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algowATT GREEN TECH SOLUTIONS *eXperience*

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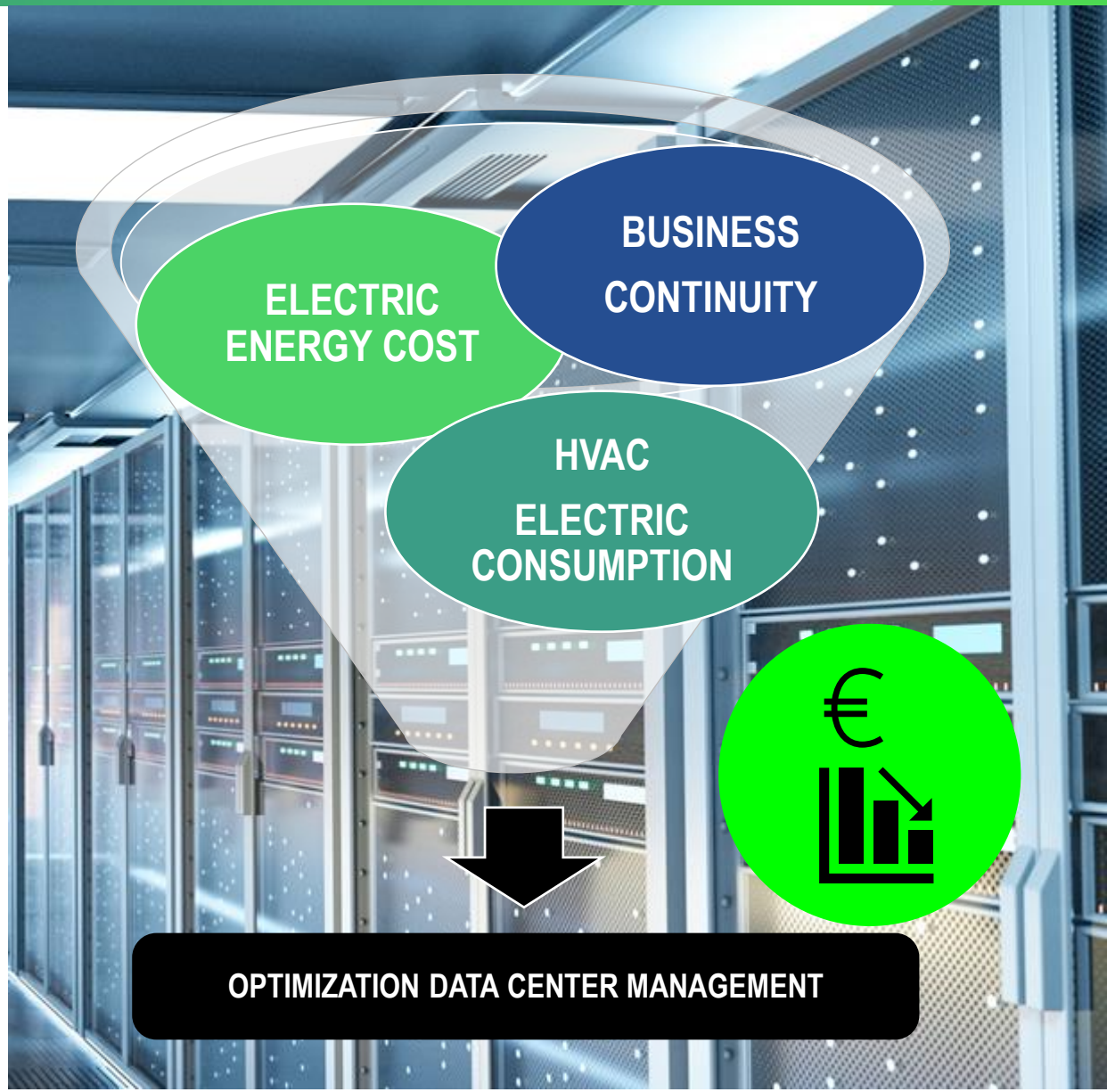
SOLUTION DELIVERY MANAGER

DATA CENTERS SOLUTIONS

algoWatt provides solutions to optimize the data centre management:

- Cost Reduction of Electric Energy Consumption
- Energy efficiency of all HVAC devices by means a continuous monitoring
- Business continuity guarantee by offering a wide range of UPS (Huawei)



Electric self-production
realization of Green Technology Electric Plant for Self-Consumption

Self-consumption of green technologies it's one of the more relevant opportunity of cost saving.
Electric Plant directly connected with Data Center
A Data Center electric consumption is well suited with Photovoltaic Plant ("flat" consumption all day long and "high" consumption during summer period without significative interruption)

As an option it's could be well integrated in a "Energetic Communities"

algoWATT GREEN TECH SOLUTIONS

- Feasibility analysis
- Technical and economic study
- Financial project and funded research
- Turn key construction of a PV plant
- Software for monitoring, operative management and maintenance

GRUPPO nsa BUSINESS PARTNER

HUAWEI

ER TENEO II

ER energy revolution pam PERFORMANCE ASSET management

ELECTRIC STORAGE
Self-consumption maximization by means storage

Electric Storage (BESS) increase the electric energy which can be provide with electric charging during the day light and the same can be provide during day night

- Feasibility analysis
- Technical and economic study
- Turn key construction of a BESS

HUAWEI

TSO SERVICES
Electric charge reserve can provide for added-value service for TSO

Electric Storage, UPS, Electric generators can provide energy in case of temporary interruption of electric transmission and distribution.
Italian TSO, TERNA, announces auctions of so called "interrompibilità»
(i.e. temporary interruption of electric distribution in order to provide to peak of electric request over the maxim electric generation)

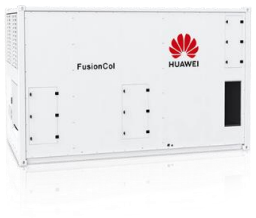
- Feasibility analysis
- Technical and economic study
- Supply of devices

- Data Centers are energy-intensive structures that are called upon to adopt sustainability and energy efficiency policies in the coming years (Pact for the climate neutrality of data centers)
- Electric Consumption for air conditioning exceeds 30% of the over all consumption of the data center
- The Data Centers need to operate in strictly controlled ambient temperature and humidity regimes

The challenge is therefore to optimize energy consumption to ensure the correct environmental parameters

Smart Cooling Products

HUAWEI

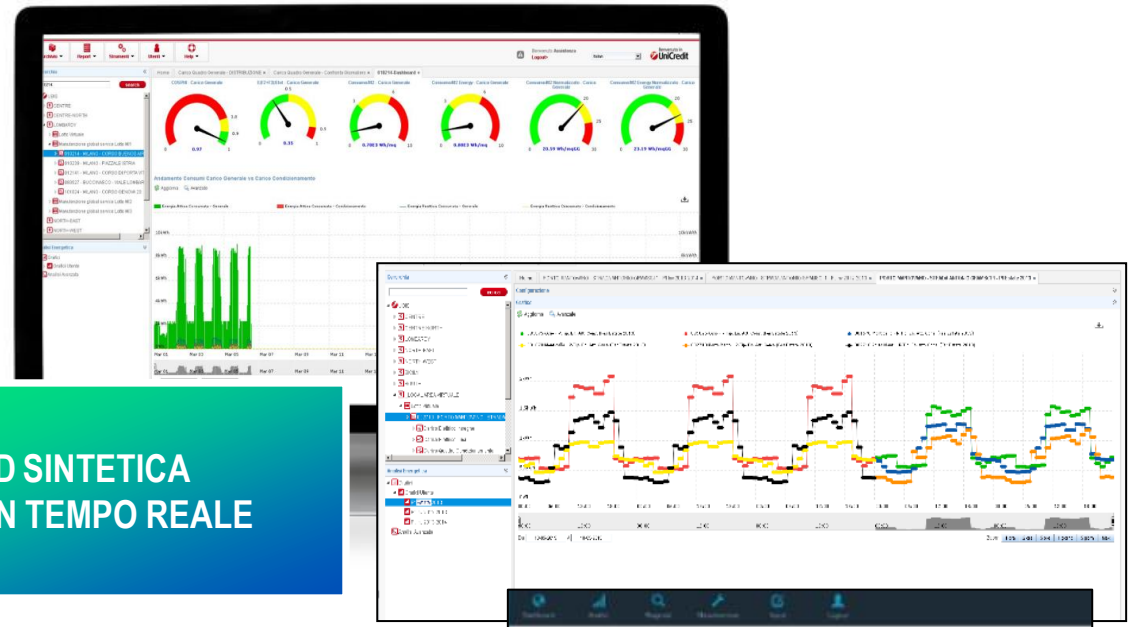


Adaptive and optimized control of HVAC equipment

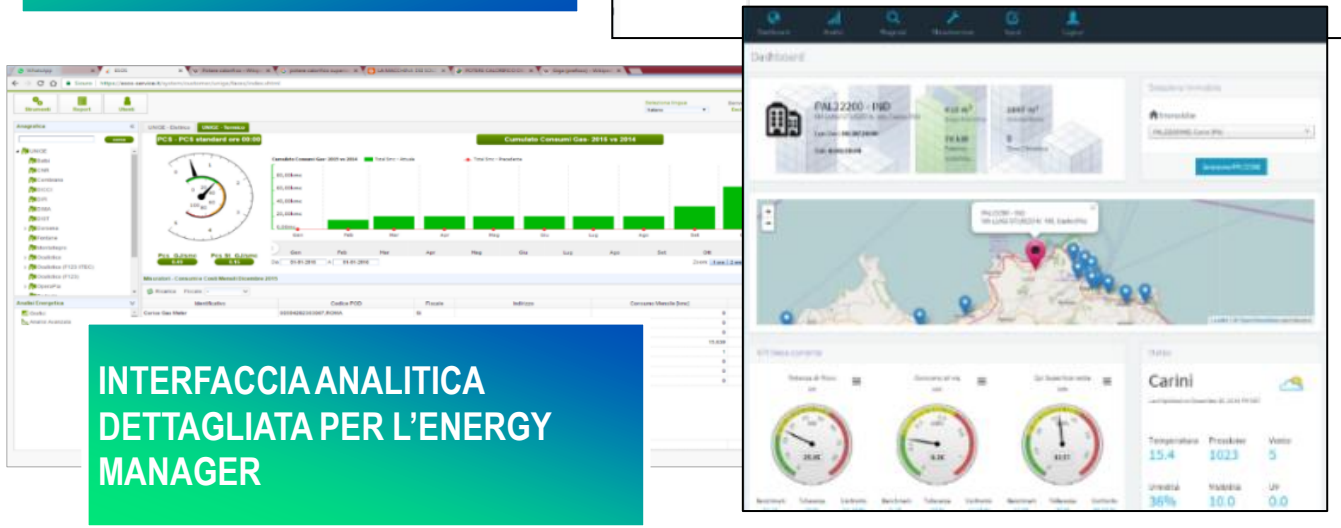
ER ESOS II

SOLUZIONE PER IL MONITORAGGIO DEI CONSUMI

- Real-time monitoring of consumption, production and energy expenditure
- Energy analysis based on the calculation of KPIs, profiles and spectral analysis of consumption
- Predefined and customizable alarms
- Interactive and summary dashboards
- Automatic and "on demand" generation of customizable standard reports
- Differentiated views based on the user's profile and perimeter
- Integration with remote control systems and company information systems
- Predefined and customizable predictive analysis algorithms



DASHBOARD SINTETICA
CON I DATI IN TEMPO REALE

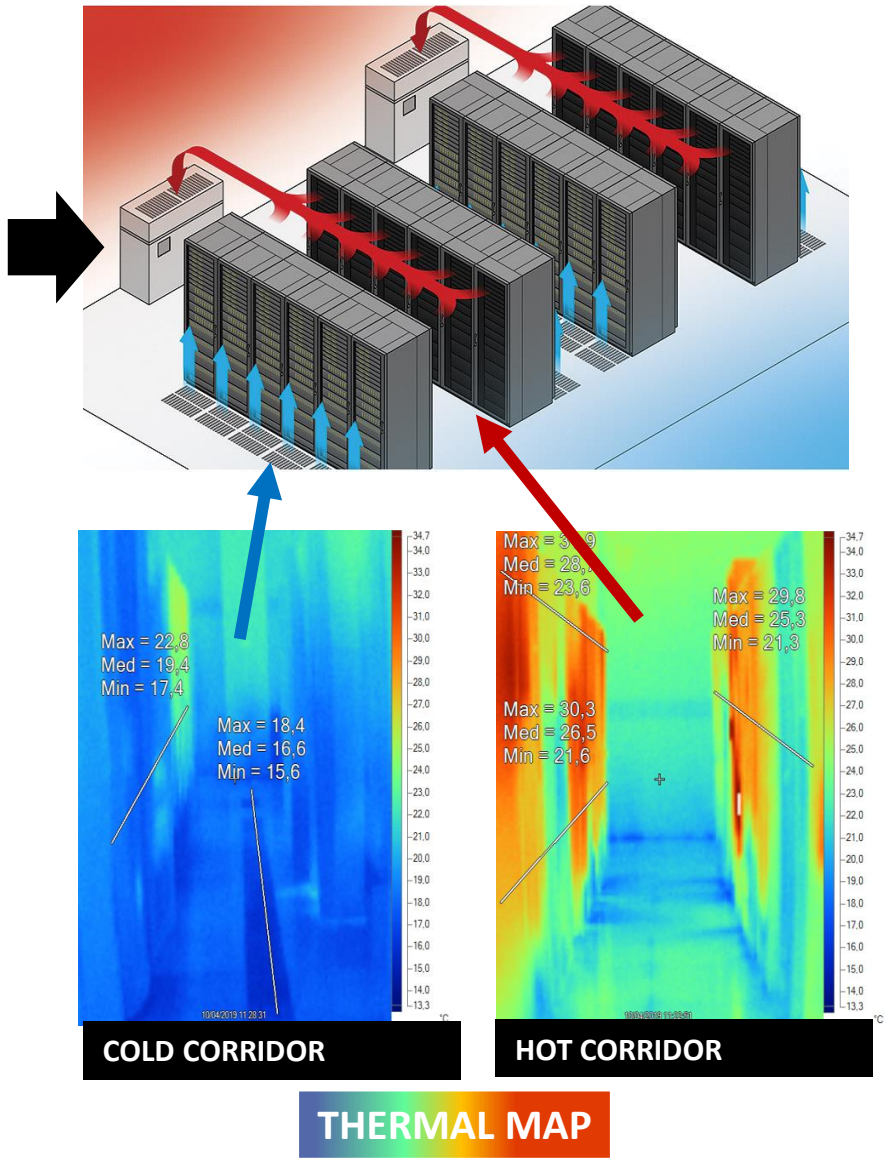


INTERFACCIA ANALITICA
DETTAGLIATA PER L'ENERGY
MANAGER

- The structure of the data centers is organized in pairs of strings of cabinets containing servers separated by corridors
- Each pair of strings is cooled by a series of machines placed in the "cold" external corridors. The air flows into the servers and comes out in the central "hot" corridor where there are extractors.
- Different computational load situations can create uneven temperatures (pockets of hot / cold air) which require "prudential" regulation of the cooling machines to avoid overheating. Different computational load situations can create uneven temperatures (pockets of hot / cold air) which require "prudential" regulation of the cooling machines to avoid overheating

The **ADAPTIVE REGULATION** of the **EACH** cooling **MACHINES**, based on the **THERMAL MAP**, allows to:

- Optimal temperature adjust each individual machine avoiding waste
- Ensure a homogeneous temperature of the servers by increasing reliability
- Reduce consumption by optimally adjusting the individual machines using only the minimum energy required
- Prevent temperature increases by analyzing computational loads
- Identify malfunctions and apply predictive maintenance

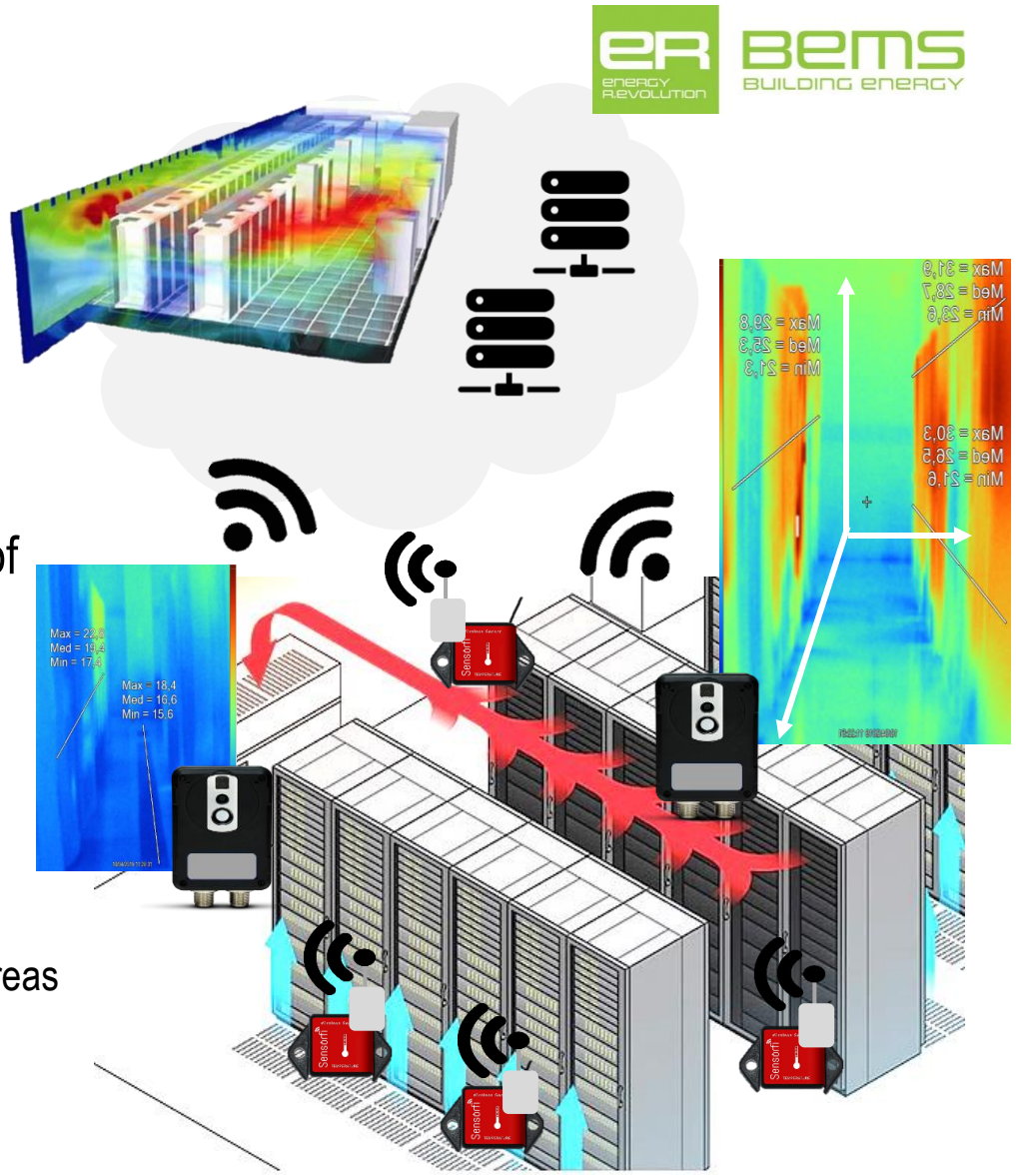


The THERMAL MAP aims to provide detailed information on the temperature of the servers and the air flows in the room in the three spatial dimensions (X-Y-Z)

«Wireless» sensors positioned in the most critical points

Thermal cameras on IP network for precise 3D measurement (2D floor and vertical height).
Low-cost devices with a matrix of 4800 points with the possibility of configuring alarms by zones and with definable thresholds.

Temperature and pressure sensors of the equipment air flows



Cloud INTEGRATION:

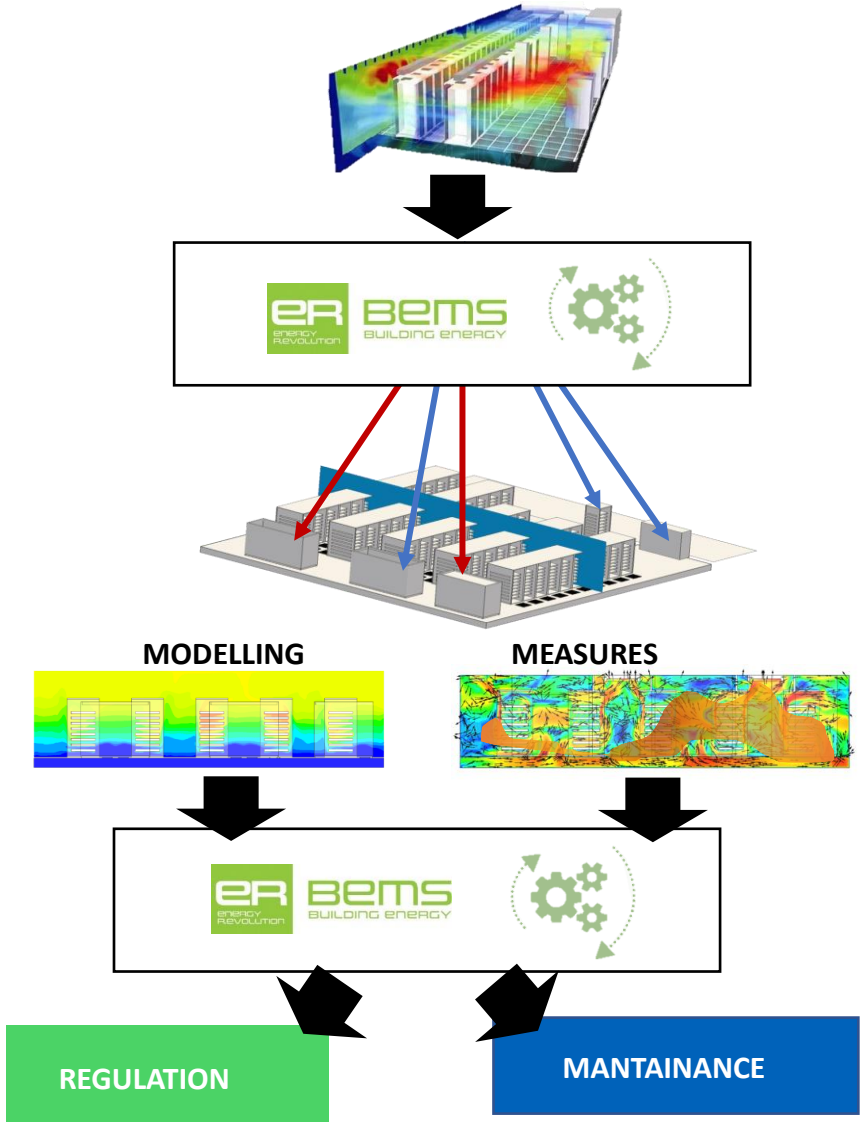
- Map of the influences of the individual air conditioning units in the different areas and on the various racks
- Mapping of the temporal evolution of the measures
- Correlation with indicators of the computational load of the individual servers

ADAPTATIVE REGULATION

- Adaptation of the customized regulation of each individual cooling machine based on temperature and computational load scenarios
- Identification of "hot pockets" in 3D and immediate compensation action
- Multi-variable approach to obtain very high performance with implementations of self-tuning algorithms using the transient data available during normal operation.

PREDICTIVE ADJUSTMENT (machine learning / AI)

- Learning of "regular" operating patterns and regulation response times (predictive model)
- Use of the predictive model and measurement of the computational load of each server for optimal pre-regulation of HVAC systems
- Detection of short- and long-term operating anomalies for scheduling extraordinary maintenance
- Detection of changes in the room configuration
- Support for predictive maintenance functions



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