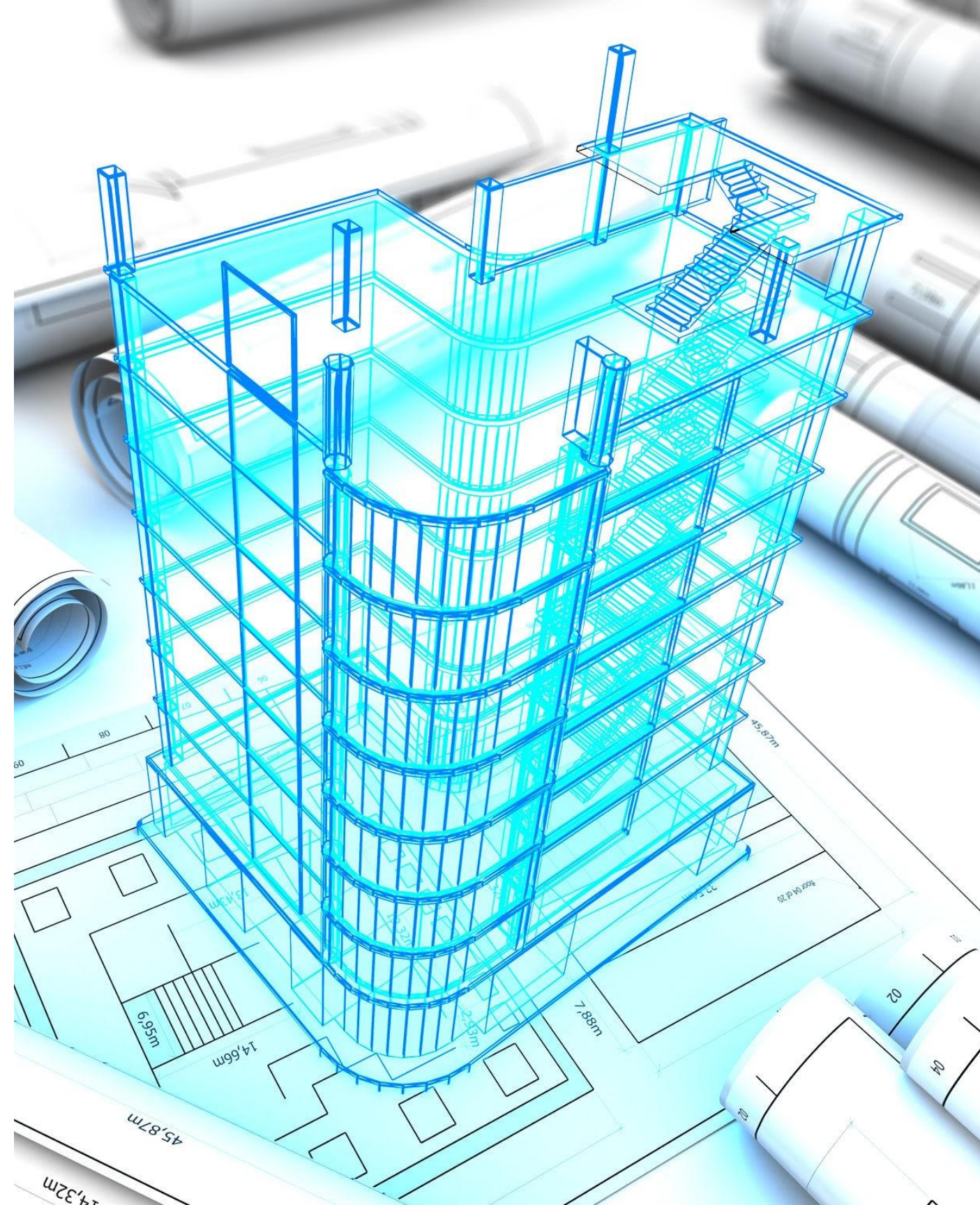
✅ **AI Solution:** Connects code requirements directly to BIM models  
Scans designs to flag non-compliant areas before construction begins



# Challenge 5: Digital Coordination Gaps

❌ **The Problem:** the digital building information not actually meeting the needs of construction and facility management later

✅ **AI Solution:** Live Digital Twins that extend the design BIM with operational data



# Phase II

Construction & Commissioning





# Challenge 1: Specialized Installations & Tight Coordination



**The Problem:** Precise coordination and execution of all the complex parts



**AI Solution:** Computer vision tools scan the site daily, comparing progress to schedule and model

Identifies errors immediately rather than weeks later when fixes are expensive

# Challenge 2: Maintaining Operations During Construction

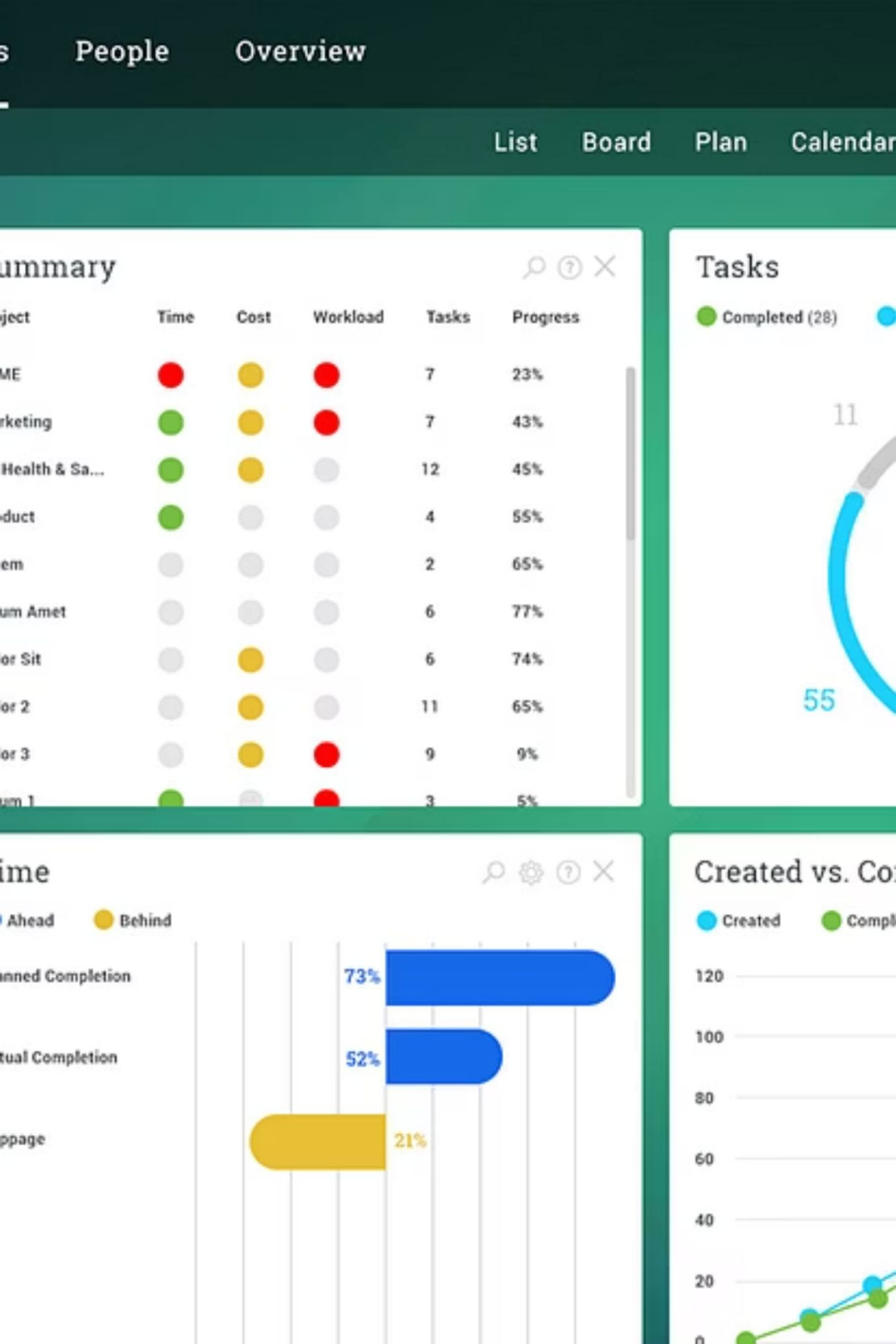
❌ **The Problem:** Keeping critical hospital functions running during construction

Must avoid noise, dust, and disruption in sensitive areas

✅ **AI Solution:** Intelligent scheduling plans noisy or dusty work for off-hours

Model construction impact on hospital operations before problems arise





# Challenge 3: Cost, Schedule, and Risk Management

❌ **The Problem:** Unexpected changes occur: materials don't arrive, designs change, weather interferes

Unidentified risks quickly snowball into major issues

✅ **AI Solution:** Predictive analytics monitors live project data

Flags cost or schedule deviations weeks before they become obvious

Provides time to course-correct before problems escalate



# Challenge 4: Commissioning & Handover



**The Problem:** Testing systems, training staff, and passing inspections happen under tight deadlines risking critical issues to be missed



**AI Solution:** Digital twin creates a virtual copy of the building  
Systems can be tested and troubleshooted virtually before physical installation  
Reduces surprises during final commissioning



# Key Takeaways



## AI Strategy

AI completely reshapes what's possible.



## AI Complements Human Expertise

Not magic - requires good data and smart people steering it



## More Predictable Process

From design to build, AI reduces uncertainty and risk



## Benefits Everyone

Project teams, hospitals, and ultimately patients all win