Bosch vision of IoT ecosystem enablement and the impact on connectivity networks
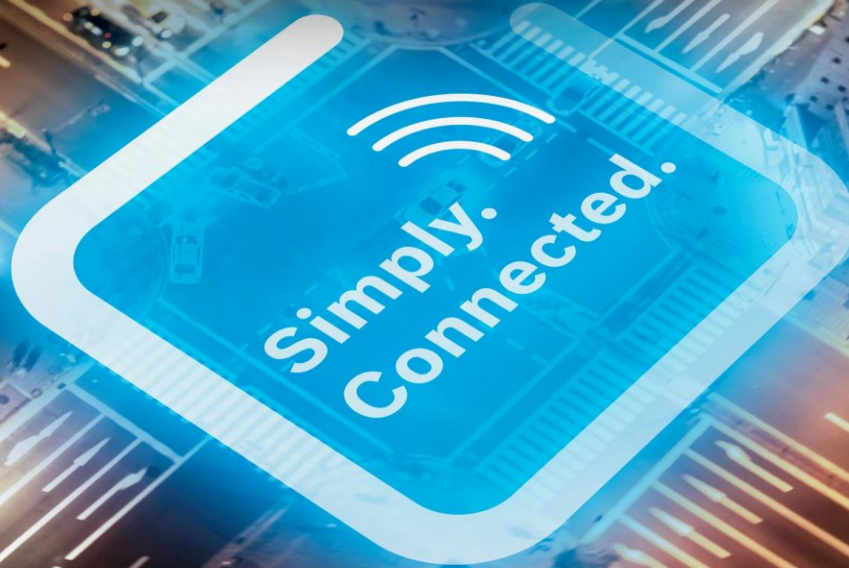
Olaf Kautz, Bosch Software Innovations - Spearheading the Internet of Things

Simply.
Connected.

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The Bosch Group: Four business sectors

Mobility Solutions

Industrial Technology

Energy and Technology   **Building**

Consumer Goods

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Bosch Group: 2015 Key figures[1]

Bosch Group	• 70.6 billion euros in sales • 375,000 associates • 223 production sites*		
Mobility Solutions	• One of the world's largest suppliers of automotive technology	60% share of sales	
Industrial Technology	• Leading in drive and control technology, packaging, and process technology		
Energy and Building Technology	• Leading manufacturer of security technology • Global market leader of energy-efficient heating products and hot-water solutions	40% share of sales	
Consumer Goods	• Leading supplier of power tools and accessories • Leading supplier of household appliances		

1) Preliminary, rounded-off figures as of 01.16   *as of 04.15

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Agility at Bosch
Key success factor for established companies in the connected age

Becoming more agile

- Start-up platform / innovation clusters as incubators for new business ideas
- Scrum as anchor of agile IoT development for products, software, and services

> We can draw on the strengths of the Bosch Group: we take the steadfastness, power, and range of an ocean-going tanker and combine it with the speed and agility of a speedboat.

Dr. Volkmar Denner,
chairman of the Bosch board of management

Source: Agility at Bosch: mission impossible?

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Bosch Software Innovations
Global presence and milestones

Germany

Chicago

Sofia

Shanghai

Singapore

Berlin (HQ)

Cologne

Waiblingen

Immenstaad
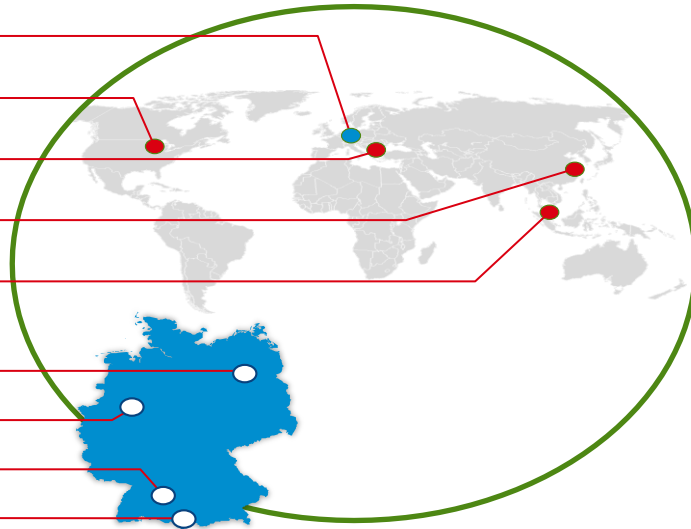
2016 — Launch of Bosch IoT Suite (PaaS) and Bosch IoT Cloud

2015 — Bosch acquires ProSyst Software

2015 — First European testbed for the Industrial Internet Consortium

2014 — Bosch ConnectedWorld conference premieres

2013 — Launch of Bosch IoT Suite

2012 — Bosch IoT Lab opens at University of St. Gallen

2011 — Bosch acquires inubit AG

2008 — Bosch acquires Innovations Software Technology

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The IoT technology and solution provider
We lead companies into the connected world

Market presence

5.1m
connected devices using
Bosch IoT Suite and ProSyst

Projects in many business areas

150+
IoT international projects in the areas of
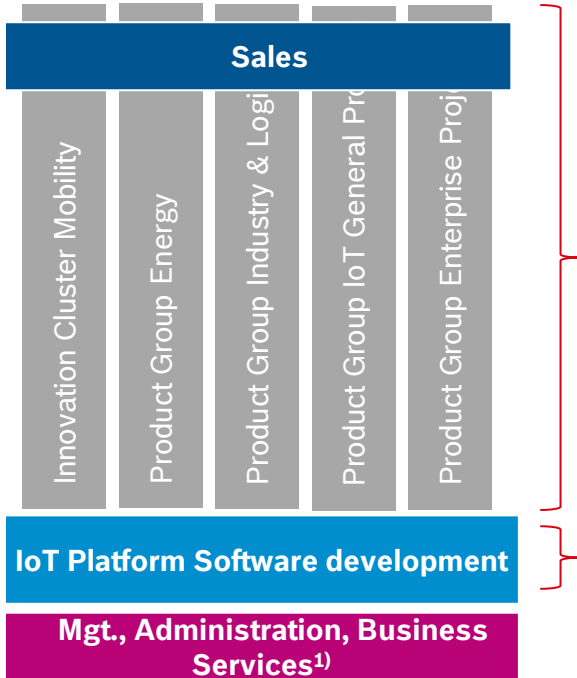manufacturing, mobility, energy,
home & building, city, agriculture …

Know-how

700+
IoT experts around the world

Bosch early IoT visionary

2008
Bosch Software Innovations emerged
out of the two earliest acquisitions in the
IoT space

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Bosch Software Innovations

Organization

Sales

- Innovation Cluster Mobility
- Product Group Energy
- Product Group Industry & Logi...
- Product Group IoT General Pro...
- Product Group Enterprise Proj...

IoT Platform Software development

Mgt., Administration, Business Services[1]

Deliverables

Solutions (system projects)

and

applications (software)

Bosch IoT Suite

Mobility

Manufacturing

City

Building

Energy
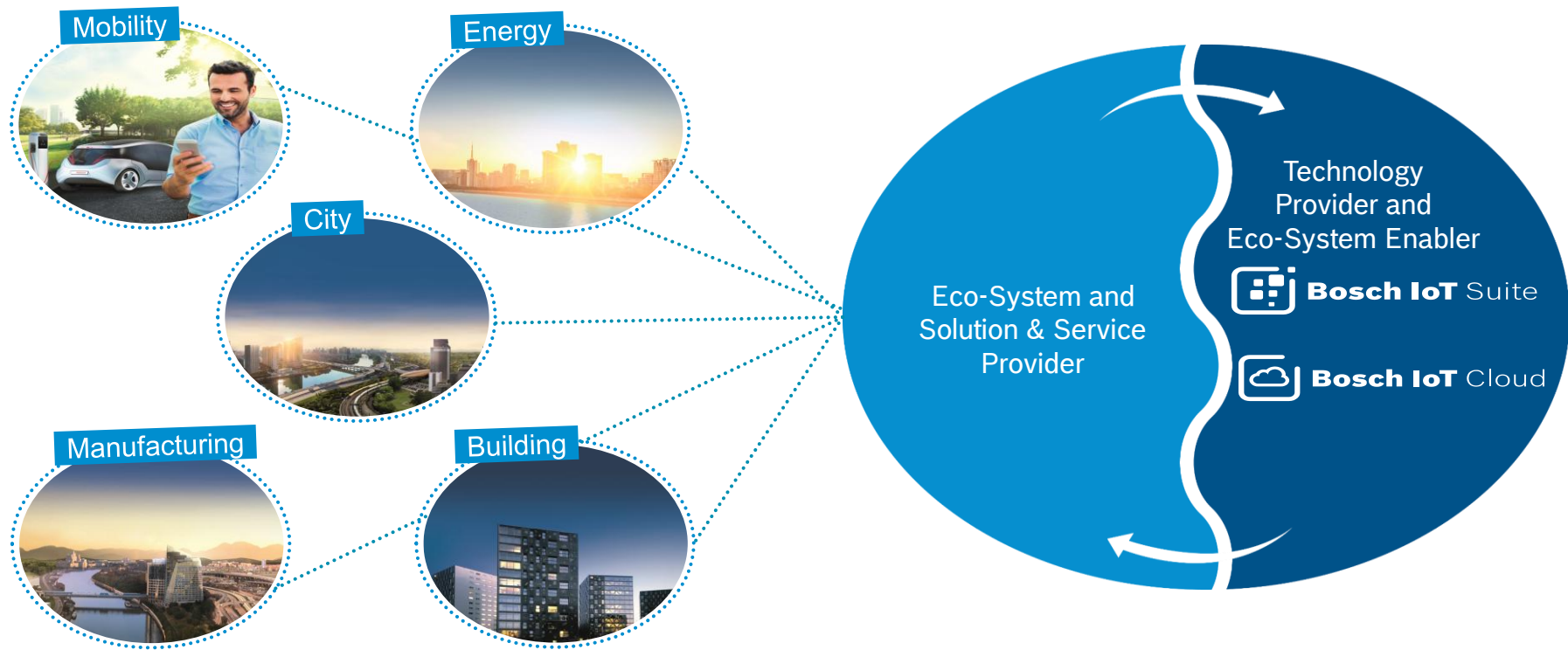

1) i.e. Strategy, HR, Controlling, Marketing, Quality Mgt. Process Mgt., Purchasing…

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IoT solutions for a connected world
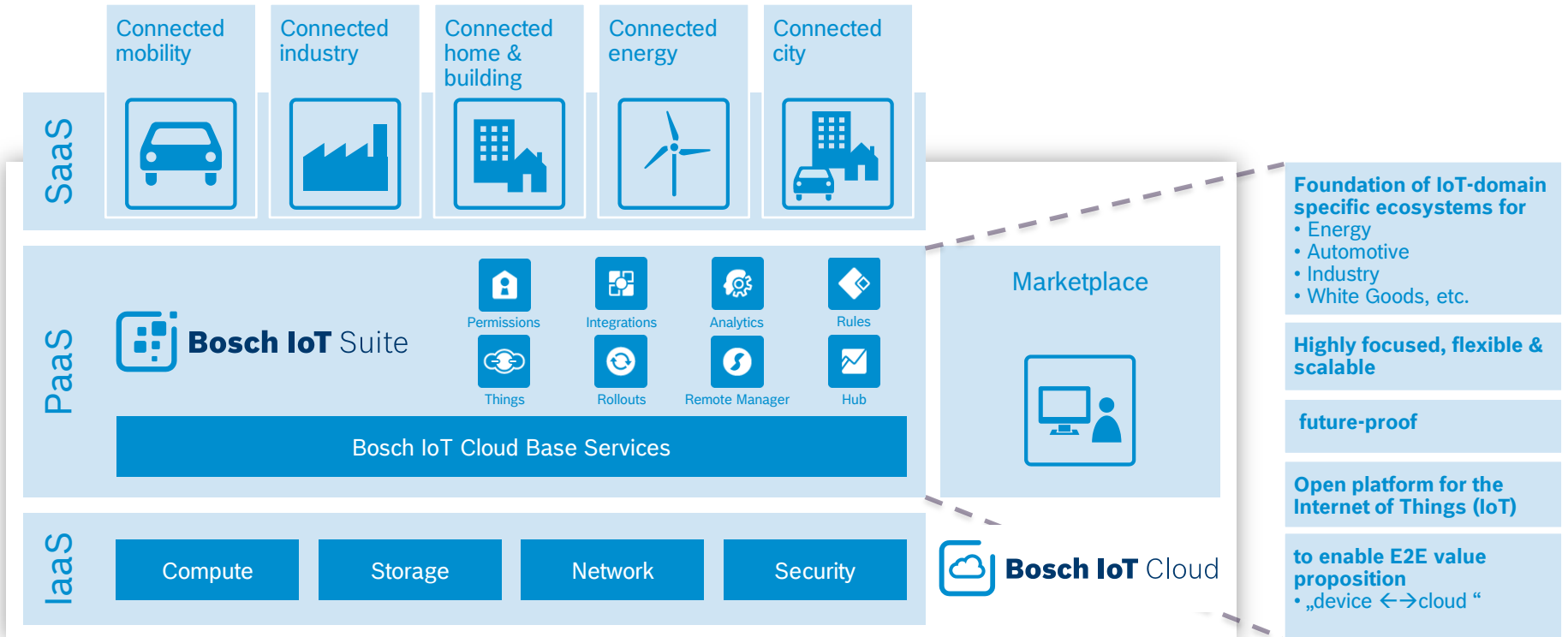## Leading IoT competence, technology, solutions and services

Mobility

Energy

City

Manufacturing

Building

Eco-System and Solution & Service Provider

Technology Provider and Eco-System Enabler

Bosch IoT Suite

Bosch IoT Cloud

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Industry-grade IoT Platform
Success factors

Bosch delivers the **complete stack** for IoT solutions

Sophisticated **industry segment knowledge** from all Bosch divisions

Best in class IoT domain knowledge

Enforced **Data Privacy**

E2E SECURITY FOR IoT SOLUTIONS

Unique

Own Data Centers

Industry-grade Platform

Connect everyThing

Fast

Industry-grade **Support** Plans

TIME-TO-MARKET

Ready-to-use **Cloud Services**

Increased Efficiency

Innovative new **Business Models**

Active **Open Source** Engagement

Partners&Communities

OPENNESS

Connectivity to Other Platforms

Cross-domain Use Cases

IoT VISION

Easy Entry Pricing

Consolidated View on **ALL** Devices

Mature **DevOps Model**

Low

TOTAL COST of OWNERSHIP

Shared Platform - Shared **Cost**

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Bosch IoT Suite running in the Bosch IoT Cloud

Elastic scalability and new business model: Platform as a Service

SaaS

Connected mobility	Connected industry	Connected home & building	Connected energy	Connected city

PaaS

Bosch IoT Suite

Permissions | Integrations | Analytics | Rules

Things | Rollouts | Remote Manager | Hub

Bosch IoT Cloud Base Services

Marketplace

IaaS

Compute	Storage	Network	Security

Bosch IoT Cloud

Foundation of IoT-domain specific ecosystems for
- Energy
- Automotive
- Industry
- White Goods, etc.

Highly focused, flexible & scalable

future-proof

Open platform for the Internet of Things (IoT)

to enable E2E value proposition
- „device ←→cloud "

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Bosch IoT Suite
Architecture
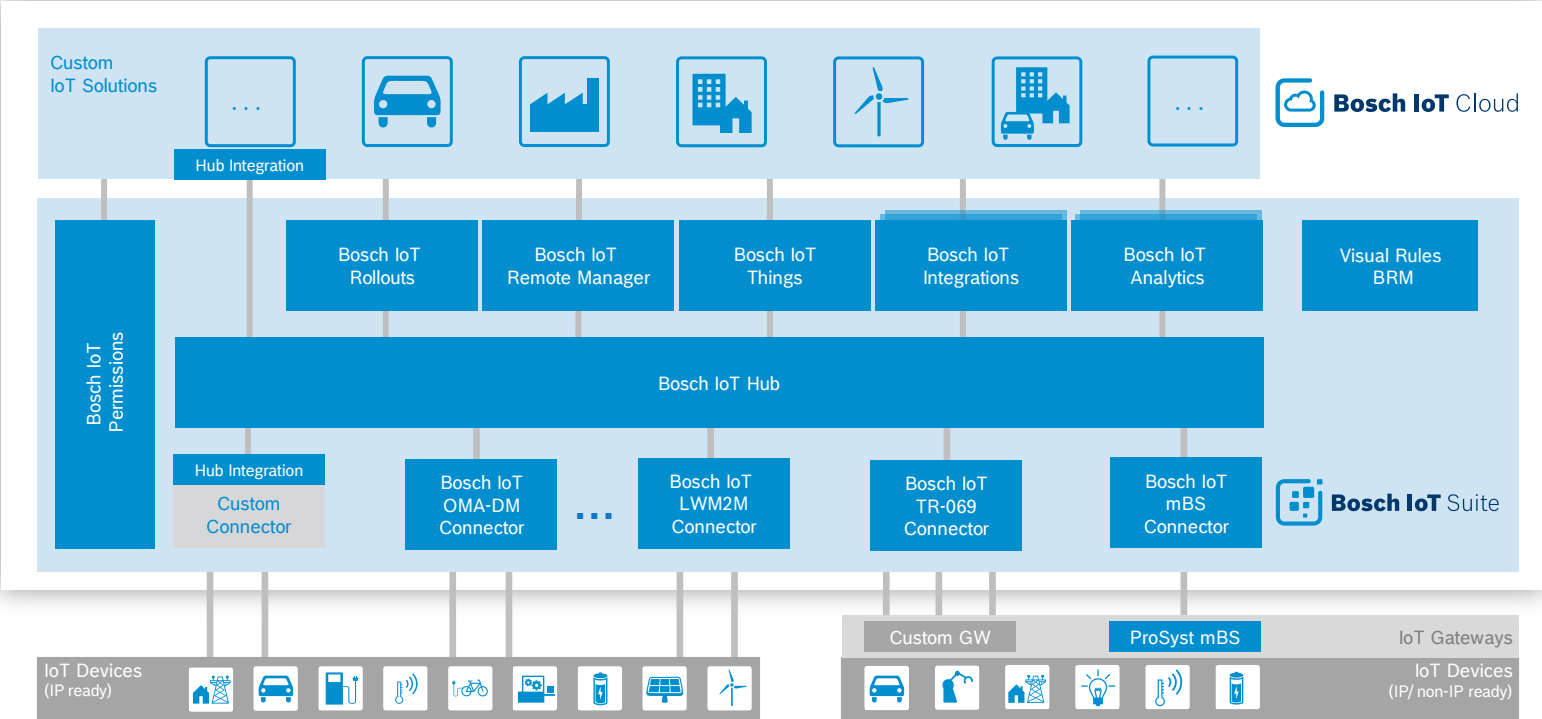
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Bosch IoT Suite Services

Tailor-made for IoT scenarios

Bosch IoT Suite

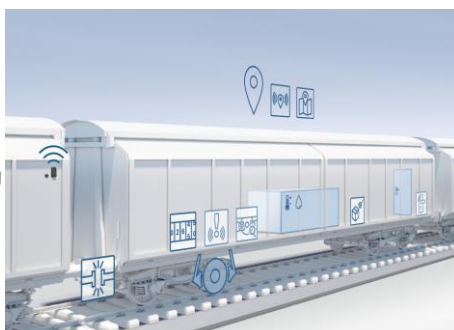|	Cloud Service	Service Description
	Bosch IoT Permissions	User management, role-based access control and multitenancy for IoT applications.
	Bosch IoT Rollouts	Manages large-scale rollouts of device software or firmware updates, both wired and over the air.
	Bosch IoT Remote Manager	Administration of device functions like network connection, configuration, monitoring, etc.
	Bosch IoT Things	Digital Twin. Central Management of Asset Data and Secure Messaging for the Internet of Things based on Device Abstraction usable in any IoT solution.
	Bosch IoT Integrations	Provides a flexible framework to build, monitor and manage easily extendable IoT solutions that integrate services and systems using best-practice patterns (EIP).
	Bosch IoT Analytics	1. Workflow Execution Service: Fully-managed, scalable Web-application to train and run KNIME-based analytics models 2. Anomaly Detection Service: Fully-managed, scalable Web-application to detect anomalously behaving things in the field 3. Usage Profiling Service: Fully managed, scalable Web-application to analyze & profile usage bevavior
	Bosch IoT Hub	Messaging backbone for device-related communication as attach point for various protocol connectors

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Bosch IoT Cloud Services orchestration
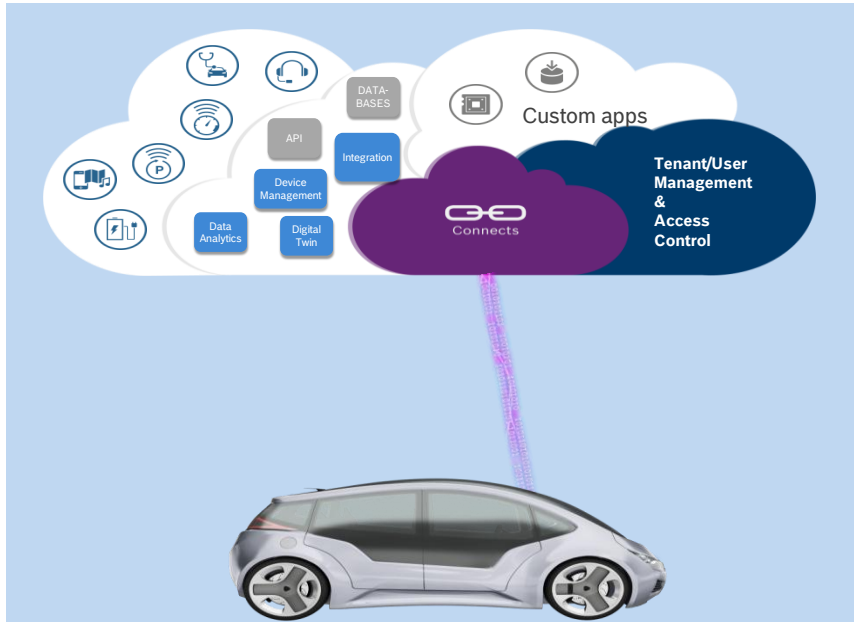## Plug-and-run IoT apps and solutions

Scalable IoT solution

SaaS

PaaS

Remote Manager

Integrations

Redis Cache

App Autoscaler

Marketplace

IaaS

Compute

Storage

Network

Security

Bosch IoT Cloud
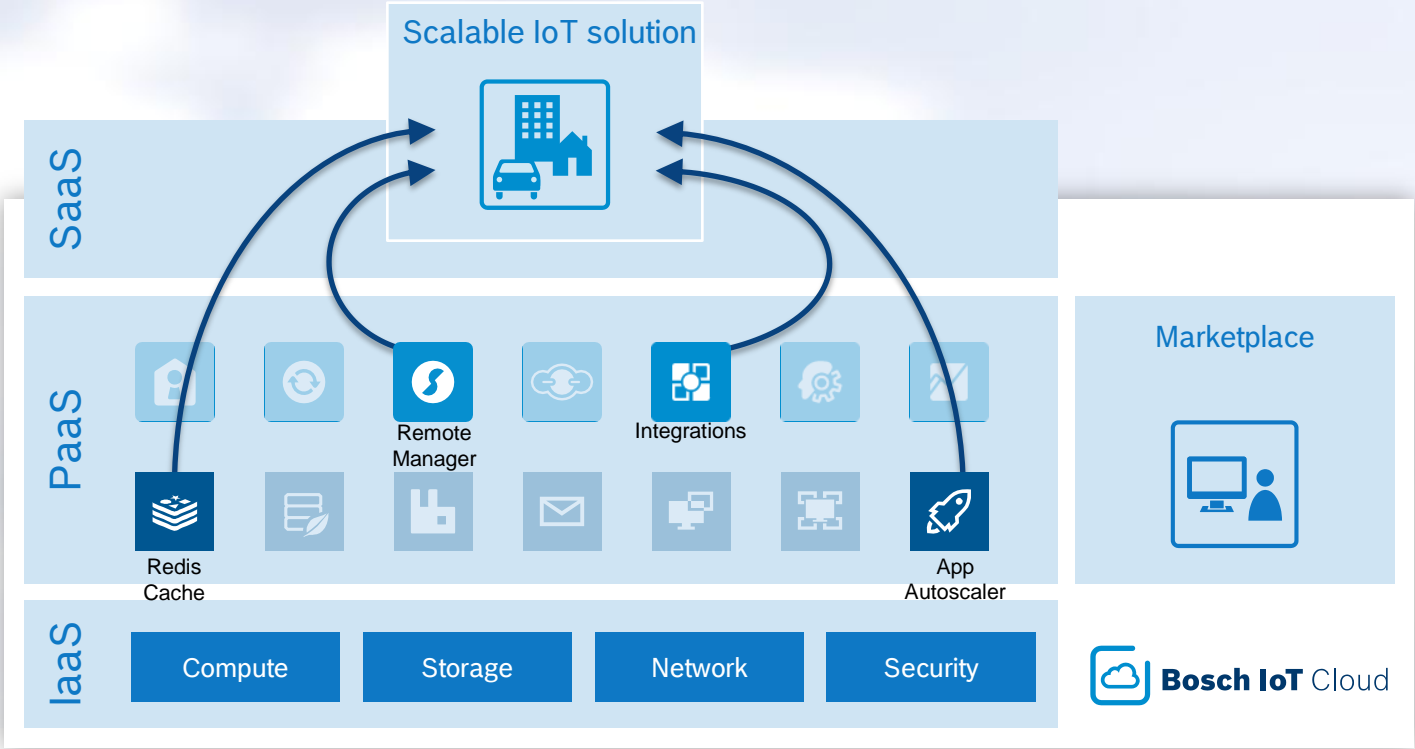
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Bosch IoT Platform in Practice
Technology for a ConnectedWorld.

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Use Case Example − Connected Car
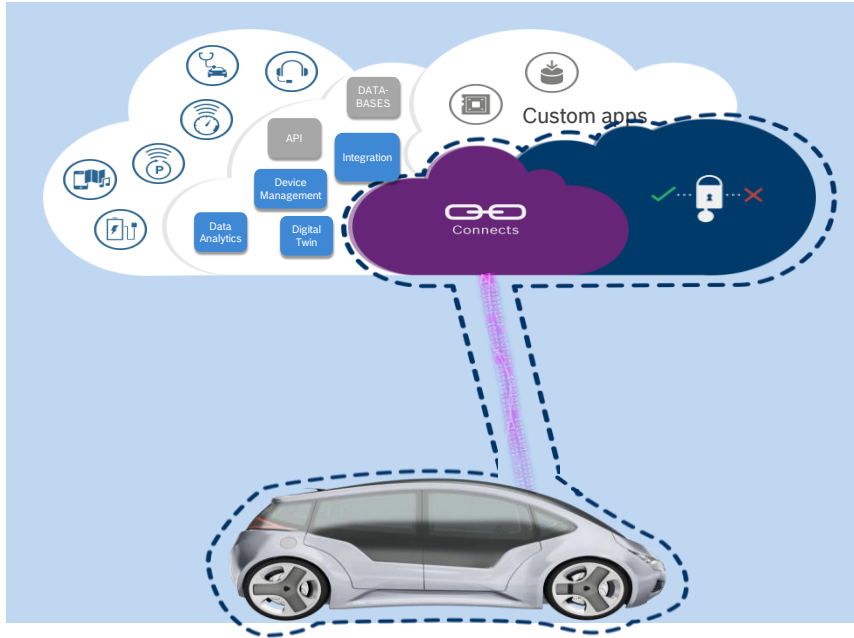
Open and innovative concepts

A cyberphysical world based on Open Information Models (Eclipse VORTO)

- **Create or just use your digital twins on open source software**

- **Share it with partner, communities,...**

- **Create eco-systems**

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Use Case Example – Connected Car

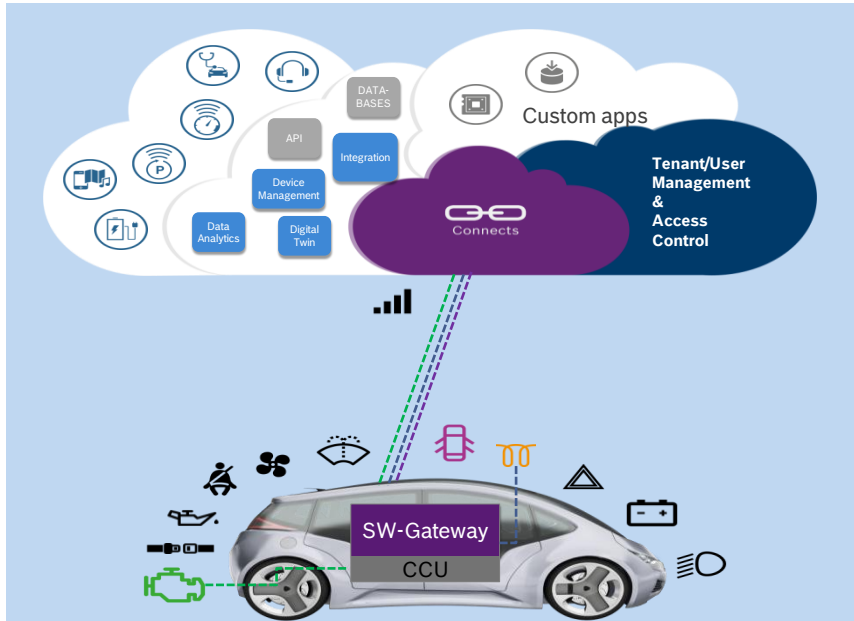**Are your assets safe? - Security and Access Control**

Strong E2E Security based on

- **Central and fully integrated**
  - **Tenant, & User Management**
  - **Access Control down to the device**
- **Embedded Software Agents and Certificate Management powered by escrypt**

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Use Case Example – Connected Car

The mobile world – future, fun and problems at the same time

Efficient and reliable communication E2E needs best in class technology partners

- **Comprehensive Connectivity Management to deal with multiple connectivity options, e.g.**
  - **Cellular**
  - **WiFi off-load**
  - **Car2X**

- **Sophisticated QoS Management to**
  - **Share ressources (e.g. Radio) efficiently**
  - **Prioritize Events, Messages, Applications, ...**
  - **Minimize latency for time critical UCs**

Blogging **Internet of Things**
Technology inspiring a connected life

http://blog.bosch-si.com

Questions? Ideas? Whishes?

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