

ENERGY BREAKFAST CLUB, 20.02.2019

Creating smarter future of homes, buildings and mobility

The future of buildings

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Creating safer future of homes and buildings

Protection against arc fault

Fire statistics

Statistics about fire accidents in Europe

Fires in Europe

- 2.000.000 fires are reported in Europe each year
- 90% of fire happen in buildings on average, where we spend 90% of out time

People killed and injured

- 4.000 people are killed by fire in Europe every year. This is 11 deaths per day
- 70.000 people are hospitalized in Europe each year due to severe injures caused by fire

Damages due to fire

- 3 minutes is all it takes for fire to involve an entire room, because we use more flammable materials than before
- 126 billion € is eaten up by fire damage each year

Fire prevention is very important to avoid death, injuries and damages

Fire statistics

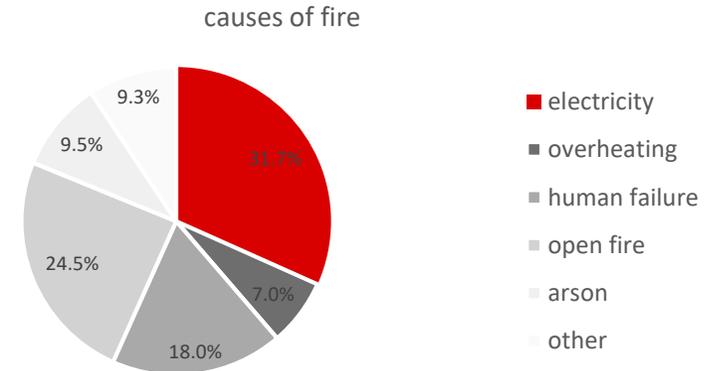
Statistics about fire accidents in Germany

Germany 2015 statistics

- 230.00 damages due to fire in 2015
- 343 deaths due to exposure to smoke, fire and flames
- 77 deaths caused by electricity

Fire due to electricity

32% of fires in Germany in 2015 had their origin in electricity and can be traced back to defects in the electrical installation due to damage wires, loose connections and/or defect devices.



Germany is the first country in Europe that prescribes as mandatory fire prevention in electrical installations

Fire due to electricity

Arc faults, overcurrent and overvoltage

Arc faults

A very common cause of fire due to electricity can be found in the arc faults.

“Contact arcs” are generally related to two conductive parts at different voltage placed in direct or indirect contact through low conductive paths. A damaged conductor could enable the creation of electric arcs between the initial merged contacts.

The current flows through the damaged section, and as a result current density tends to increase. The increased heat in the affected area by the Joule effect starts overheating the insulation with consequent risk of fire.

Overcurrent

Can be differentiated in two types:

Short circuits occur when two conductors come into contact and quickly create a high current draw that results in an explosion of the conductors, which can then ignite any nearby combustible materials.

Overload occurs when an electric circuit carries more current than it is designed to handle. An overheated conductor can damage its insulation and cause a fire by igniting any nearby combustible materials.

Overvoltages

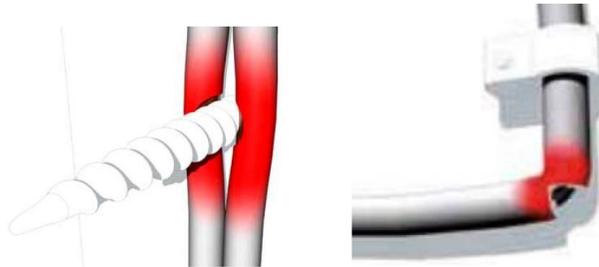
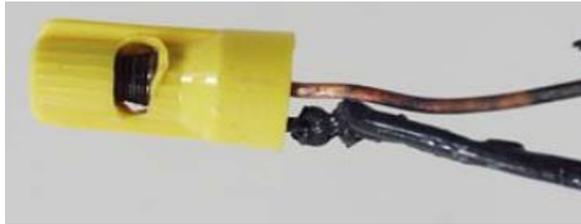
Overvoltages of long duration (from several seconds to several minutes) are voltages that may not be high but are long enough in duration to cause certain components in electrical equipment to overheat and even catch fire, if they have not been sized correctly to operate under such conditions.

These overvoltages may be caused by faults in the supply network (break in neutral conductor, short-circuit to earth of high voltage network cable).

Arc faults, overcurrent and over voltages are two possible causes of fire due to electricity: a proper protection against them is required

Different causes of the arc faults

Introduction to arc the arc fault concept



Parallel arc fault

Can generally be defined as insulation breakdown between the conductive parts that are normally isolated.

Main causes are insulation failure, mechanical or accidental interference with conductive parts causing damage

Serial arc fault

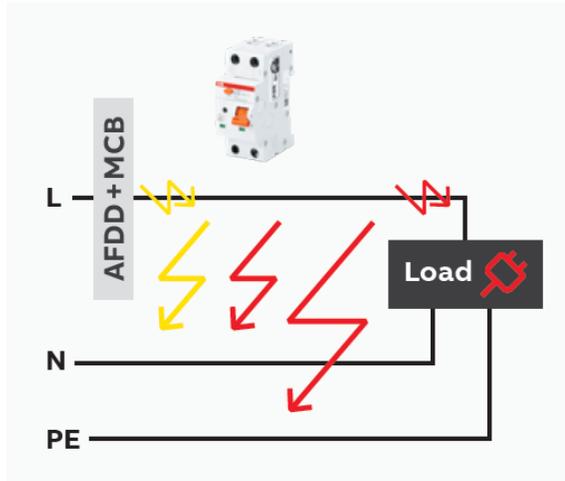
Can generally be defined as the partial disruption and unintended release of an active conductor not normally interrupted.

Main causes are lack of conductor continuity, defective switches (which do not properly close the poles); with terminals that are not tight; light bulbs that are not well tightened; and partially broken or poorly spliced cables.

Protection against arc faults

Different levels of protection

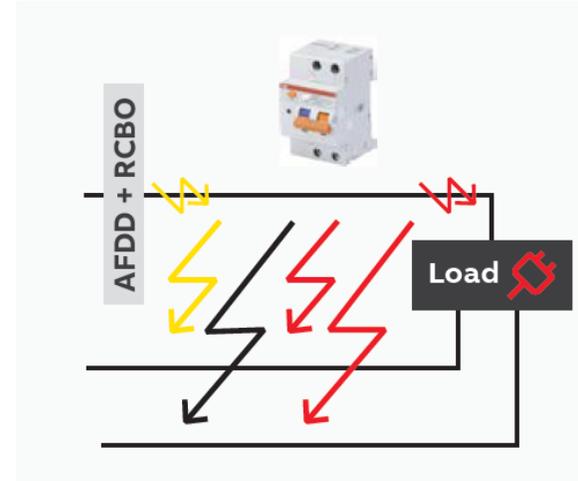
AFDD with integrated MCB



Protection against:

- Overcurrent ✓
- Earth fault current ✗
- Earth arc faults ✓
- Parallel arc faults ✓
- Series arc faults ✓

AFDD with integrated RCBO



Protection against:

- Overcurrent ✓
- Earth fault current ✓
- Earth arc faults ✓
- Parallel arc faults ✓
- Series arc faults ✓

AFDDs provide complete protection against arc faults, reducing the risk of fire

Why we need this product

Standard, countries

- Germany is the first country in Europe that has prescribed the AFDD installation as mandatory (starting from 18th December 2017) in the applications described in the DIN VDE 0100-420 local wiring regulation
- The IEC 60364 global wiring regulation at the moment prescribes the AFDD only as recommended, thus it is difficult to foreseen which will be the use of AFDD in other European countries



Application of the AFDD

IEC and VDE standard comparison

IEC 60364-4-42: Recommended application

The installation in final circuit **is recommended** in:

- Rooms with sleeping accommodation
- Locations with risks of fire due to
 - Processed or stored materials
 - combustible constructional materials
 - fire propagating structures
- Locations that contain irreplaceable goods

DIN VDE 0100-420: Mandatory application

The installation in final circuits in single phase AC system with less than 16 A **is mandatory** in locations such as:

- Rooms with sleeping and living accommodation in:
 - homes and day care centers (for children, disabled and elderly)
 - barrier-free apartments
- Locations with risk of fire due to
 - the processed or stored of materials
 - combustible constructional materials
- Locations that contain irreplaceable goods

It is generally **recommended** for locations such as

- Rooms with sleeping accommodation
- Locations with fire propagating structures
- Final circuits, that supply sockets used for appliances which need high loads

Samples of application of AFDD

IEC 60364-4-42

Recommended application according to IEC 60364-4-42

Rooms with sleeping accommodation

- Home and day care centers
- Retirement home
- Asylums
- Hotels
- Hospitals



Locations with risks of fire due to combustible constructional materials

- Wooden buildings
- Carpentry
- Gas station
- Barns



Locations with risks of fire due to fire propagating structures

- Skyscrapers
- Combustible buildings
- Forced ventilation systems



Locations that contain irreplaceable goods

- Museums
- R&D centers
- Laboratory



ABB new arc fault detection device

S-ARC1 & DS-ARC1 _ Product overview

S-ARC1 is the new 1P+N **AFDD with an integrated MCB** in 6 kA and 10 kA breaking capacity.

Complete protection against:

- Earth arc faults
- Parallel arc faults
- Series arc faults
- Overvoltage

AFDD

- Short-circuits
- Overload

MCB



DS-ARC1 is the new 1P+N **AFDD with an integrated RCBO** in 6 kA and 10 kA breaking capacity.

Complete protection against:

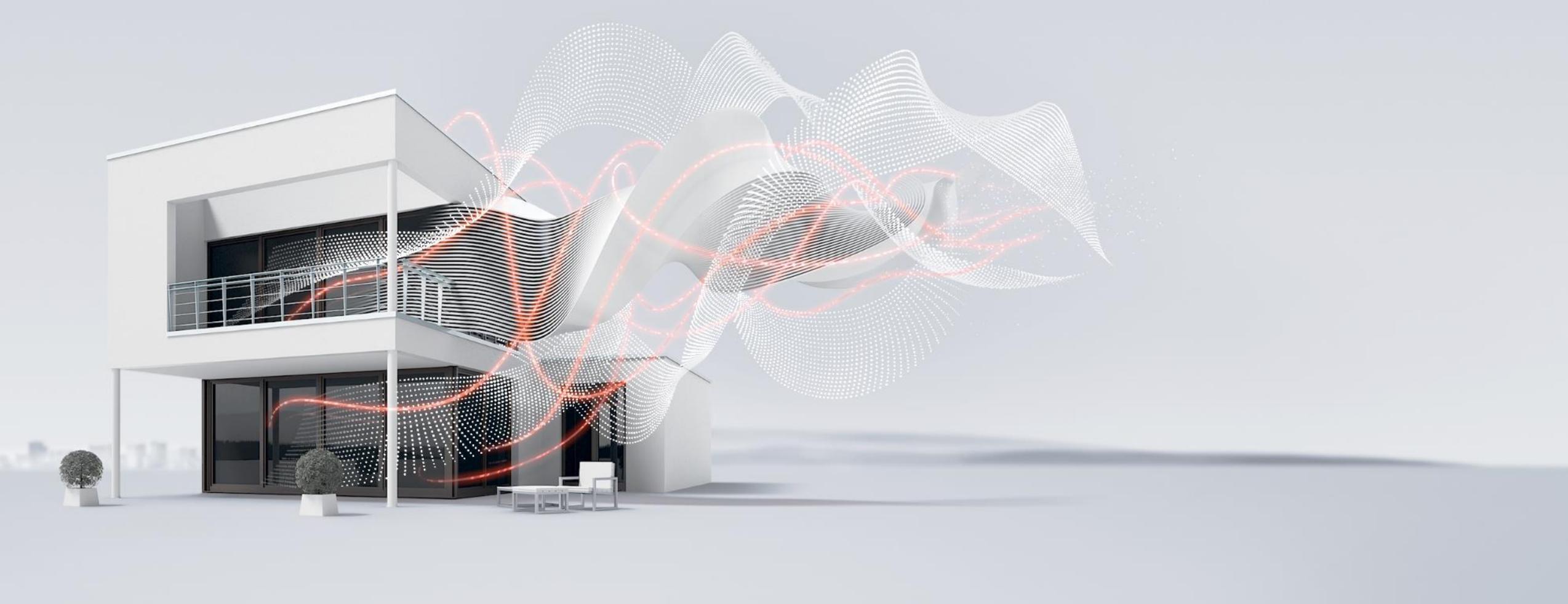
- Earth arc faults
- Parallel arc faults
- Series arc faults
- Overvoltage

AFDD

- Short-circuits
- Overload
- Earth fault currents

RCBO





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Megatrends shape the future of buildings



Urbanization

70% of the world's population will live in cities by 2050¹

UN study



Digitalization

By 2020, 33bn+ internet-connected devices will be used worldwide²

Strategy Analytics study



Integration of flexible supply

The solar market will grow to 150 GW in 2025

Frost&Sullivan



Integration of flexible demand

EVs will represent over 55% of the market by 2040

Bloomberg



SECURITY & COMFORT



Smarter Home

Single Family
Multi Family

EFFICIENCY & SECURITY



Smarter Building

Office
Hotel
Commercial

AVAILABILITY & CHARGING TIME



Smarter Mobility

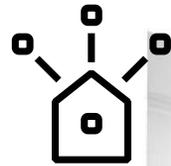
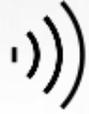
Bus charging
Car charging

Current possibilities

To increase security and comfort

ABB Ability™

Remote control, maintenance,
commissioning



**Smarter
Home**

Current possibilities

To increase security and comfort

EFFICIENCY



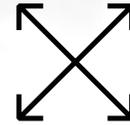
Solar, EV Charging

CONTROL



Control via smartphone or tablet inside or remote

FLEXIBILITY



Sonos, Alexa, Google, Apple & Philips Hue Integration
Smarter Home Developer Program

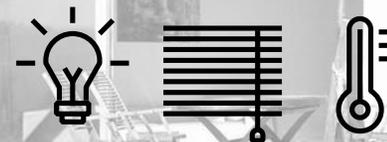
ABB Ability™

SECURITY



CCTV, Sirens, Home security, Door communication, Access control

COMFORT



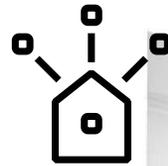
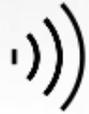
Light, Blinds, Heating

Current possibilities

To increase security and comfort

ABB Ability™

Remote control, maintenance,
commissioning



Home Automation

ABB-free@home®

ABB-secure@home

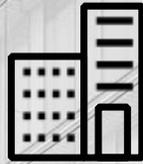
ABB-Welcome

Current possibilities

To increase efficiency and security

ABB Ability™

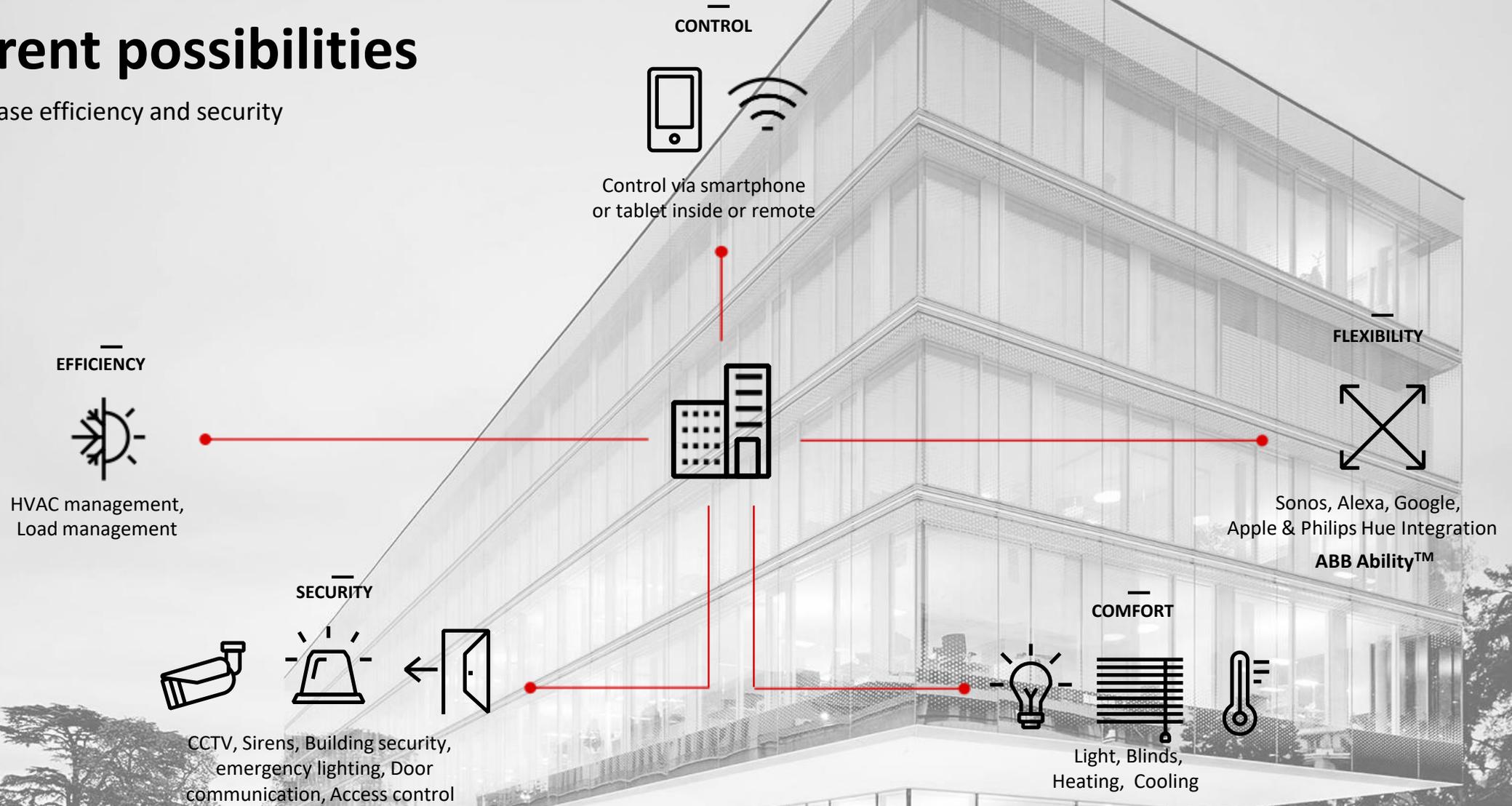
Remote control, maintenance,
commissioning



**Smarter
Building**

Current possibilities

To increase efficiency and security

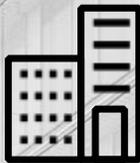


Current possibilities

To increase efficiency and security

ABB Ability™

Remote control, maintenance,
commissioning



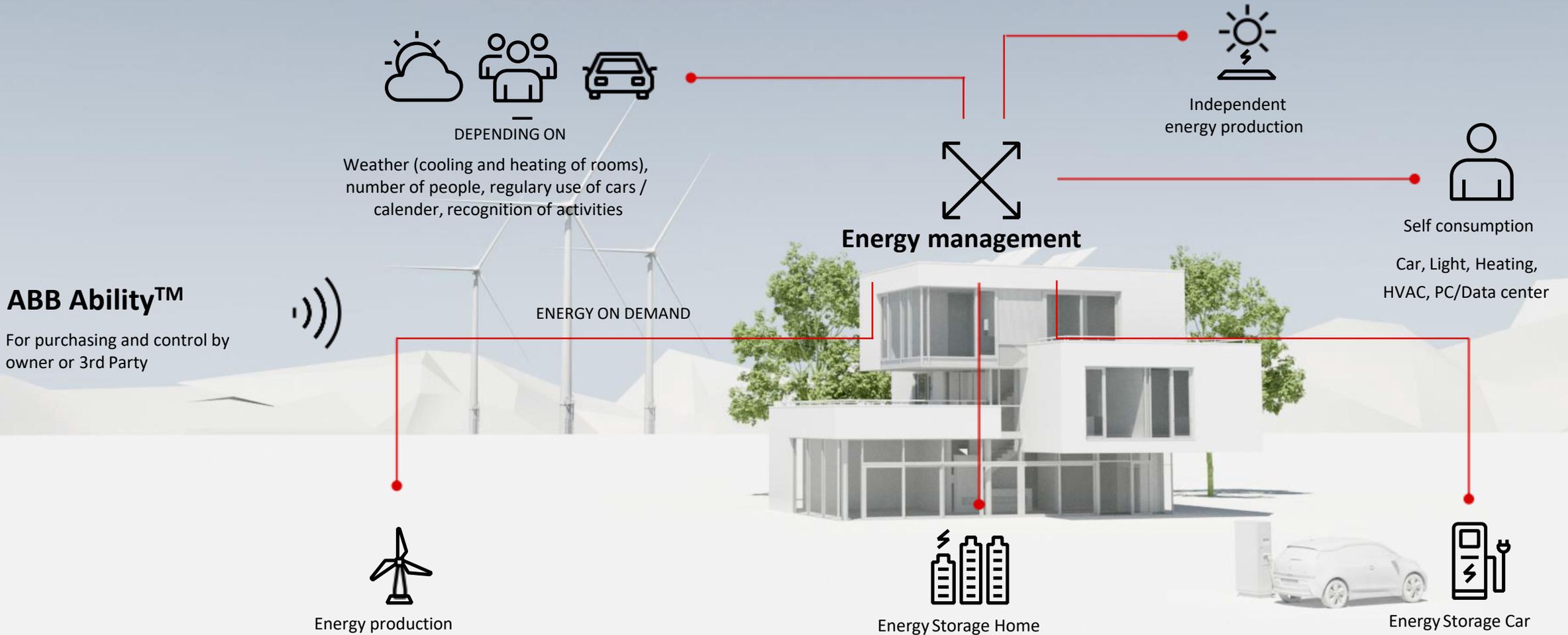
Building Automation

ABB i-bus® KNX

ABB-Welcome IP

Future possibilities – energy efficiency

By the right energy management and integration of renewables



Future possibilities – AI and face recognition

For supporting individualization and well being

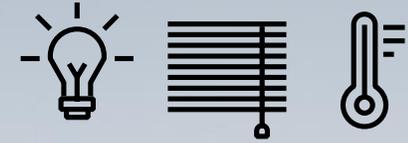
ABB Ability™

For purchasing and control by owner or 3rd party



Personalization through face recognition
Building knows who you are and changes the setup

CONTROL



Based on experience AI changes the setup of the house

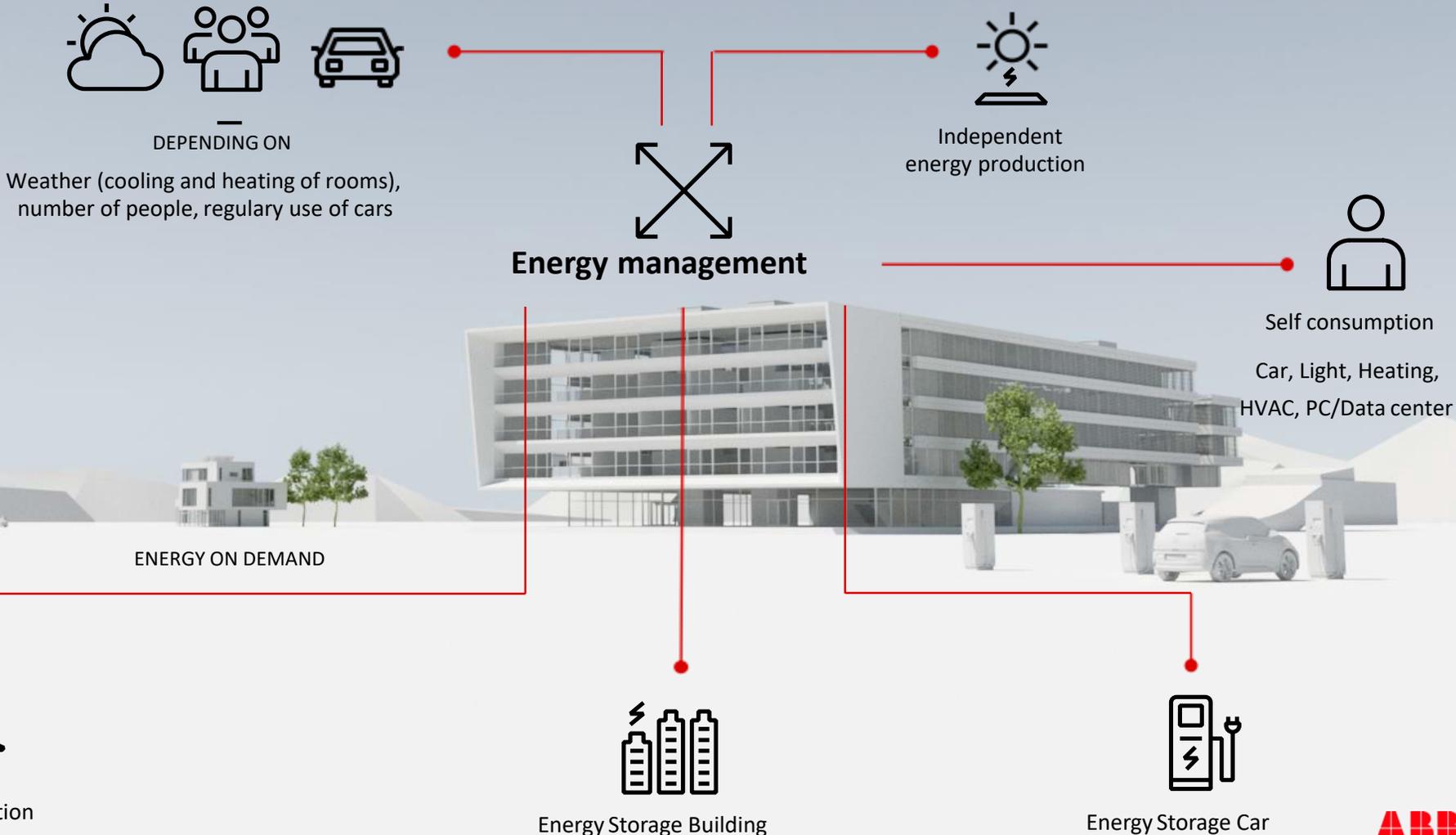


Future possibilities – load management

By the right energy management and integration of renewables

ABB Ability™

For purchasing and control by owner or 3rd Party

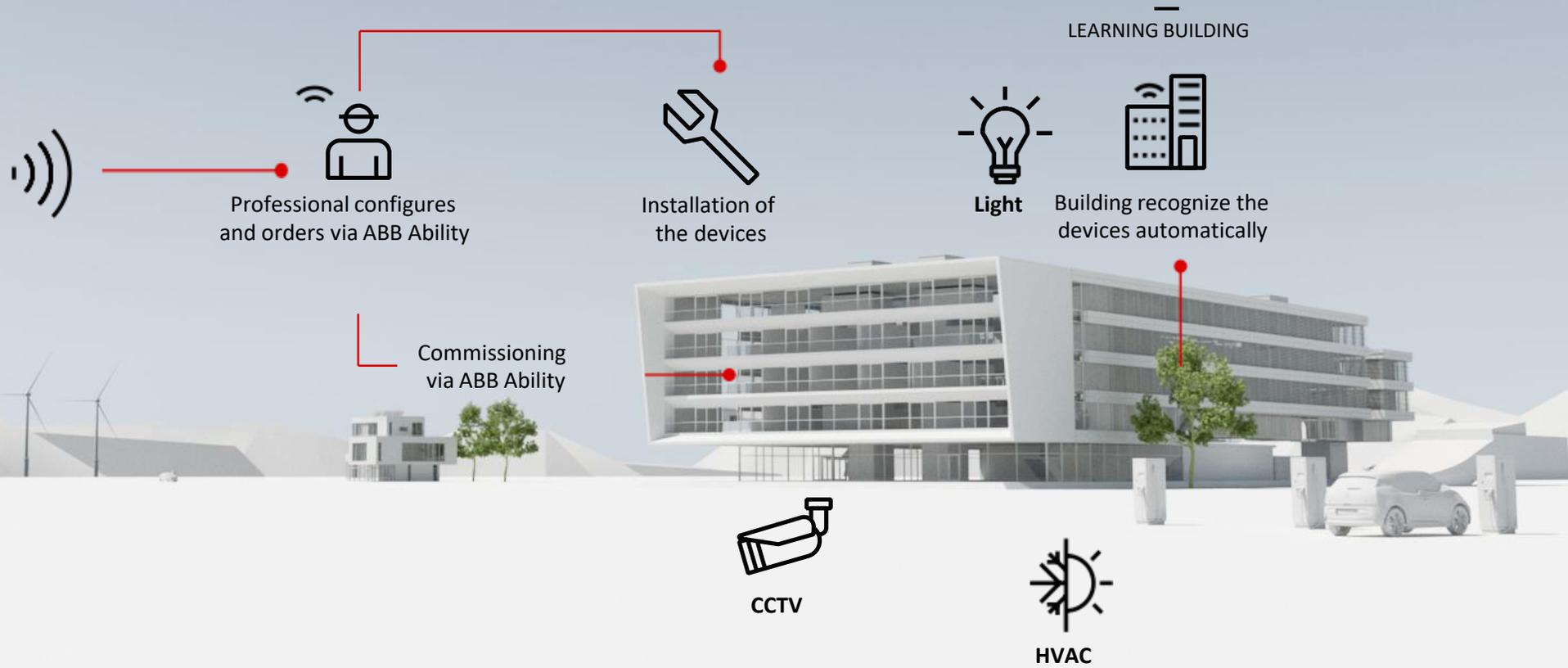


Future possibilities – easy integration

To reduce construction and maintenance time

ABB Ability™

Configuration, ordering, commissioning and control



Future possibilities – personalization

To increase the security level and have convenient usage



Camera
recognition



Personalization through face
recognition

Building knows who you are

INDIVIDUAL NEEDS



Temperature, light
time Management, routing,
work space management
meet right people



Future possibilities – personalization

To increase the security level and have convenient usage



Camera
recognition



Personalization through face
recognition

Building knows who you are

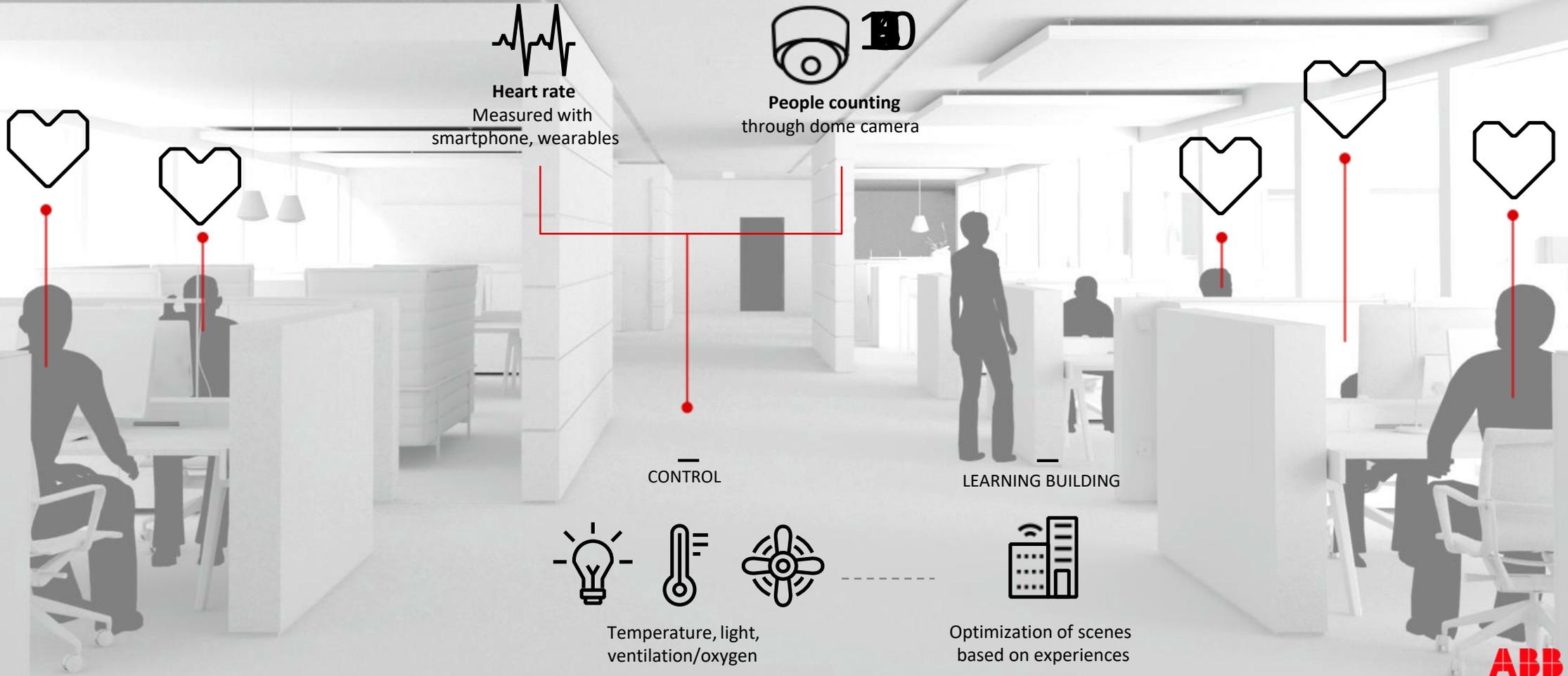
INDIVIDUAL NEEDS



Temperature, light
time Management, routing,
work space management
meet right people

Future possibilities – well-being

To create healthy working places



Future possibilities – routing

To increase the safety level and have convenient usage



Routing Light



Emergency Exit



ROUTING

Guiding through the building, access control, calendar functions, sirens, escape routing, overview of people inside the building

Future possibilities – BIM data

To improve building applications during lifetime

LEARNING BUILDING

Artificial
Intelligence

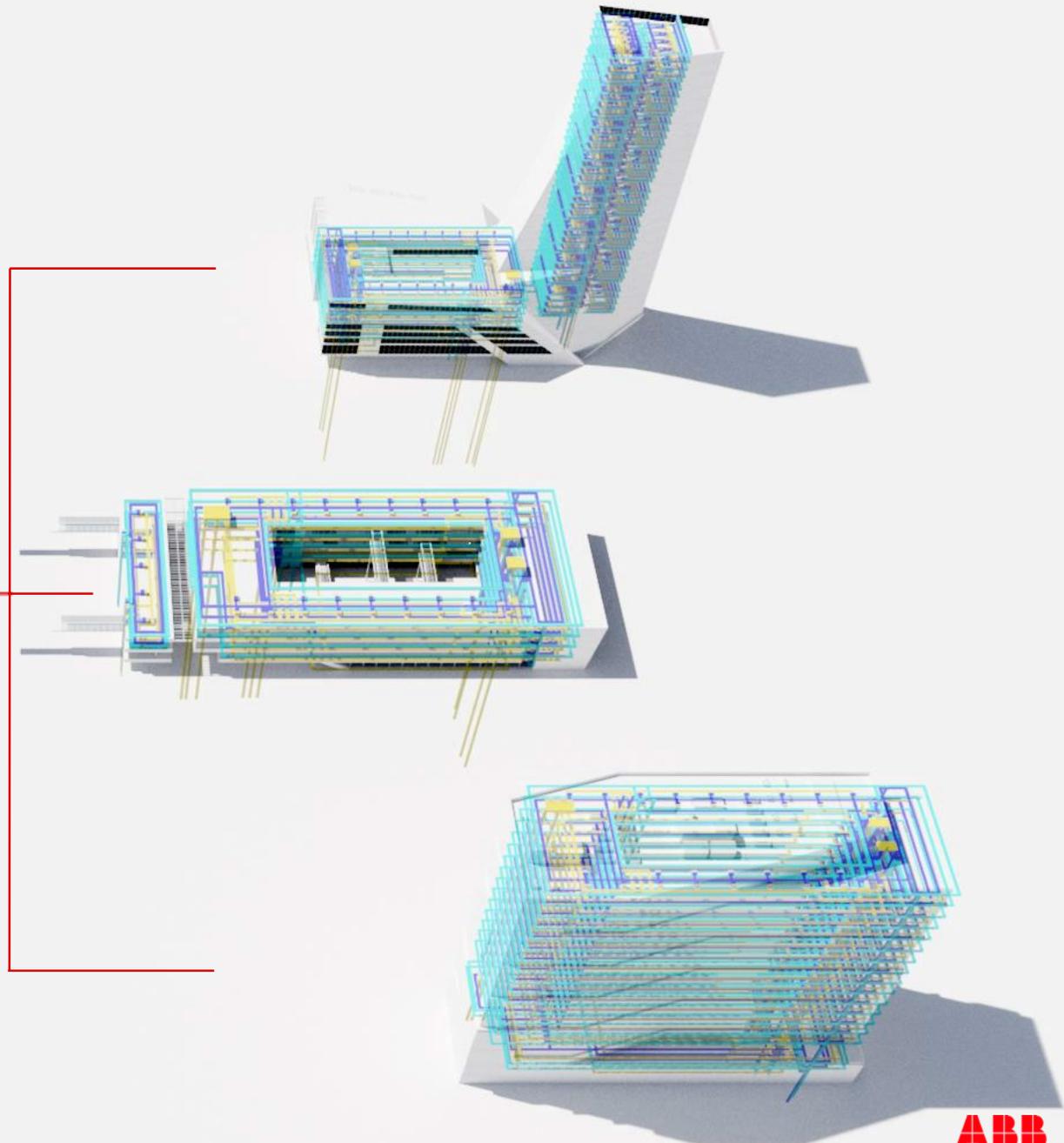


BIM Data
Building
Information
Modeling

AI–developing new
buildings based in BIM



AI–developing new
cities based in BIM





Conclusion

Megatrends

Expectations

ABB Ability™ solutions

Urbanization



Digitalization



Flexible demand



Flexible supply



Control

Comfort

Security



Efficiency

Flexibility

Smarter Home



Smarter Building



Smarter Mobility



SECURITY & COMFORT



Smarter Home

Single Family
Multi Family

EFFICIENCY & SECURITY



Smarter Building

Office
Hotel
Commercial

AVAILABILITY & CHARGING TIME



Smarter Mobility

Bus charging
Car charging

ABB