Making Assets Smart

Smart City Monitor applications for integrated holistic management and operations of buildings

There is growing public interest to shopping and leisure centers, campuses, new business and residential districts as urban islands or smart micro-cities.

Local impacts of global trends

- More investments and developments of shopping and leisure centers, campuses, new business and residential districts as green urban “Smart Micro-Cities”
- Growing operational and maintenance costs for running various building systems including HVAC, elevator, electrical, lighting, security, fire alarm, etc.
- High whole life costs ratio **1:5:200** where costs 1 is construction, 5 – totals of maintenance and operating and 200 is totals of business operating during the lifetime of the building.

Dynamics of change

Energy

In accessing energy and other resources.

Regulations

Regulations for public and residential facilities

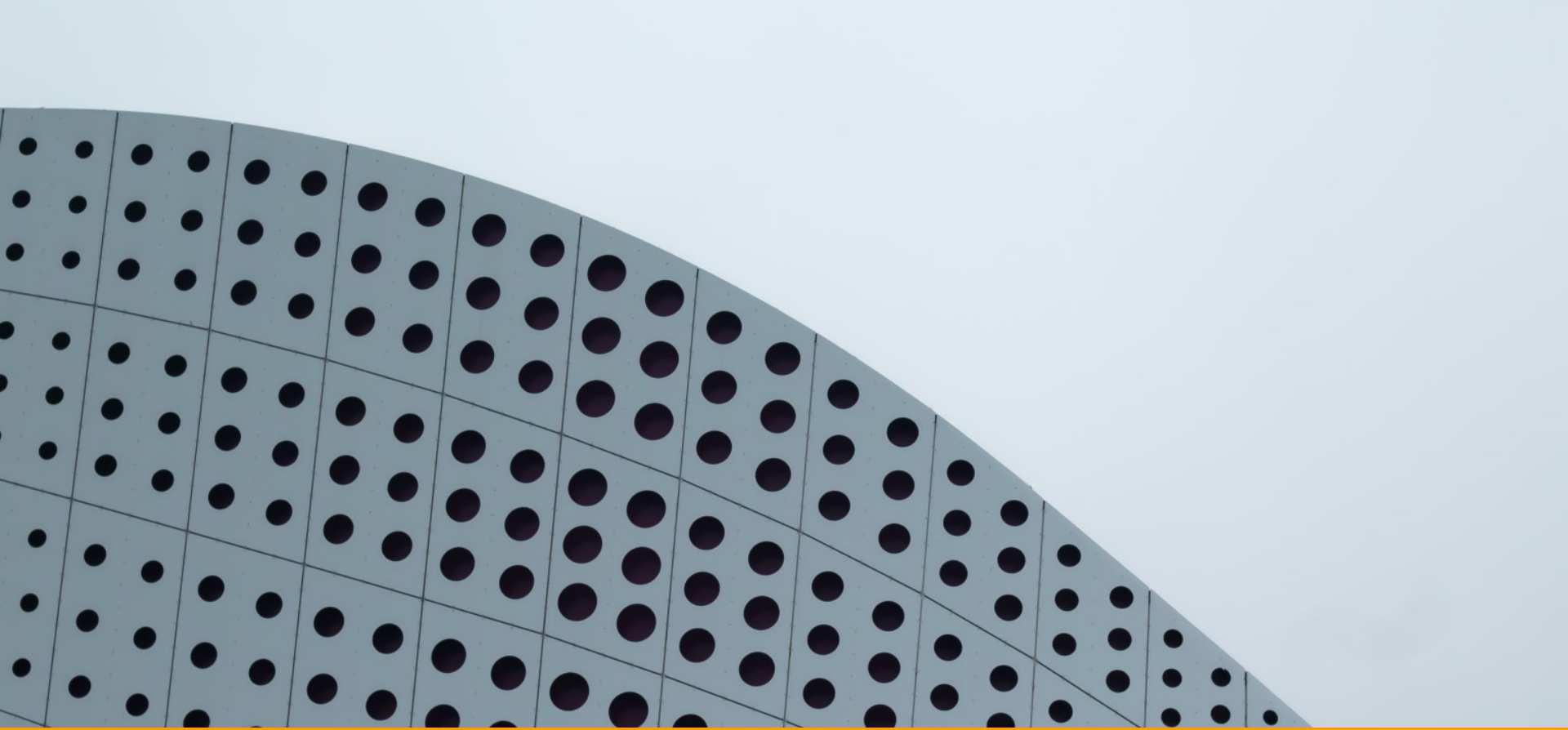
Standards

New standards of safety and security,

Require smart response: Smart support to building management and operations to optimize the costs and make business sustainable.

Life cycle cost statistics

- Smart AI-driven support to building management and operations allows optimising the whole life cycle costs and making business sustainable
- Smart building cost is ~25% above conventional
- However, it results in lower operational and maintenance costs:
  - ~ 38% for 30 years of the operations.
  - 50%-100% benefit-cost ratio (BCR) improvement



Key issues for smart building:

- How to make holistic **integrated vision** of various multiple processes in **real time**?
- How have it smart and **optimized automatically as a whole**, not within each separate system independently?
- How to introduce **new smart functions and KPIs** for energy efficiency, environmental friendliness, security, and safety, comfort and health, accessibility and mobility as well as maintainability?
- How to have building as a **big system easily managed**?
- **What are the costs** of such novel building management system (BMS)?

Smart City Monitor

Innovative platform introducing new generation of ICT/IoT

The Smart City Monitor (SCM) platform is a new generation of ICT/IoT for automatic AI-driven assistance for smart management and operations of connected assets in large scale applications.

What is Smart City Monitor?

- **Integrates** all building systems and IoT.
- Enables digital **transformation of big data streams** from multiple processes into holistic integrated vision of building operations and maintenance.
- Supports **smart management** and operational control and business sustainability.
- SCM supplements and links existing automated building systems in multiple assets to let their coordinated operations and **transparency of performance**.

How is Smart City Monitor used?

- SCM is the software running in **cloud** engine or at **premises**
- It presents **operational status of all building processes** and its results in necessary standard and custom indicators
- Authorized stakeholders can **monitor** and analyse **the whole system sustainability status** online in real time

“How are you my building and business now?”

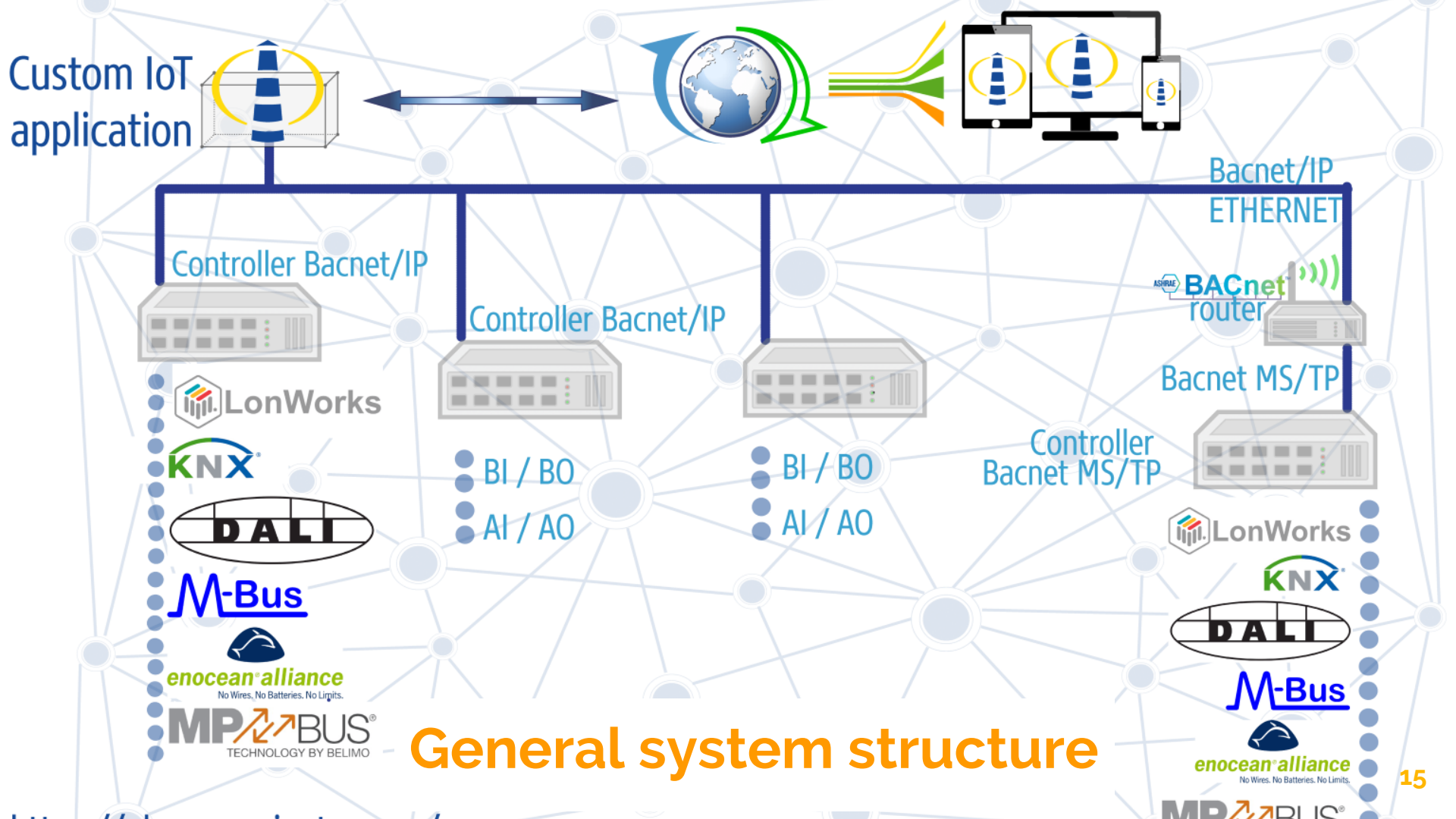
How is Smart City Monitor used?

- SCM automatically **collects data** from large number of **sensors, meters**, automated systems and other data sources
- SCM engine runs **open custom model of specific building** as cyber-physical system optimising operational costs and resource efficiency
- SCM transforms big data into **AI-driven system performance analytics**, predictions and prescriptions and optional controls
- Adding new functions & linkages AR/VR, BIM, GIS, etc

Smart City Monitor use cases

- Shopping and Trade Centers
- Micro smart districts in megacities
- Universities, schools and kindergartens
- Residential areas
- Water and waste collection monitoring
- Public campaigns monitoring of results
- Smart Pedestrians (Local Intelligence service).

Applications: Realising holistic analytics of ongoing processes for owners and public bodies by various KPIs related quality of life and services and performance



General system structure

Smart City Monitor use case: Shopping Center

Use case example: Shopping Center

Size in m: 600*150

120 shops

3 restaurants, parking area

Application: operational transparency for monitoring and performance in real time

Functions:

- Automatic collection of metering data about each shop operations: water, electricity, waste, number of visitors, current shop status, fire, CCTV
- Calculating all performance indicators, costs, revenue, customer service index, ROI, regulation compliance, etc

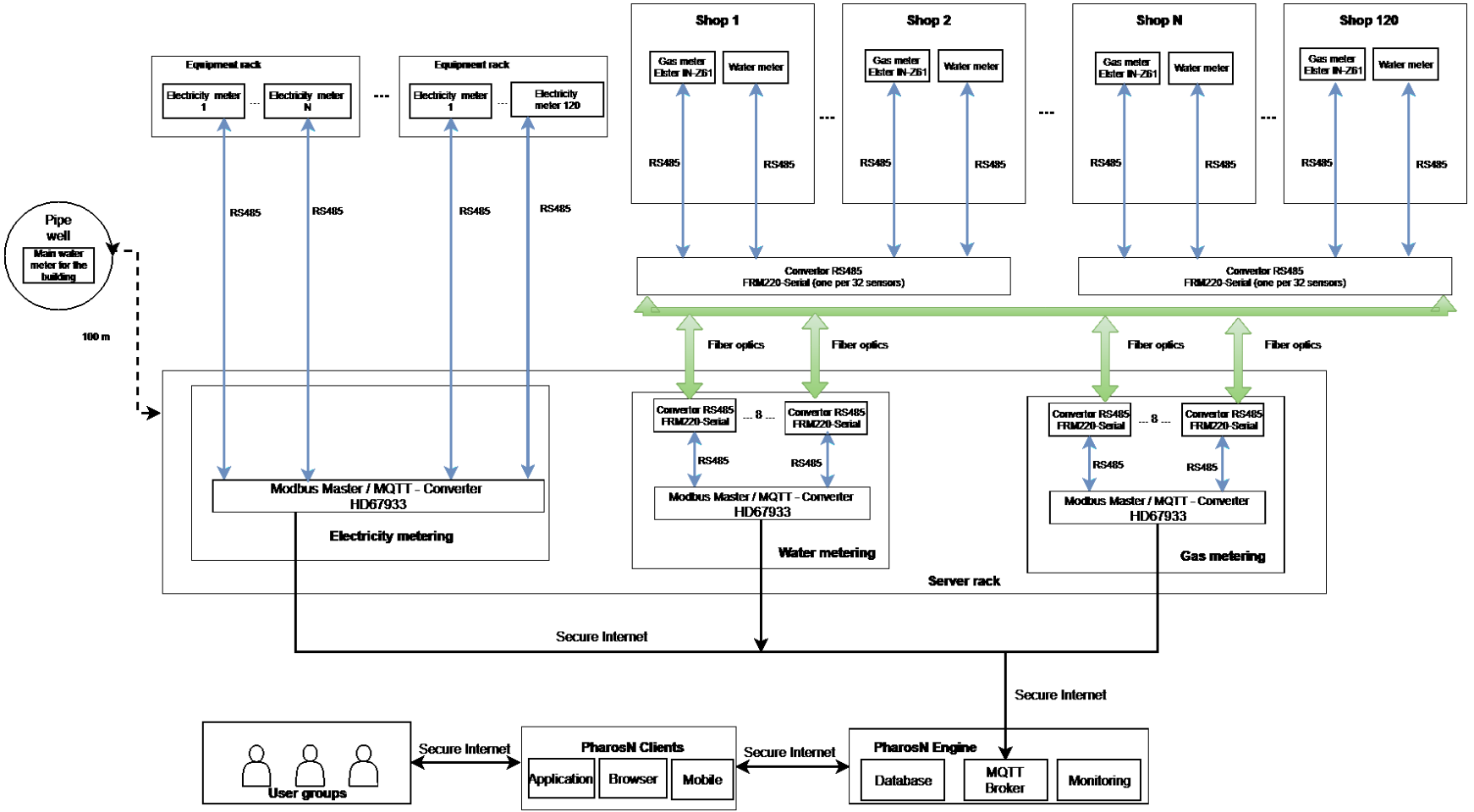
Real time calculation of performance analytics about ongoing processes:

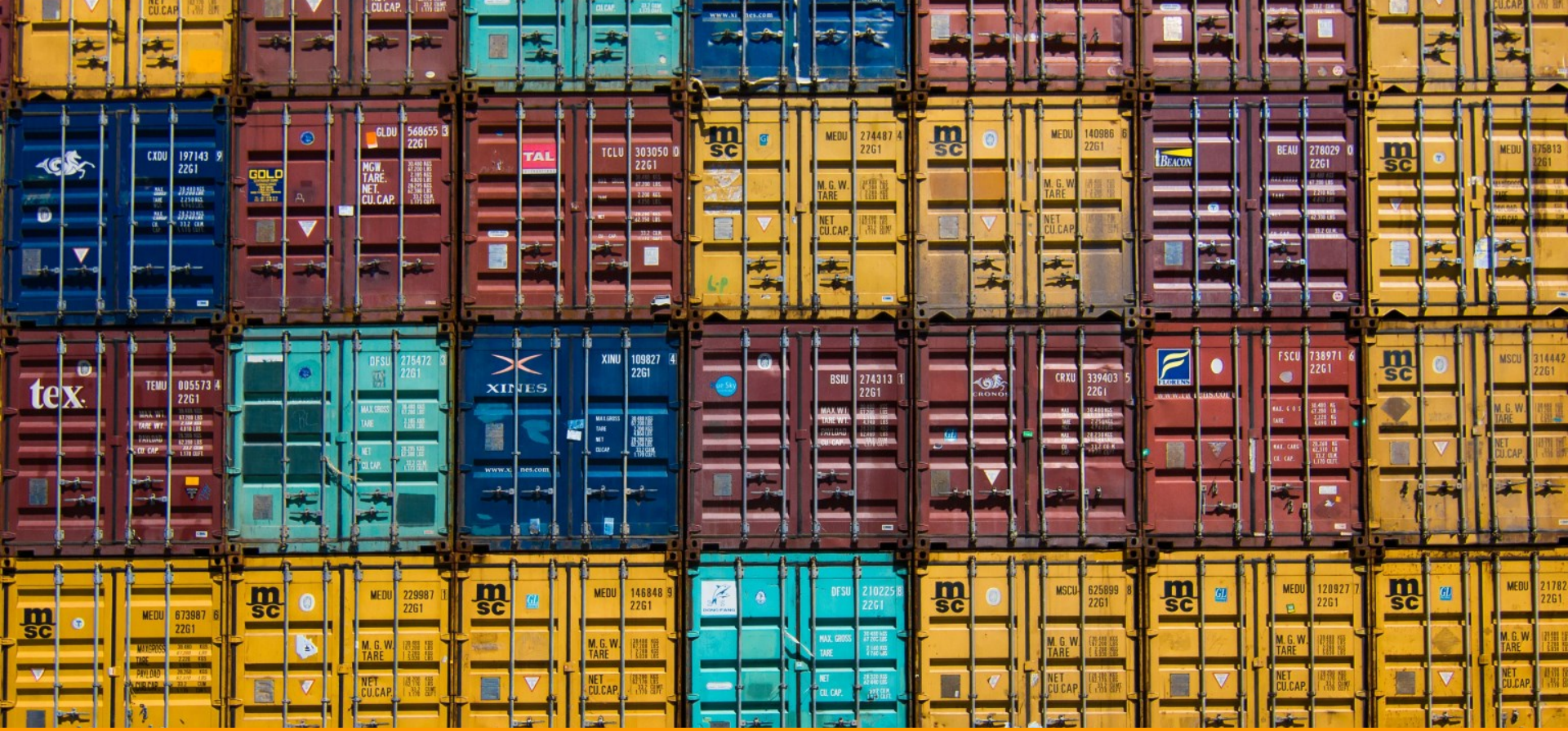
- Energy and water consumption, visitors vs. buyers, advertisement efficiency, each costs element for the buildings separately and in totals, revenue by categories and totals, customer satisfaction, optional scenarios of optimization actions, operational control of employees and sustainability targets, trends, etc.

Public information and promotion:

- Optional public presentation of specific performance aspects online is as business promotion actions e.g.
- number people in the center, total number of products and services,
- customer satisfaction, compliance with standards, green efficiency, etc.

Shopping center system diagram





Compliance to standards:

- Smart City Monitor supports compliance with all major international standards of quality management such as ISO 9001, 14001, 37120, 37122, 37123, etc
- The model allows for national and local enterprise standards
- The standard definitions are introduced into the open building model as indicators and operational targets
- SCM automatically controls compliance in real time
- Non-compliance cases are promptly identified
- Relevant operators and stakeholders are notified immediately
- The cases are stored as evidence and easily analysed in detail
- Improvement actions formulated using statistics and analytics
- Authorized users have secure access to reports in real time

Business offer:

GOLEM Integrated Microelectronics Solutions GmbH offers organizations in construction, real estate and assets management the Smart City Monitor implementation in the following stages:

- 1. Project formulation and review
- 2. Agreement, time schedule and budget
- 3. Project planning and specifications (~3 months)
  - Model of the building
  - Data sources to be used (sensors, smart meters, automated systems, IoT, databases) and its linking to the SCM by planned or existing networks (fiber optics, cable, Wi-Fi, LoRa, etc)
  - Information services for key stakeholder groups (owners, management, operators, customers, public)
  - Mobile applications for the stakeholders

- 4. System implementation and integration (~6 months depending of related construction and components installation schedules for meters, sensors, video cameras, connectivity networks, etc) including
  - Model design and development accordingly to the specifications
  - Model running and testing on data simulators
  - Model demonstration for customer evaluation and feedback
  - Dashboards, interactive reports and mobile apps design and implementation for each stakeholder group
  - Data sources implementation and linking
  - System tests and tuning (targets, events, alarms, sustainability conditions, operational dashboards, etc)
  - Quality control and acceptance by the customer

- 5. Customer employee training, technology and operational knowledge transfer to the customer
- 6. Continuous support (included in the license fee)

Additional options:

- Participation in the relevant Horizon 2020 consortiums for projects funded by European Commission

System costs:

The SCM project cost estimation is provided upon the review of the project scope and scale.

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The key cost components are:

The number of data sources to be collected in real time

The number of online sessions by stakeholders

The number of key performance indicators and objects in the building monitored and analysed (the model complexity)

The company policy is to formulate unique cost-effective and competitive project offer answering the customer needs and conditions.

Thanks!

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PharosN and Smart City Monitor service portal: pharosnavigator.com