



This Communication is part of a project that has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N°101069732



**AEROS ENERGY EFFICIENT,
HEALTH SAFE & SUSTAINABLE
SMART BUILDINGS**

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Infocom World 2023

The Concept

Energy Efficient, Health Safe and Sustainable Smart Buildings

Target



to minimize energy consumption and maximize health measures
with smart-seating recommendations and
automated housekeeping/building maintenance
leveraging the aerOS edge-cloud continuum concepts

Powered by aerOS partners COSMOTE, UPV, NCSR, FOGUS, INFOLYSIS



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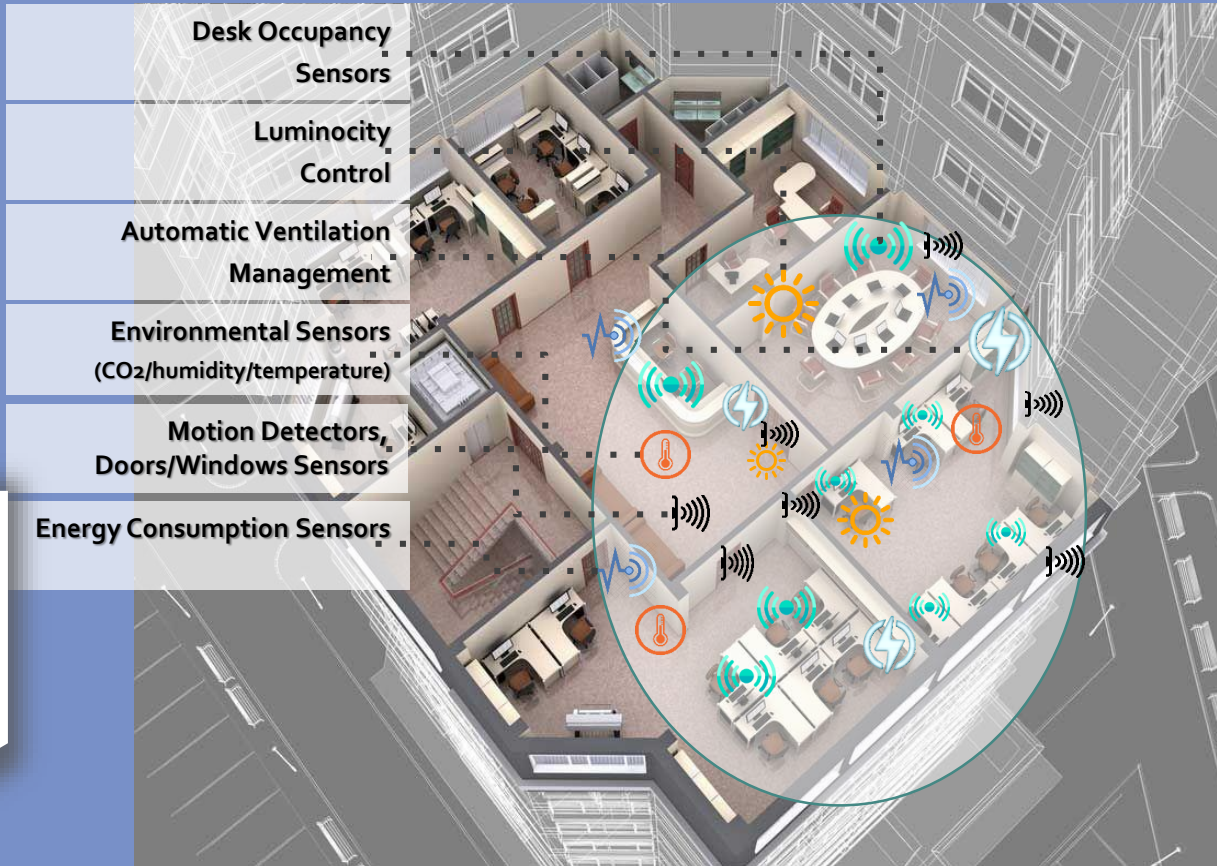
Context

By considering...

the metrics received by a vast range of sensors

historical data on energy consumption, CO2 emissions

historical data on employees' routine/preference



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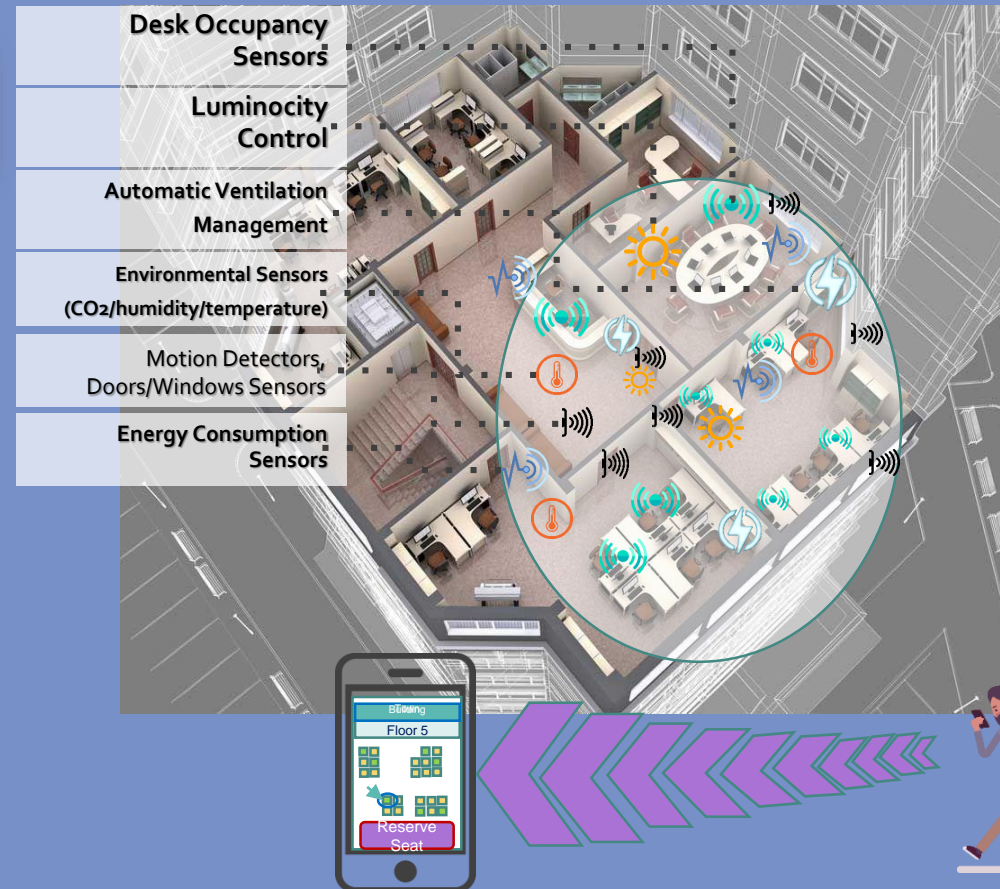
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The aerOS pilot:

Exploits AI to determine room health conditions and considers energy efficiency criteria to recommend the appropriate seating placement to the employee

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Exploits AI to determine room health conditions and considers energy efficiency criteria to recommend the appropriate seating placement to the employee

Uses the sensors' data to actuate the ventilation, heating and air-condition systems as well as control luminosity

Context

- Desk Occupancy Sensors
- Luminosity Control
- Automatic Ventilation Management
- Environmental Sensors (CO2/humidity/temperature)
- Motion Detectors, Doors/Windows Sensors
- Energy Consumption Sensors



Energy Monitoring & Building Management System



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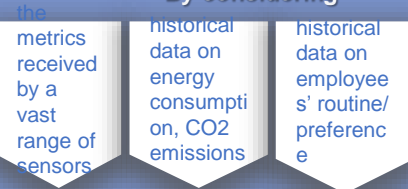


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Challenges & Innovations

With multiple IOT vendors and solutions, tech integration, so that sensors, systems, analytics work in sync is cumbersome

the aerOS architecture as a unique abstraction layer

Distinctive infrastructure characteristics of each building rationalizing autonomous and decentralized decision-making

the aerOS edge-cloud continuum

Energy Efficiency

IoT automations

swarm intelligence among the aerOS nodes to co-operate decentralized

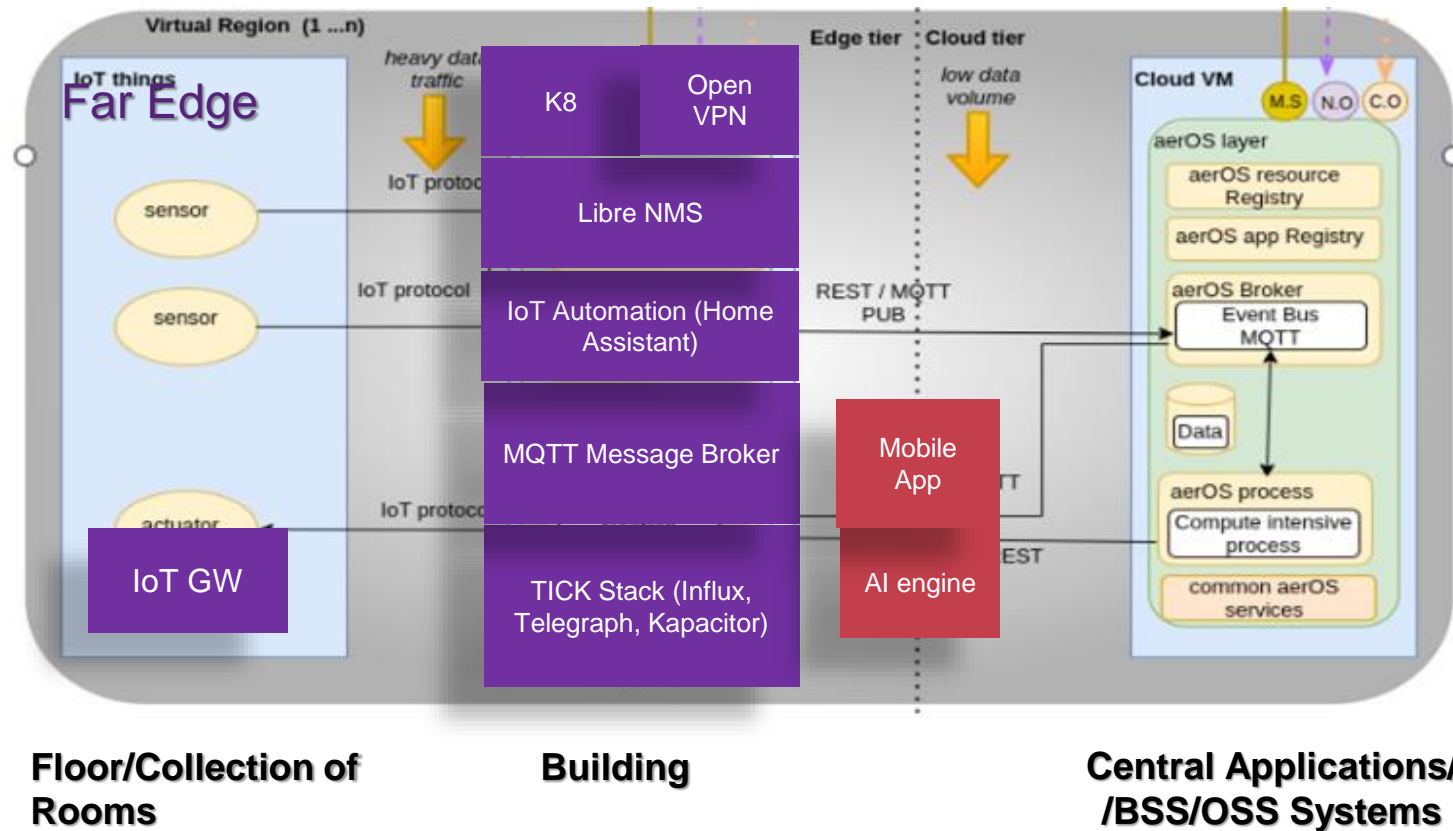
5G SA IoT GWs with SDN, NFV, Network Apps Capabilities

Smart energy consumption calculation and forecast algorithms and systems



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aerOS Use Case 5 Application Architecture

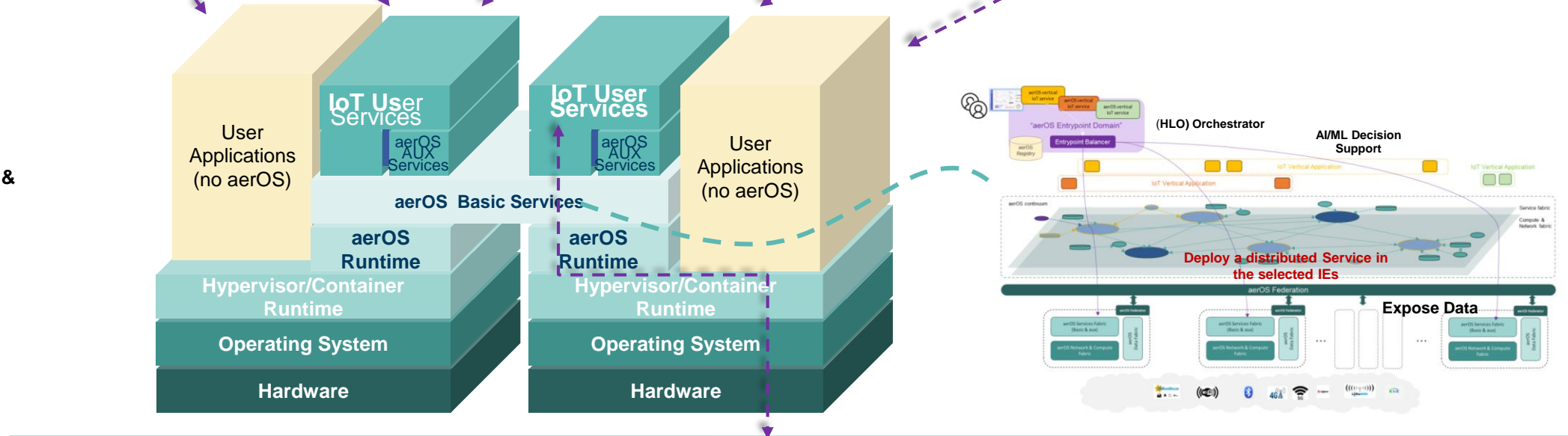


IoT Application in aerOS architecture

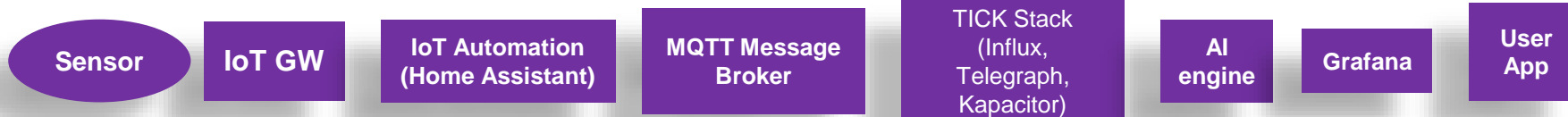
Pilot 5 Infrastructure Components



aerOS Components & Orchestration



Pilot 5 Application Components



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What do we consider a healthy office space?

Hi

Thermal Comfort

- **Temperature: 19 °C - 25 °C**
- **Humidity: 30% - 50%**

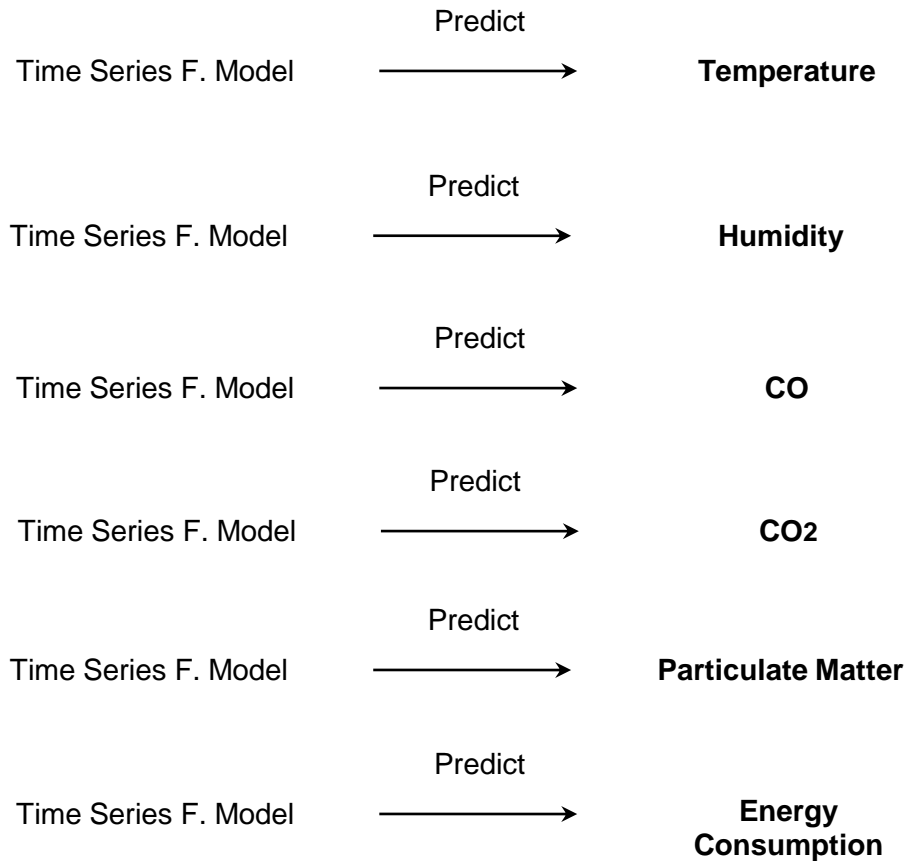
Air Quality

- **CO: 30 ppm (1h)**
- **CO₂: < 1350 ppm**
- **Particulate Matter (PM_{2.5}):
25 mg/m³ (24h)**

- Settimo, G.; Manigrasso, M.; Avino, P. Indoor Air Quality: A Focus on the European Legislation and State-of-the-Art Research in Italy. *Atmosphere* **2020**, *11*, 370. <https://doi.org/10.3390/atmos11040370>
- Indoor Environmental Input Parameters for Design and Assessment of Energy Performance of Buildings Addressing Indoor Air Quality, Thermal Environment, Lighting and Acoustics, B S I Standards, 2008
- http://bpie.eu/wp-content/uploads/2018/10/The-Inner-value-of-a-building-Linking-IEQ-and-energy-performance-in-building-regulation_BPIE.pdf




Future



Rules /
Thresholds

Optimization
Algorithms



Control HVAC

- Heating
- Ventilation
- Air Conditioning

Healthy Office

Energy Efficiency

PILOT 5 SYSTEMS & DATA FLOW

Application Plane

Leonardo IoT Application

1. Home Assistant
2. Backend/Tick Framework
3. Sensors

Forecasting System

1. Trained Models
2. AI Model Inference

Health & Energy System

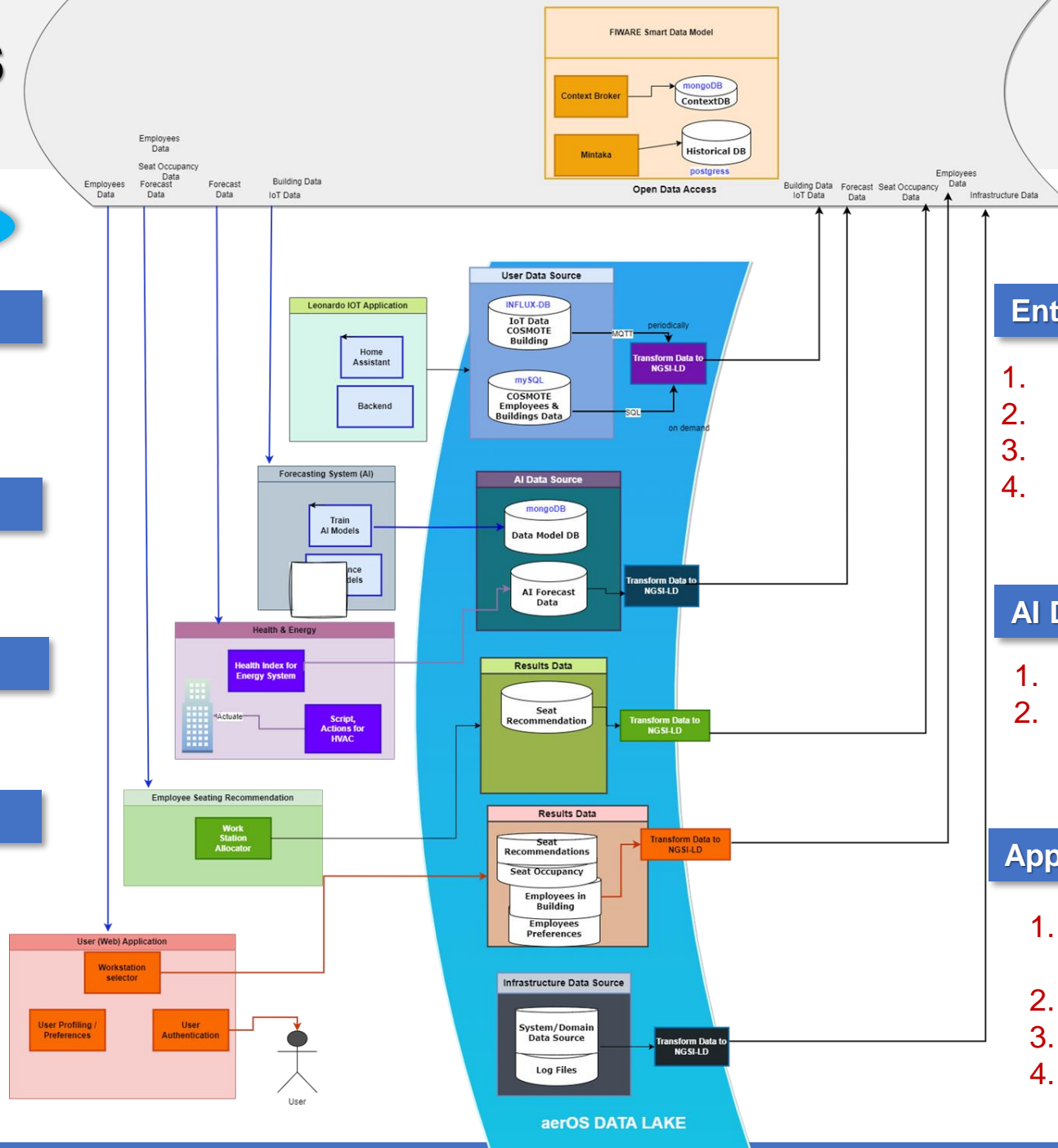
1. Health Index System
2. Actuator System

Seat Recommendation System

1. Seats Selection

User Application

1. User Preferences
2. Seats Occupancy



Data Plane

Enterprise Data

1. IOT/Sensors Data
2. FloorPlan/Buildings Data
3. Employees/Organisational Data
4. Employees Seating Preferences

AI Data

1. Trained Models
2. Forecast Data (Temperature/CO2)

Application Data

1. User Authentication/Authorisation
2. Room Health Indicator (Hi)
3. User Interactions
4. Application logs





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THANK YOU

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