DIGITAL TWIN INTEGRATION FRAMEWORK

Digital Twin Platform Autodesk Tandem

MEDICAL DIGITAL TWIN

Medical Facility's Data Streams

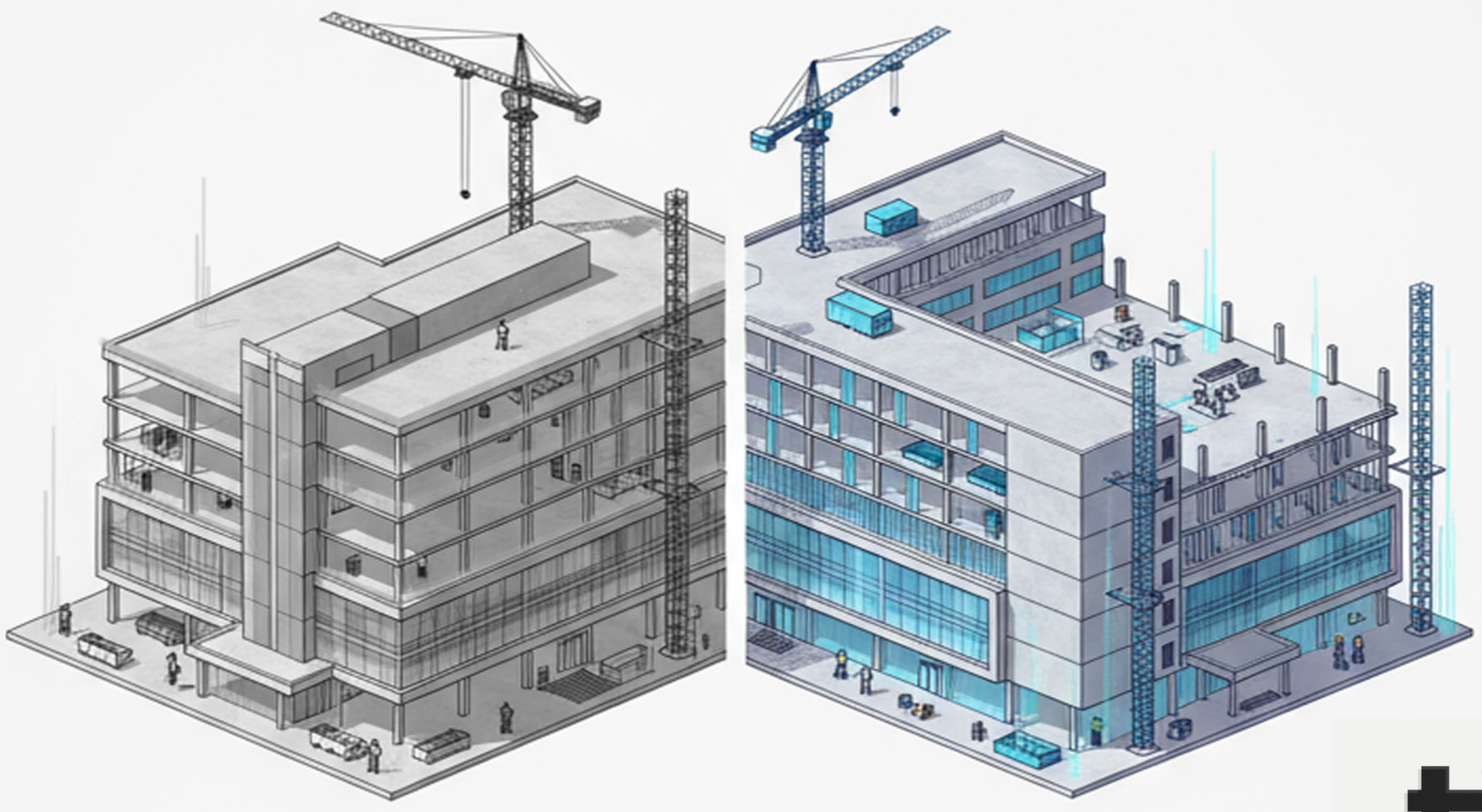
Equipment & Asset Data

Medical Equipment Data

Quality of Care Data

Management & Environmental Data

Spacial & Architechtural Data



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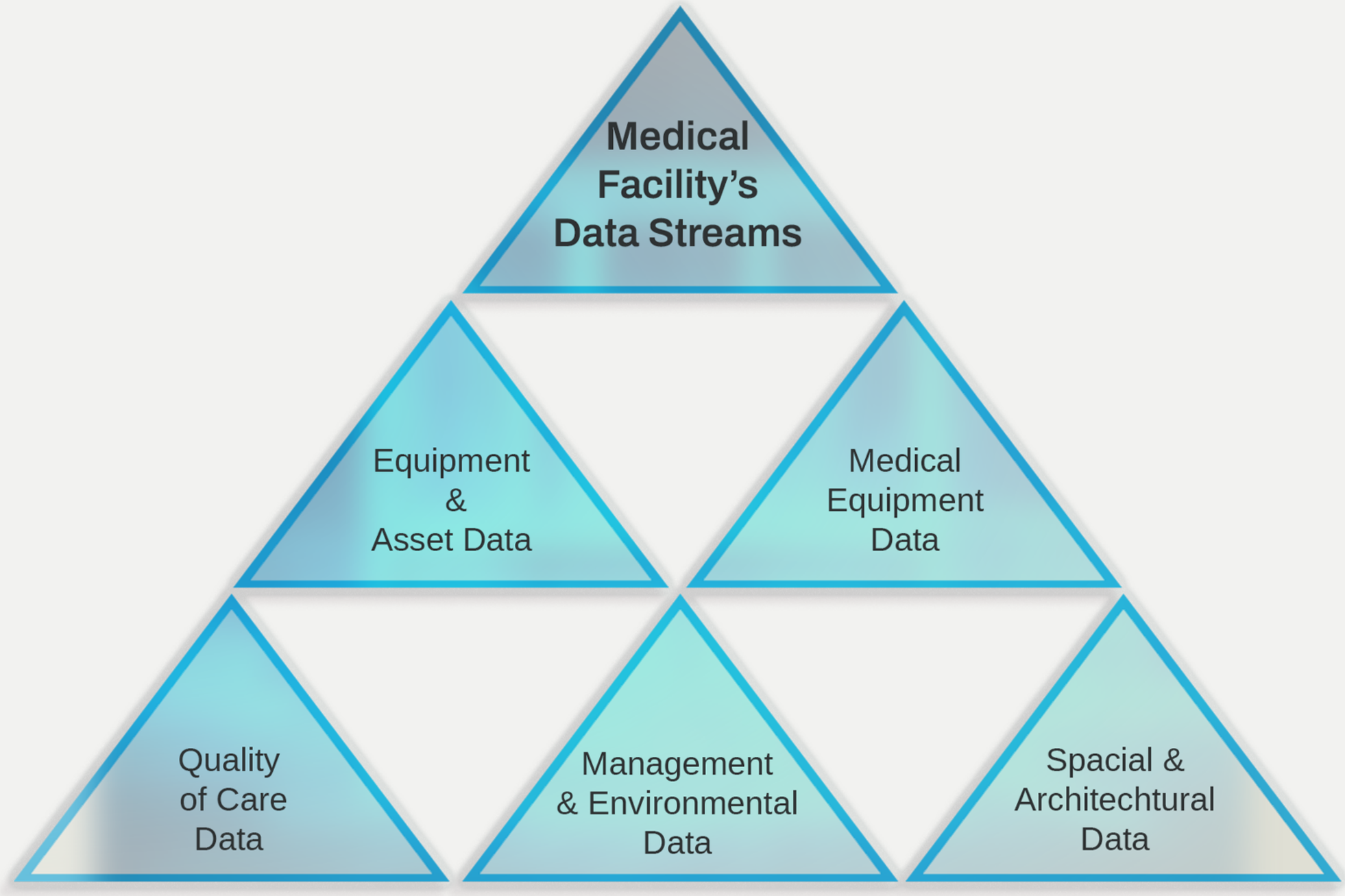
MEDICAL DIGITAL TWIN



Digital Twin Functions, Outputs & Applications

- Medical Audits and Compliance Tracking with Alarms
- Management Decision Making
- Process Optimisation
- VR Space "Doll House" with data overlay
- Report Generation
- Multi Index Search
- Artificial Intelligence (AI)
- Dashboards tracking parameters
- EXCO Reporting
- PDF exports of various reports
- BCM

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MEDICAL DIGITAL TWIN

Utilities Diesel and Gas Data
Source: Afrox Gas sensors or BMS

Finance Data:
Source: SAP, JDE, Sage, Quickbooks, Xero

Utilities (Water , Elec)
Source: Smart Water and Electricity meters with Billing Platform

HR Staff & Time Man.
Source: Sage, SAP, JDE, Sage, Quickbooks, Xero

IOT Sensors Data (Temp, Humidity, PM2.5, noise)
Source: IOT Platform with IOT Sensors & BMS

Procurement Data:
Source: Sage, SAP, JDE, Sage, Quickbooks, Xero

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MEDICAL DIGITAL TWIN

Equipment
&
Asset Data

Asset Configuration
Source: CMMS

Workflow data
Source: ERP Platform

Planned Maintenance,
Breakdown Maintenance
Data
Source: CMMS

Process Flow data
Source: ERP Platform

BMS Data
Temp, alarm, humidity,
air quality
Source: BMS Platform

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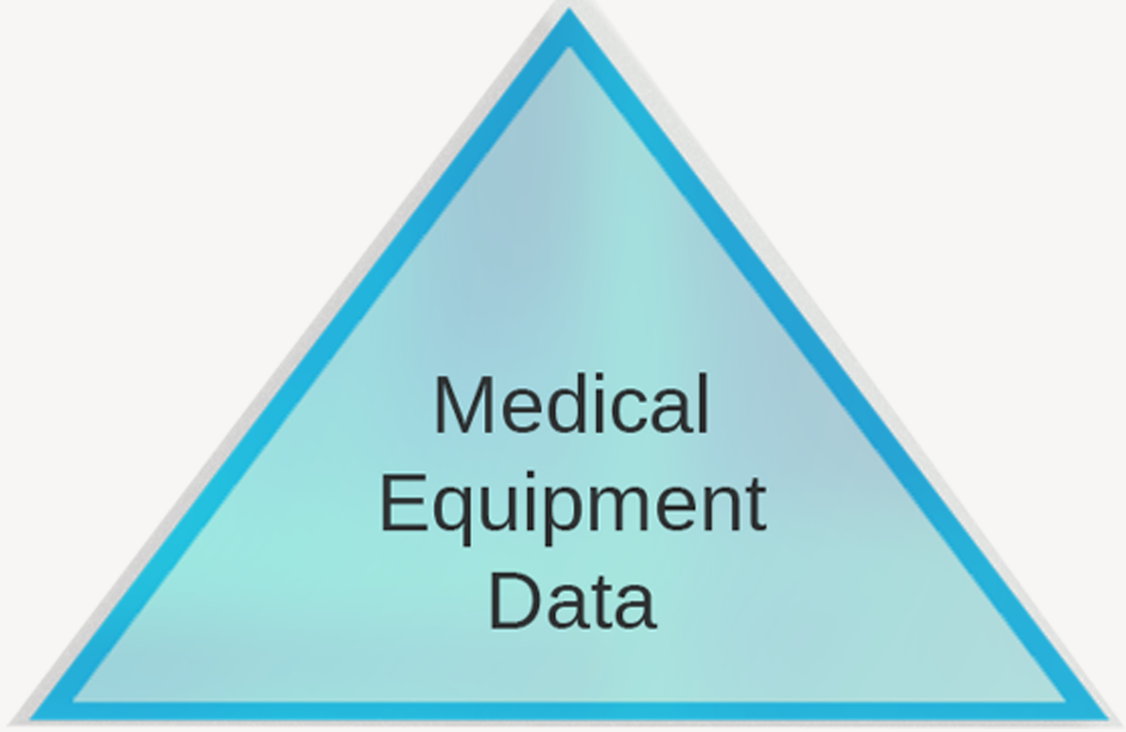

Medical Anesthetic Gas Consumption
Source: HL7 data broker via Anesthetic Machine

Medical Equipment data from MRI , Ultrasound, XRay
Source: HL7 data broker via Anesthetic Machine

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Medical Clients Analytics
Source: Medical Platform

Client Surveys:
Source: Form in Digital Twin Platform

Mobile APP

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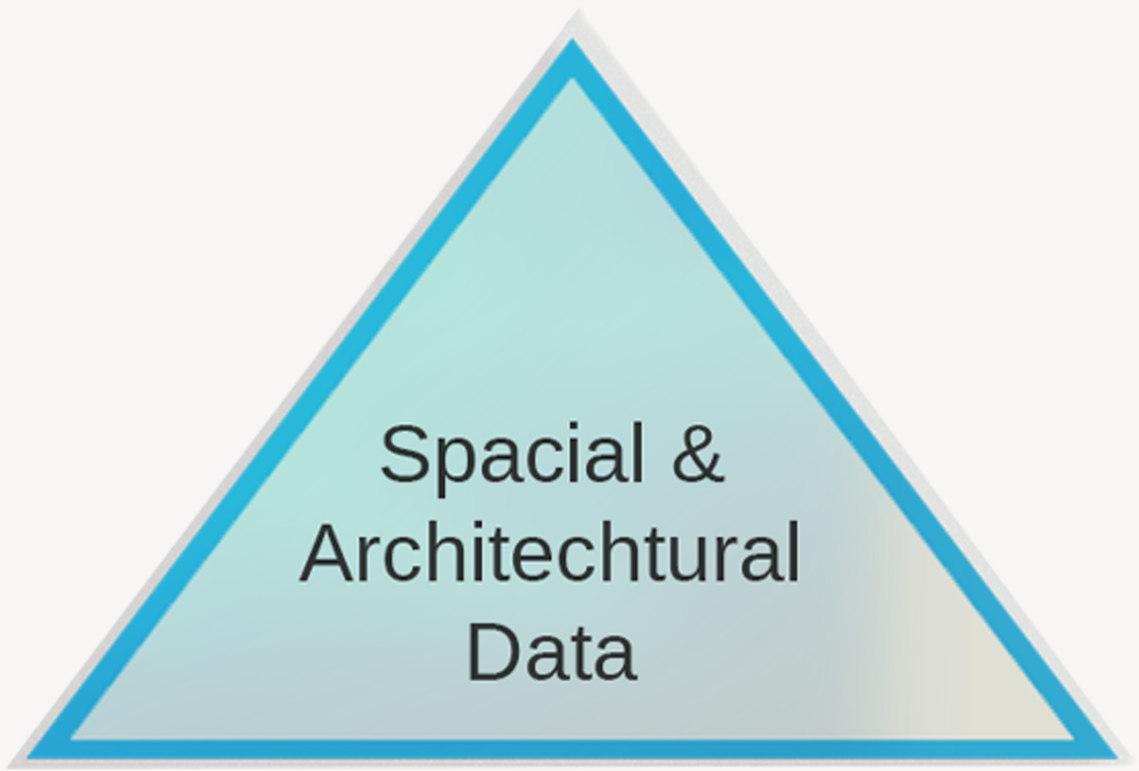
MEDICAL DIGITAL TWIN



360 Degree scans of hospital
Source: Matterport Scan

3D Models of Hospital:
Source:
BIM, Revit Models;
Architectural drawings

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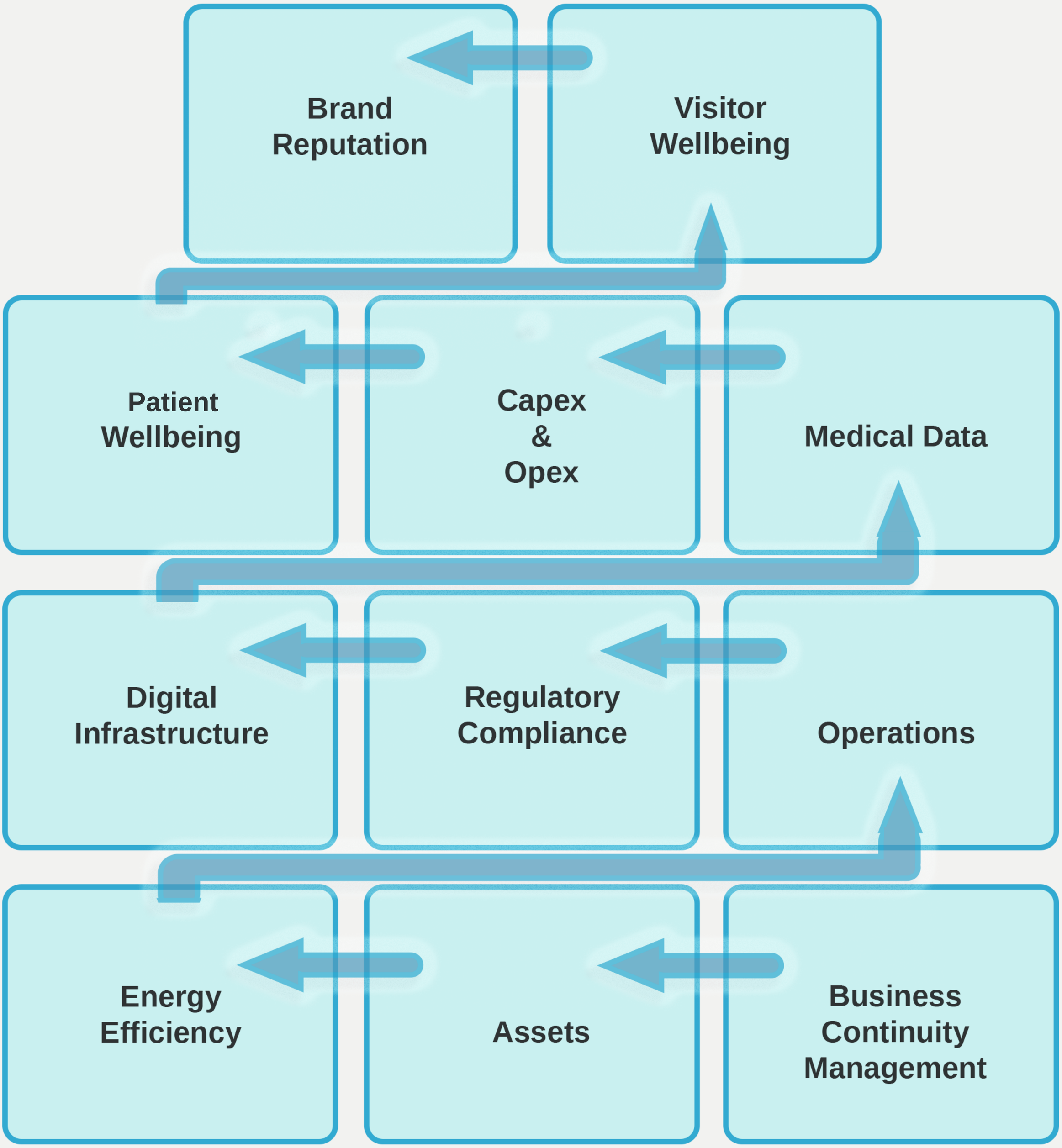
TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS



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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Brand Reputation

Traditional Approach & Operational Gaps

Negative media coverage from safety and operational incidents damages brand reputation and stakeholder confidence

Limited visibility into brand sentiment trends across digital channels

Information silos lead to outdated public-facing communications

High-performing staff attracted to organizations with stronger reputational positioning

Difficulty attracting next-generation talent who expect digital-first environments

Intelligent Digital Solutions

Real-time social media monitoring with AI-driven sentiment analysis to identify emerging reputational risks

Automated staff wellness reporting and perception surveys for proactive engagement

Recognition systems that reward high-performance staff and strengthen retention

Proximity-based threat monitoring to protect facility assets and occupants

Module

HR Module Survey Module Social Media API

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Visitor Wellbeing

Traditional Approach & Operational Gaps

Limited real-time assistance for visitors experiencing difficulties (e.g., lift malfunctions, intercoms requiring manual monitoring)

Insufficient analytics on visitor volumes, movement patterns, and facility utilization

Low-fidelity data on dwell time and return visitor rates limits operational insights

Environmental hazards affecting visitor experience go undetected

Missing demographic intelligence on visitor origins and preferences

Intelligent Digital Solutions

Precise footfall analytics using access point data to generate hotspot analysis and demographic profiles

Cross-referenced consumption data (e.g., consumables usage patterns) to identify anomalies and prevent losses

Camera-based analytics for return visitor identification and dwell time measurement

Enhanced visitor experience through data-driven facility improvements

Module

Customer Behaviour

Visitor Access Management

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Patient Wellbeing

Traditional Approach & Operational Gaps

- Significant administrative burden maintaining current safety documentation and vendor certifications
- Documents frequently expire between procurement initiation and project completion
- Limited validation capability for parking revenue across independent data sources
- Extended resolution times for tenant complaints create dissatisfaction
- Lease renewal negotiations complicated by unresolved operational issues
- Delayed compliance submissions (e.g., lift annexure documentation) from tenants
- Protracted tenant turnover reporting cycles
- Incomplete oversight of contractor activities across facilities

Intelligent Digital Solutions

- AI-accelerated lease development with rapid FICA compliance verification
- Unified parking revenue reporting integrating Admyt, Skidata, Servest, and similar platforms
- Digital query logging and resolution tracking for tenants, improving transparency and satisfaction
- Streamlined tenant engagement through centralized communication channels

Module

- Tenant Engagement
- Tenant & Lease Management
- Parking Management
- Contract Management

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Capex & Opex

Traditional Approach & Operational Gaps

Capital expenditure planning relies on estimation rather than data-driven forecasting, often resulting in unspent budgets

Suboptimal capital allocation leads to over- or under-investment, with depreciation schedules disconnected from actual assets

Delayed visibility into year-to-date capex spend complicates strategic allocation decisions

Budget data locked within ERP systems limits accessibility for operational teams

Incomplete cost-versus-income visibility requires manual financial manager intervention

Overspend detected retrospectively, with frequent cost allocation errors

Difficulty justifying new operational expenditure or identifying reduction opportunities

One-time savings difficult to systematize for recurring impact

Critical financial data inaccessible during key personnel absence

Executive leadership lacks longitudinal financial trend visibility (1-5 year horizons)

Asset disposal complicated by insufficient due diligence documentation

Intelligent Digital Solutions

Automated lifecycle costing forecasts for strategic capital planning

Facility Management Condition Index (FMCI) scoring to prioritize capital allocation effectively

AI-generated financial reporting: balance sheets, income statements, and cashflow projections with real-time updates

Module

Capex Reporting	Clustering Module
Project Management	Process Optimization

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Medical Data

Traditional Approach & Operational Gaps

Medical equipment performance data remains unanalyzed, limiting operational optimisation

Intelligent Digital Solutions

HL7 data broker integration for comprehensive medical equipment analytics

Module

Procurement Module

Soft Services Module

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Digital Infrastructure

Traditional Approach & Operational Gaps

Legacy contracts with bandwidth providers create capacity constraints and slow adaptation

Control room overstaffing compensates for infrastructure gaps; outdated facility layouts hinder efficiency

Decentralized document storage limits institutional knowledge management

Cyber threats and IT vulnerabilities go undetected; critical software (e.g., generator systems) improperly archived

Missing data source APIs; information trapped in email rather than cloud repositories

Network equipment (CCTV, switches, firewalls, access points) replaced reactively after end-of-life

Intelligent Digital Solutions

Modern control room with centralized asset monitoring (security, fire, water, alarms, diesel) via unified platform

Digital twin visualization of complete infrastructure topology

Real-time health monitoring of all IP-enabled devices (network switches, access points, payment terminals)

AI and neural network analysis to derive actionable insights from aggregated data sources

Module

User Management	Bandwidth Optimisation Module
360 Camera Scan Module	PRTG Network Module

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Regulatory Compliance

Traditional Approach & Operational Gaps

Inadequate audit preparedness results in extended documentation retrieval periods

Risk of losing accreditations (GBCSA, SASHORE, financial audits, OSH, medical audits)

Repeat audit findings not systematically assigned for remediation

Incomplete occupancy certificate coverage across lease portfolio

Certificates of Compliance (COCs) gaps for electrical distribution boards extend audit preparation timelines

Executive leadership lacks real-time risk visibility; monthly risk meetings lack structure
Insurance premium increases driven by insufficient risk management documentation

Intelligent Digital Solutions

Continuous compliance scoring via dashboard with instant documentation extraction (e.g. PDF maintenance records)

Ongoing KPI tracking for security service provider risk management

Digital tenant installation management for complete compliance oversight

Module

Risk Module	OSH Module
Legal Compliance	Insurance Module

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Operations

Traditional Approach & Operational Gaps

Customer complaints not systematically logged or tracked

Absence of centralized call center functionality for complaint management

Service provider KPIs measured retrospectively rather than in real-time

Limited visibility into personnel location and attendance status

Complaints regarding cleaning, security, and waste management lack proper escalation protocols

Consumables usage (toilet paper, soap) not monitored

Contracts frequently expire before renewal action, creating procurement audit findings

No centralized operational call logging and tracing system

Excessive meeting burden (management committees, operations committees)

Inability to track field staff location or assign tasks to specific individuals

Intelligent Digital Solutions

Platform-based KPI scoring for all service providers (soft and hard services) with real-time performance tracking

Digital contract management and development workflows

Integrated call center functionality for operational and maintenance request tracking

Automated reporting highlighting risk items for management decision-making

Digital signature capture streamlines approval workflows

Module

CRM	Turnover Reporting	Call Centre
Management Reporting Module	Digital Signature	Financial Management

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Energy Efficiency

Traditional Approach & Operational Gaps

Water leak detection occurs only after significant losses

Carbon footprint measurement lacks precision

Limited real-time visibility into water and electricity recovery ratios
(both usage units and financial terms)

Extensive reconciliation required with utility management companies to verify data accuracy

Intelligent Digital Solutions

Three-month predictive forecasting for utility parameters with BMS-controlled energy optimisation

Precise waste recycling metrics for sustainability reporting

Tenant electricity theft detection capabilities

Automated water leak alarms via Digital Utility Management Module

Module

Utilities Module

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Medical Assets

Traditional Approach & Operational Gaps

Maintenance activities occur inconsistently, with institutional knowledge residing with individuals rather than systems

Root cause failure analysis (RCFA) and failure mode effects analysis (FMECA) not systematically conducted

Asset degradation (e.g., generator failures) detected late in lifecycle

Breakdown reports communicated via WhatsApp rather than captured digitally

Infrastructure investments poorly tracked, limiting ROI and internal rate of return calculations

Development master plans (5-10 years) inadequately monitored, resulting in budget overruns

Disconnect between development teams and facilities management/operations

Intelligent Digital Solutions

New asset development integrated digitally within development team workflows, including BIM and BAM models

Comprehensive asset database with lifecycle costing and time-based management

Calculated mean time between failures (MTBF), mean time to repair (MTTR), and demand availability metrics

Digital CMMS including asset tagging, breakdown maintenance tracking, and 3-5 year planned maintenance forecasting

IoT sensor deployment for continuous asset condition monitoring

Module

CMMS Module	Document Warehousing	Form Management
IoT Platform	BMS Module	

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TRANSFORMING MEDICAL FACILITY MANAGEMENT WITH DIGITAL TWINS

Business Continuity Management

Traditional Approach & Operational Gaps

Reactive rather than proactive BCM approach; standard operating procedures require frequent manual review

SOPs and risk assessments expire before scheduled updates

Crisis response lacks coordination when risk events occur

Remote building control capabilities limited or absent

Infrequent simulation exercises compromise preparedness

Delayed executive escalation impacts media management and stakeholder communication

Extended business recovery periods following BCM events

Company SOPs and risk assessments become outdated or overlooked

Intelligent Digital Solutions

Automated critical alarm systems with digital monitoring across all systems (fire, water, generators, security, finance, cybersecurity)

Automatic escalation protocols for predictive risk management

Digital platform activation with systematic escalation during BCM events

Virtual monthly BCM meetings with centralized documentation

Digital procedure development and version control for continuous improvement

Module

BCM | Incident Reporting Module | Document Management

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