Caverion

Internet of Things – shaping business models of industries

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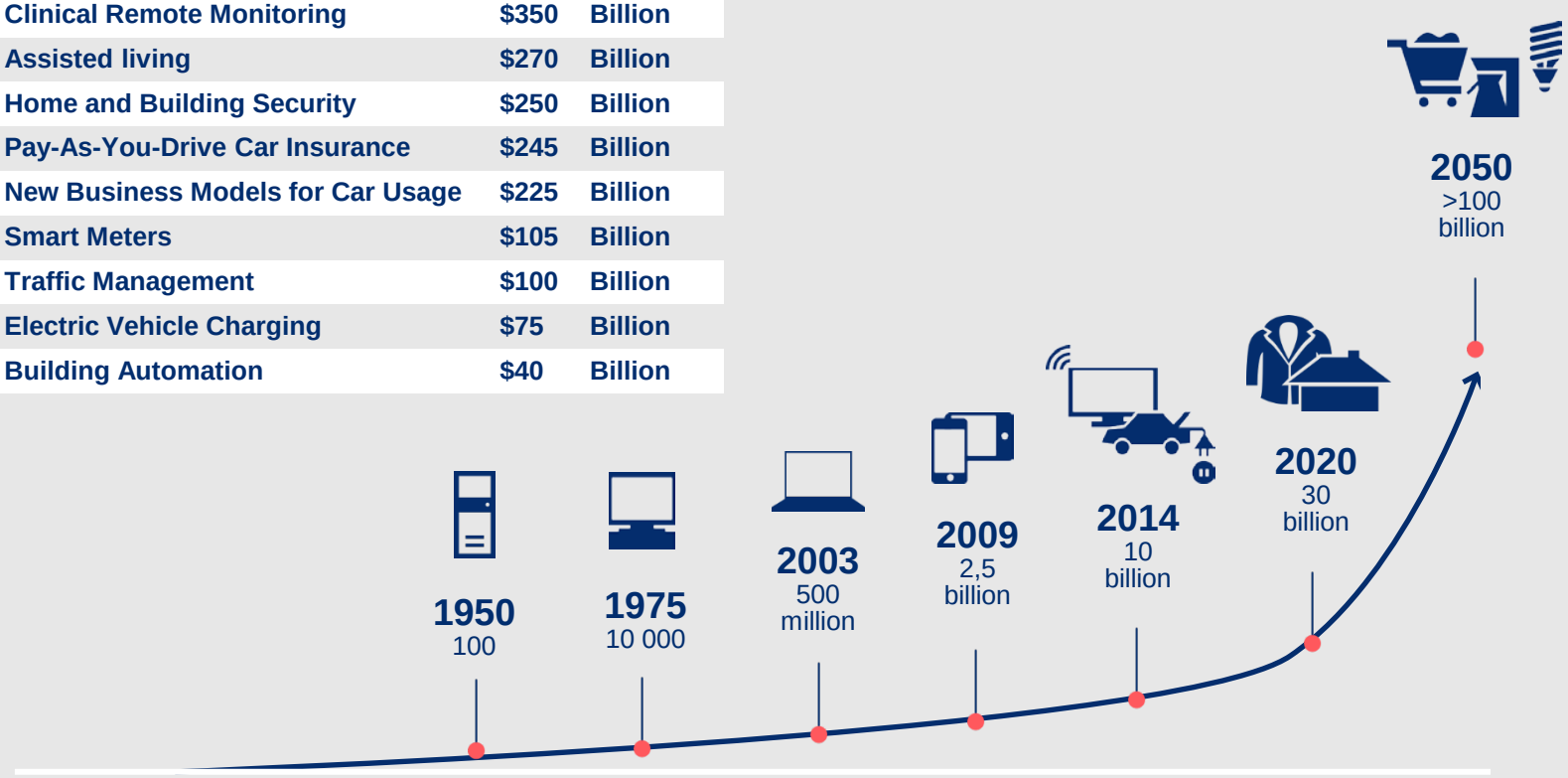
Expansion of IoT

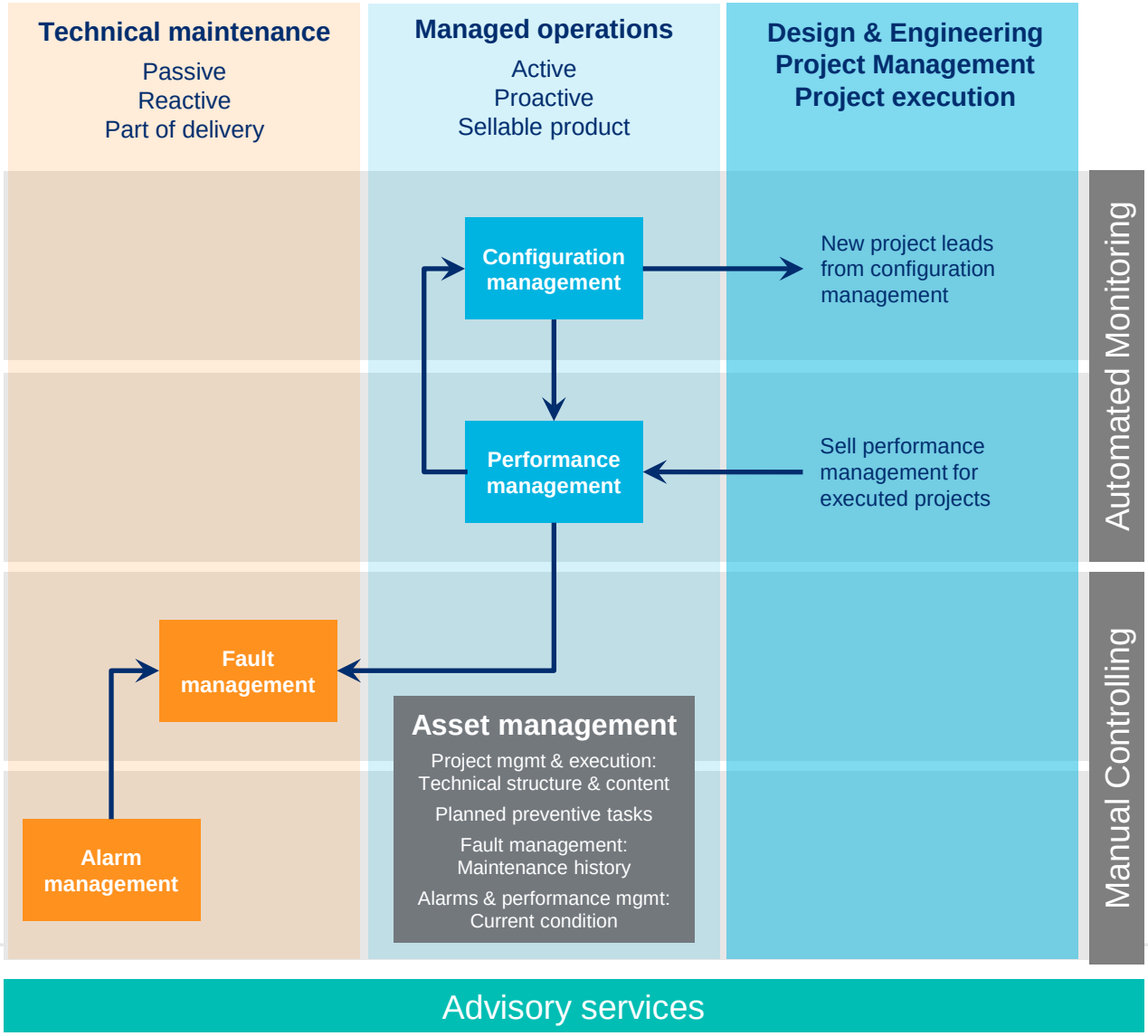
Top ten in 2020

1.	Connected car	$600	Billion
2.	Clinical Remote Monitoring	$350	Billion
3.	Assisted living	$270	Billion
4.	Home and Building Security	$250	Billion
5.	Pay-As-You-Drive Car Insurance	$245	Billion
6.	New Business Models for Car Usage	$225	Billion
7.	Smart Meters	$105	Billion
8.	Traffic Management	$100	Billion
9.	Electric Vehicle Charging	$75	Billion
10.	Building Automation	$40	Billion



Source: IBM 2015, Internet of Things an IBM Point of View

Remote Center Evolution in Our Industry



Megatrends in the market support our long-term strategy

Increasing technology

Technology in buildings currently account for 40−60% of building costs

Integrated technologies require multi-discipline expertise

Maintenance is increasingly based on preventive measures as well as on actual needs and conditions.

Improving energy efficiency

Tightening legislation relating to energy efficiency

In 2020, all new buildings are required to be on a passive house level (almost self-sufficient energy-wise)

Increasing demand for energy-efficient solutions also for existing buildings

Growing digitalisation

All technologies in buildings have an IP address.

Demand for remote monitoring is increasing.

10,000 buildings currently under Caverion's remote control.

Fragmented market

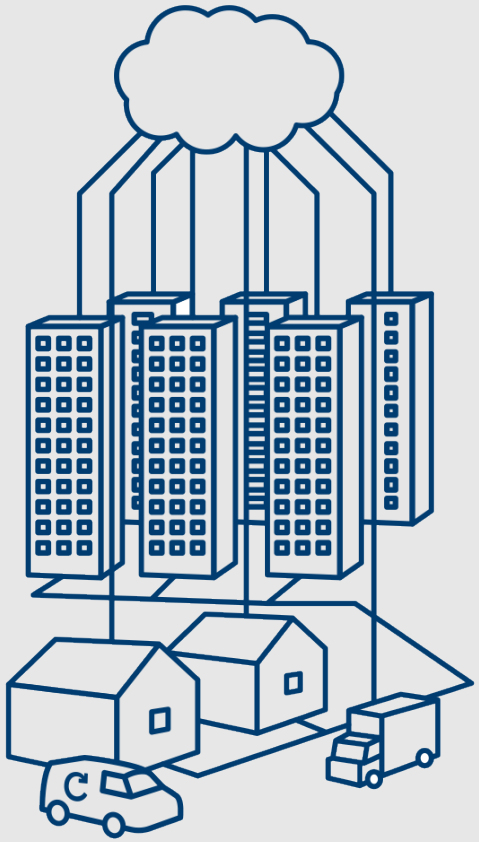
A lot of small companies in the market

Extensive services a competitive advantage especially in large projects

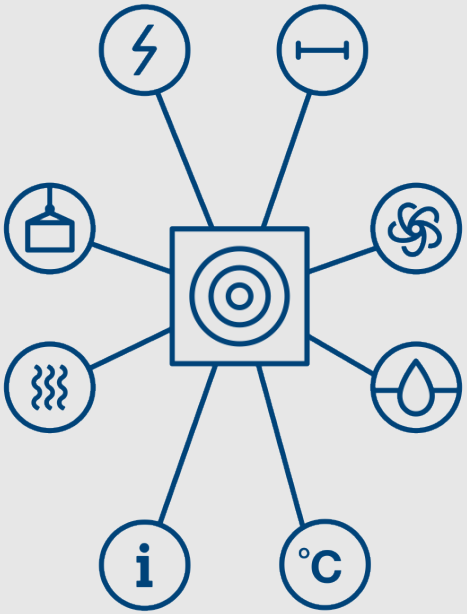
Growth potential especially in German-speaking areas

Elements of IoT

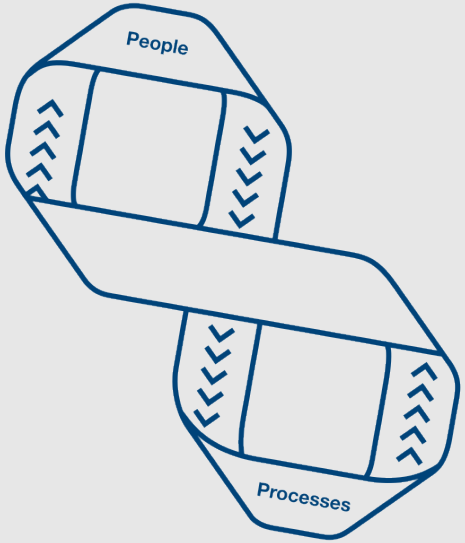
1. Connectivity



2. Sensors & Information



3. People & Processes



New Applications Based on Measured Elements

Presence

Utilize existing presence detection to find usage patterns and forecast utilization rates of the building.

Benefit examples: impact on cleaning needs or food estimations to catering

Conditions

Adjust traffic lightning based on conditions and analyze detection of lamp failures

Benefit examples: define light level by demand or generate optimal travel plan for maintenance

Energy

Define daily patterns by time series to define normal consumption profiles and alert deviations with detailed causes.

Benefit examples,: AHU or indoor light effect are adjusted according the peak load maximum.

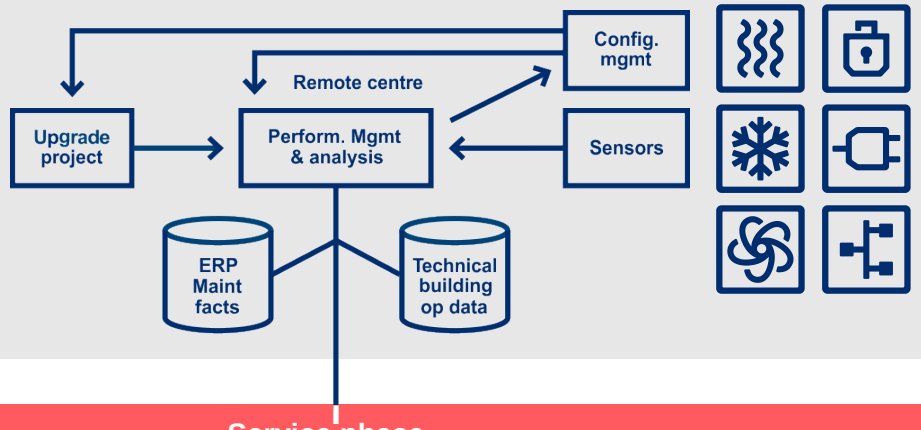
Change in Managed Services by Digitalization

Building Information Modeling (BIM)

Benefits

- Improved quality
- Seamless communication
- Improved predictability

IoT and Intelligent buildings



Digitalized approach

Construction phase

BIM as designed → BIM as build

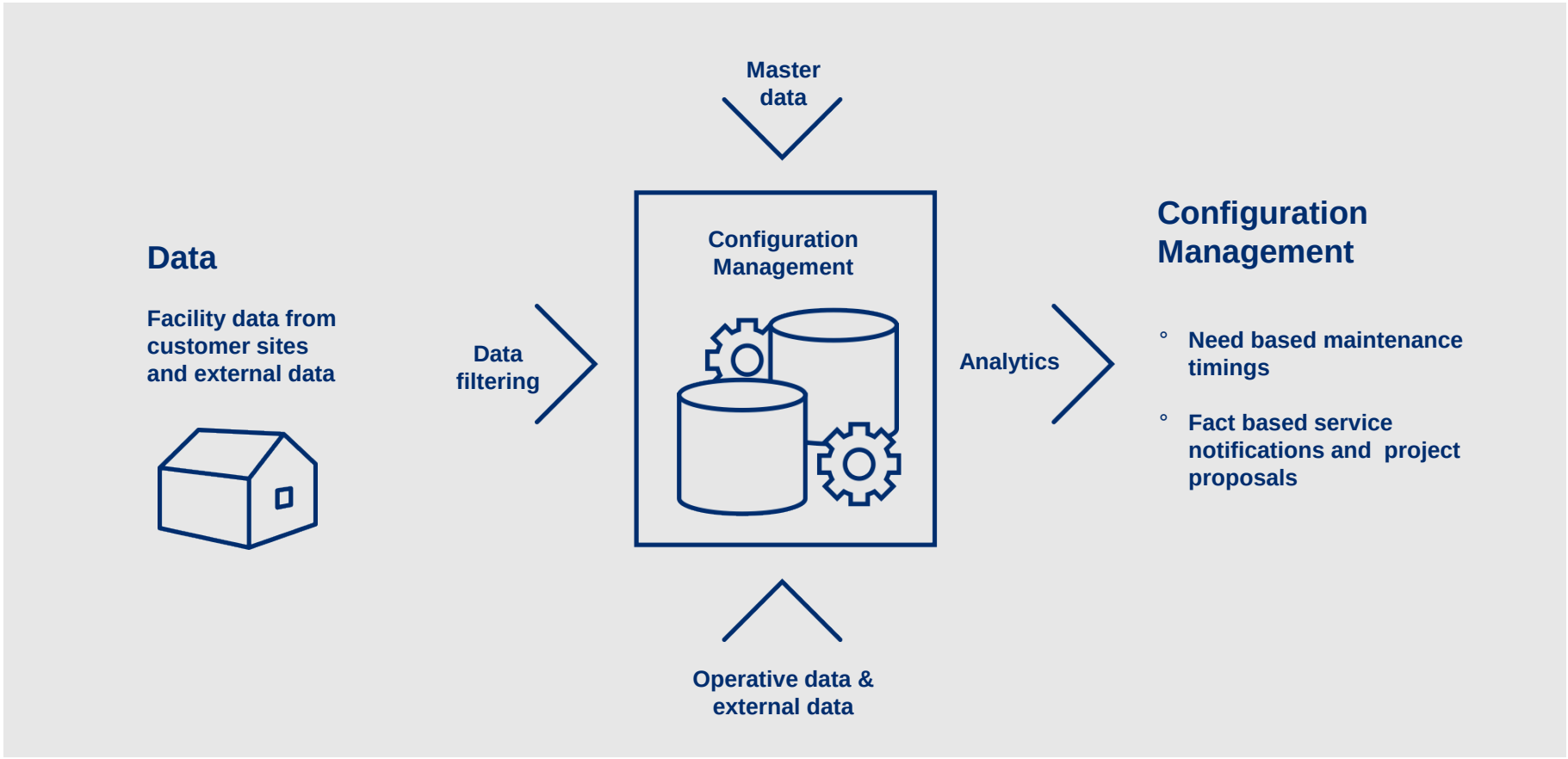
Service phase

BIM as served → MO; MLC advisory service

Traditional approach

Adv → D&E → PM → PE → TM → MO

Preventive Maintenance Driven by Analytics



Data gathering → Data transfer → Storage → Analytics → Notification

Customer Benefits of IoT

1. Identify

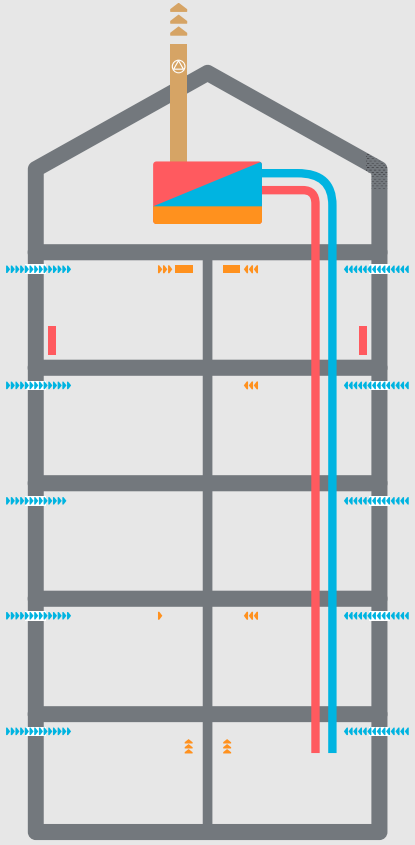
Continuously diagnoses of facility performance and automatically generate notifications with opportunities for operational efficiencies

2. Prioritize

Highlighting required action items using performance trending and expert guidance

3. Execute recommendations

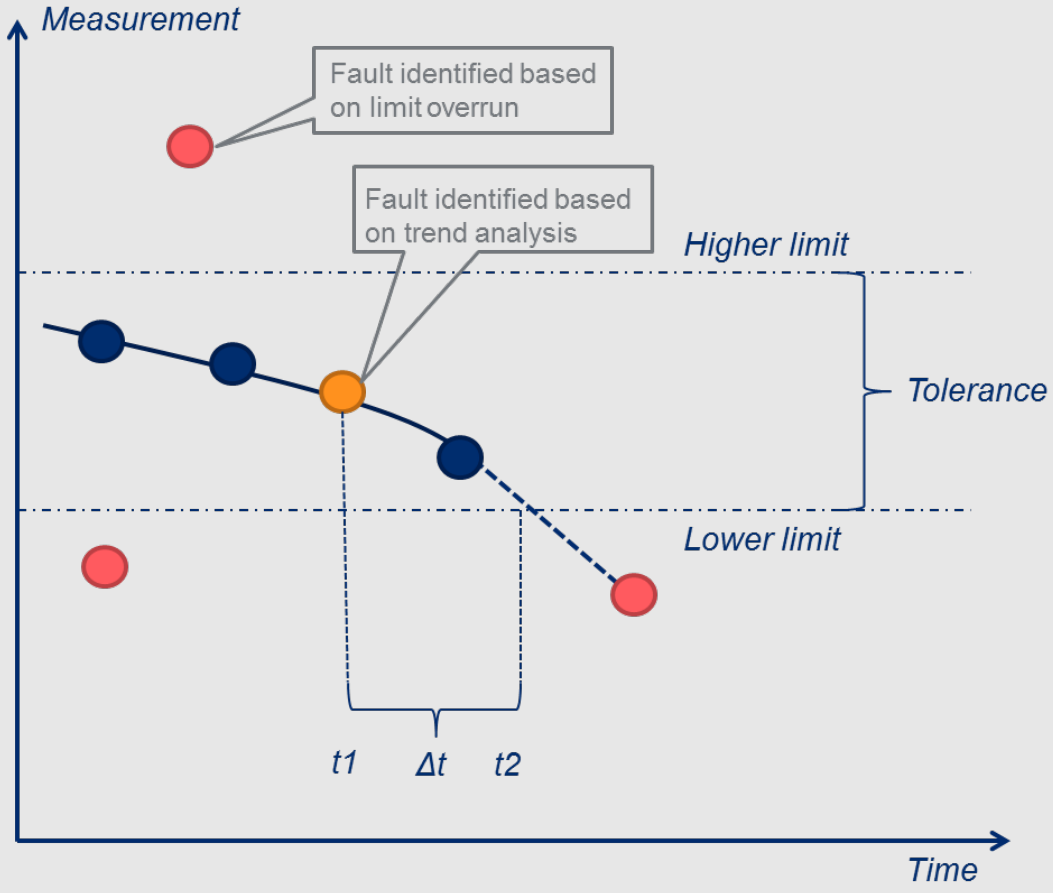
When recommendations are implemented, the results are evident – driving down energy costs and improving building performance.



Value Proposition and Metrics

Value Proposition	Key Performance Indicators	Operational Performance Indicators
◦ Promise of value to be delivered and acknowledged and a belief from the customer that value will be delivered and experienced	◦ SLAs agreed in the contract and connected to Caverion rewarding/invoicing ◦ KPIs will be illustrated in customer reports & portals	◦ Detailed technical metrics for internal usage ◦ OPIs will be illustrated in Service manager / facility manager dashboards
Guaranteed indoor conditions		
◦ Caverion can guarantee for indoor conditions, which affects to better wellbeing and working conditions of employees and facility users ◦ Guaranteed indoor conditions make better and safer production environment	◦ Realized indoor condition level % or h	◦ CO2 level trend ◦ Temperature level trend

Fact Based Investment Proposal



Notification

Building name: Building #33
Equipment name: AHU01
Analysis name: AHU coil analysis
Estimated daily cost savings: €914

Problem:
Excess or simultaneous heating and cooling

- The preheating coil and/or cooling coil are either providing excess heating or cooling or operating simultaneously

Possible causes:

- Valve setting is not set properly and is leaking
- Valve is stuck
- Temperature sensor error or sensor installation error is causing improper control of the valves

Recommended action:

- Check and correct together with next service site visit (Planned 06.15)

Case examples: Managed Life Cycle

Life Cycle Model	Client	Client segment	Country	Disciplines								Value	Lifespan	Size
														
PPP	Päiväkehrä school, City of Espoo	Public	Finland	√	√	√			√	√		EUR 14 million	2015–2037	7,400 m² including the extension of 2,500)
	Rygge Ungdomsskole (general contractor Kruse Smith AS)	Public/ General contractor	Norwayy	√	√	√		√	√	√		EUR 8.8 million	2015–2016	11,000 m²
	Torkinmäki school and day care centre, City of Kokkola	Public	Finland	√	√	√			√	√		EUR 12 million	2015–2037	7,200 m²
	Holstebro police station	Public	Denmark	√	√	√			√	√		EUR 18.8 million	2014–2041	12,000 m²
	National Court House, Viborg	Public	Denmark	√	√	√	√		√	√		Not disclosed	2013–2039	9,460 m²
	Kaivomestari, City of Espoo	Public	Finland	√	√	√		√	√	√		Not disclosed	2003–2028	11,434 m²
	Huhtasuo school and day care centre, City of Jyväskylä	Public	Finland	√	√	√	√	√	√	√		EUR 16 million	2014-2040	-
ESCO	Siilinjärvi municipality	Public	Finland	√	√	√				√		EUR 1.1 million	2013–2023	Nine facilities of the municipality
EPC	Leksand municipality	Public	Sweden	√	√	√				√		EUR 6.5 milliion	2015–2026 (first phase 2013-)	152,000 m²
	Söderhamn municipality	Public	Sweden	√	√	√						Not disclosed	2014-	410,000 m²
	Kalmar municipality	Public	Sweden	√	√	√						Not disclosed	2012–2016	175,000 m²

Case examples: Managed Operations

Client	Client segment	Country	Disciplines	Lifespan	Size
					
MTU Aero Engines AG	Industry	Germany	√ √ √ √ √	2014->	285,000 m²
PVO-Vesivoima	Industry	Finland	√ √ √ √ √ √ √ √ √	2013−2018	7 Hydropower plants
Patria	Public	Finland	√ √ √ √ √ √ √	2012−2017	180,000 m²
Total Raffinerie (petroleum refinery)	Industry	Germany	√ √ √ √ √ √ √ √	2009–	320 hectare
Orion Corporation	Real estate owners and developers	Finland	√ √ √ √ √ √	2009–2015	200,000 m²
Marine Façade, the Passenger Port of St. Petersburg	Public	Russia	√ √ √ √ √	2011–	The biggest passenger port in the Baltic Sea region
Kesko	Real estate owners and developers	Finland	√ √ √ √ √	2001–	500,000 m²
Karolinska University Hospital (Locum)	Public	Sweden	√ √ √ √ √ √	2002–2019	400,000 m²
Finnair	Real estate users	Finland	√ √ √ √ √ √ √	2007–	170,000 m²
Varma	Real estate owners and developers	Finland	√ √ √ √ √ √ √	2011–	982,000 m²
Valio	Industry	Finland	√ √ √ √ √ √ √ √	1995–	

Life Cycle Solutions for
Buildings and Industries