

# E-FLIGHT FORUM 2017, BEIJING

## 电动飞行论坛 2017 , 北京

### ELECTRIC SYSTEM INTEGRATION

### 电气系统集成

BOSCH GENERAL AVIATION TECHNOLOGY GMBH  
博世通用航空技术有限公司  
ERWIN WEGER  
GENERAL MANAGER/ 总经理

# Electric System Integration/ 电气系统集成

## Agenda/ 议程

- ▶ Short overview Bosch General Aviation Technology (BGAT)
- ▶ Electric Propulsion System Integration
  - ▶ Pure Electrical
  - ▶ Hybrid
  - ▶ Hybrid integrated
  - ▶ Proposal for work packages
- ▶ Future prospect: Next Generation Electronic Control Unit
- ▶ Studies and potential products which could be transferred from Automotive

# Bosch Aviation Technology

## General Information / 概览

- ▶ Bosch General Aviation Technology (BGAT) was founded in 2008 as legal entity in Vienna, Austria
- ▶ Since 2017 North and South America market will be served by Bosch Aviation Technology LLC (BATC), located in Novi, Michigan
- ▶ BGAT/BATC offer services and products based on existing Bosch Systems for General Aviation
- ▶ Bosch offers potential for synergies between the automotive and the aviation industry, according to the principle „Aviation meets Automotive“
- ▶ **Benefit from those synergies!**

# Bosch Aviation Technology

## EN9100 Certification

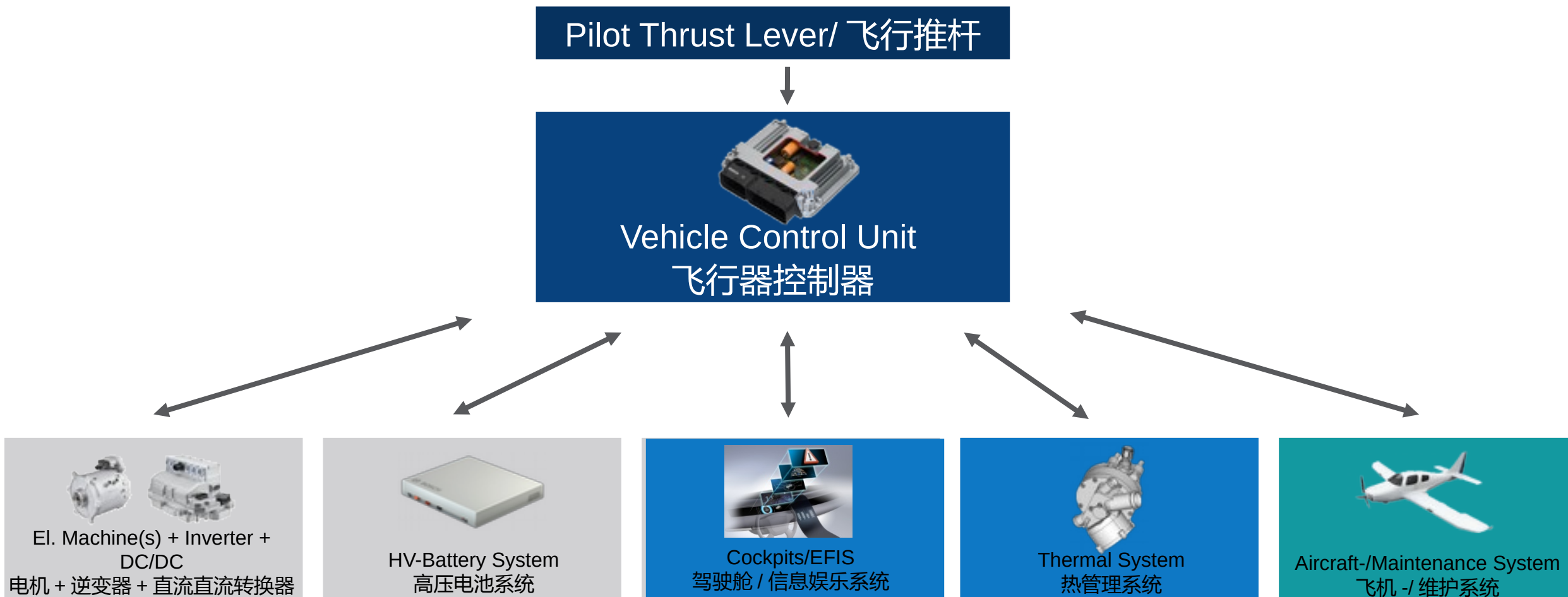
## EN9100 认证



# ELECTRIC PROPULSION SYSTEM INTEGRATION 电力推进系统集成

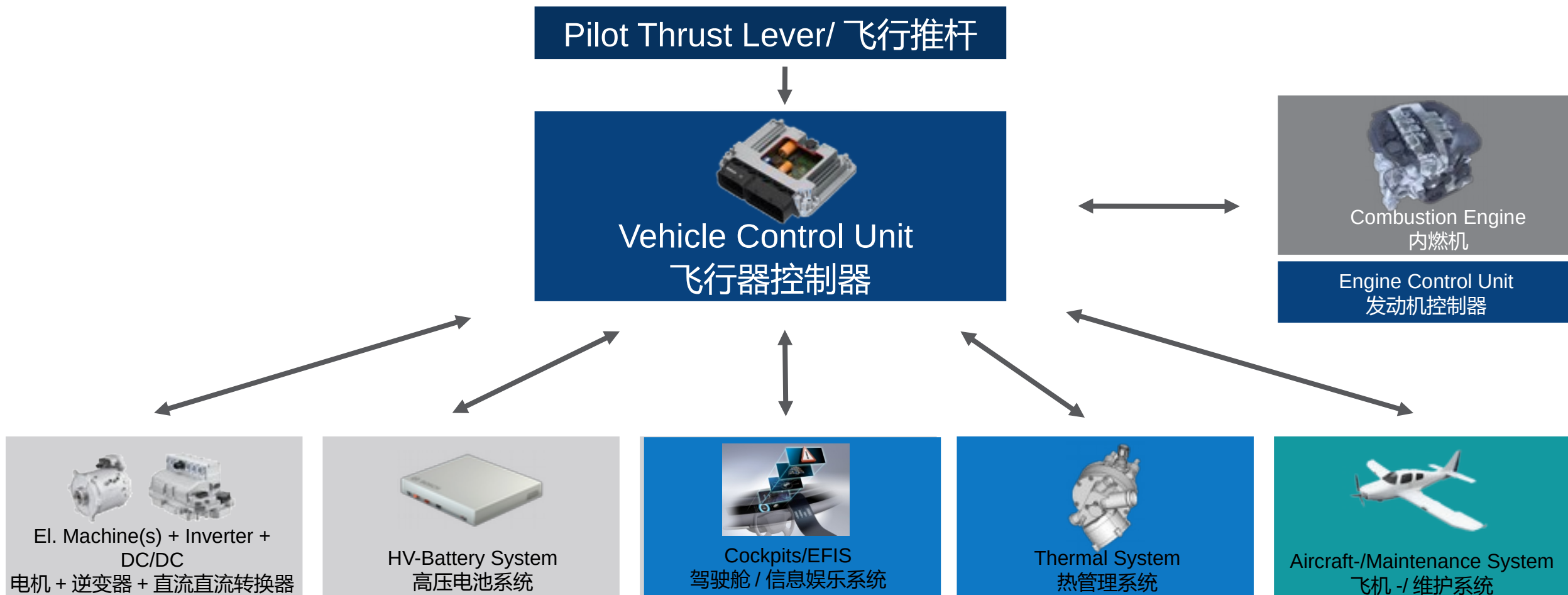
# Bosch Aviation Technology

## 1. Pure Electric Propulsion Architecture / 纯电动推进系统架构



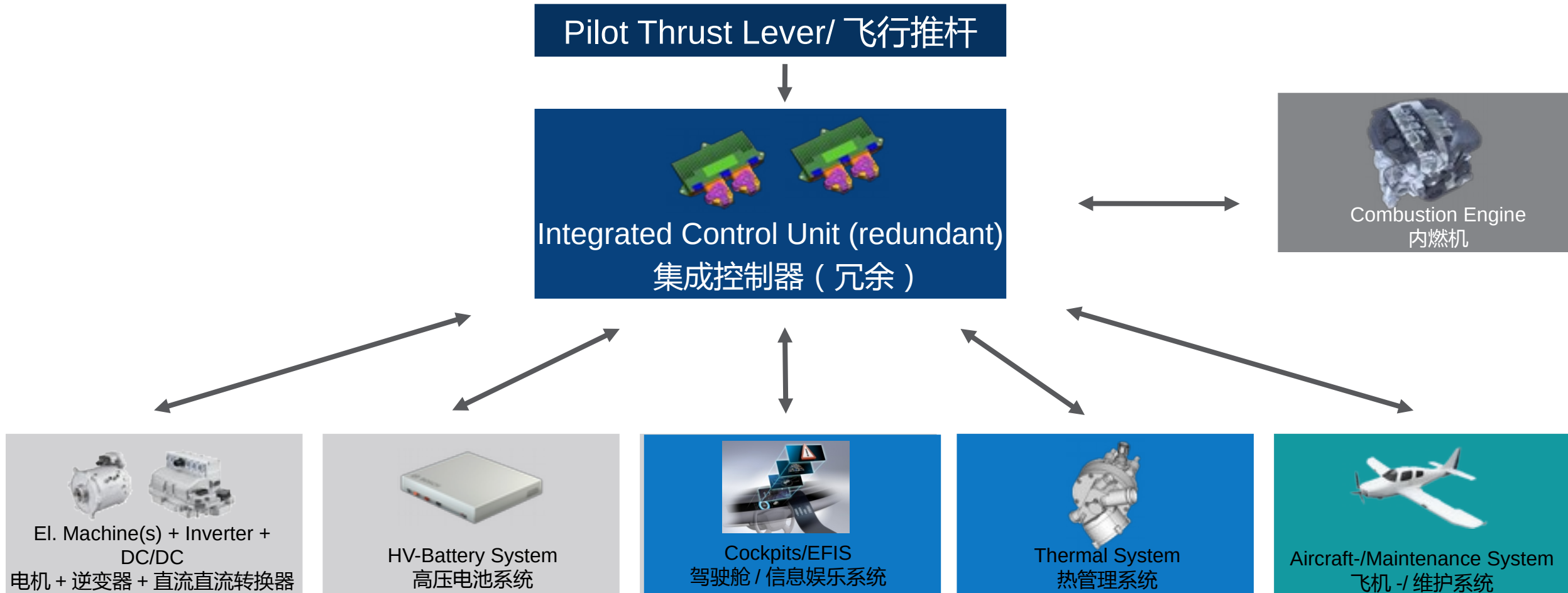
# Bosch Aviation Technology

## 2. Hybrid Propulsion Architecture / 混合动力系统架构



# Bosch Aviation Technology

## 2. Hybrid Propulsion Architecture integrated



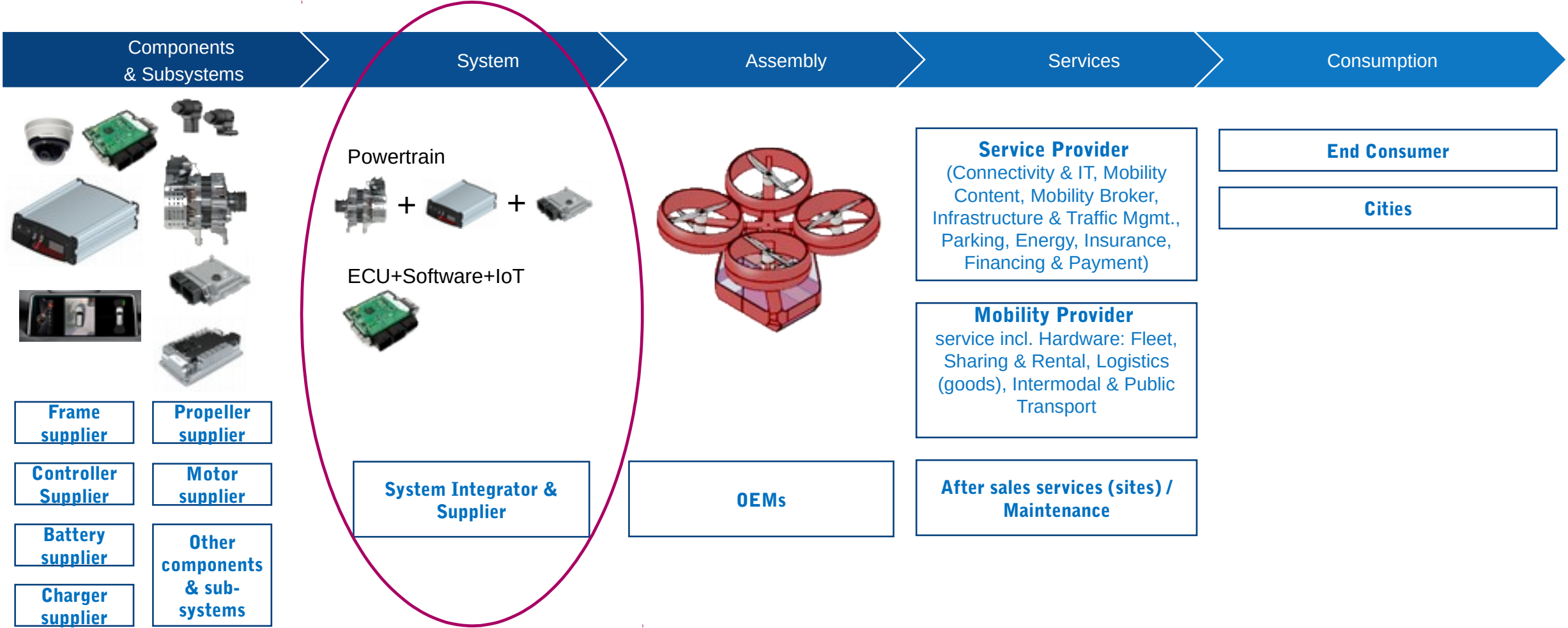


# ELECTRIC PROPULSION SYSTEM INTEGRATION 电动推进系统集成

## WORK PACKAGES 产品 / 服务解决方案

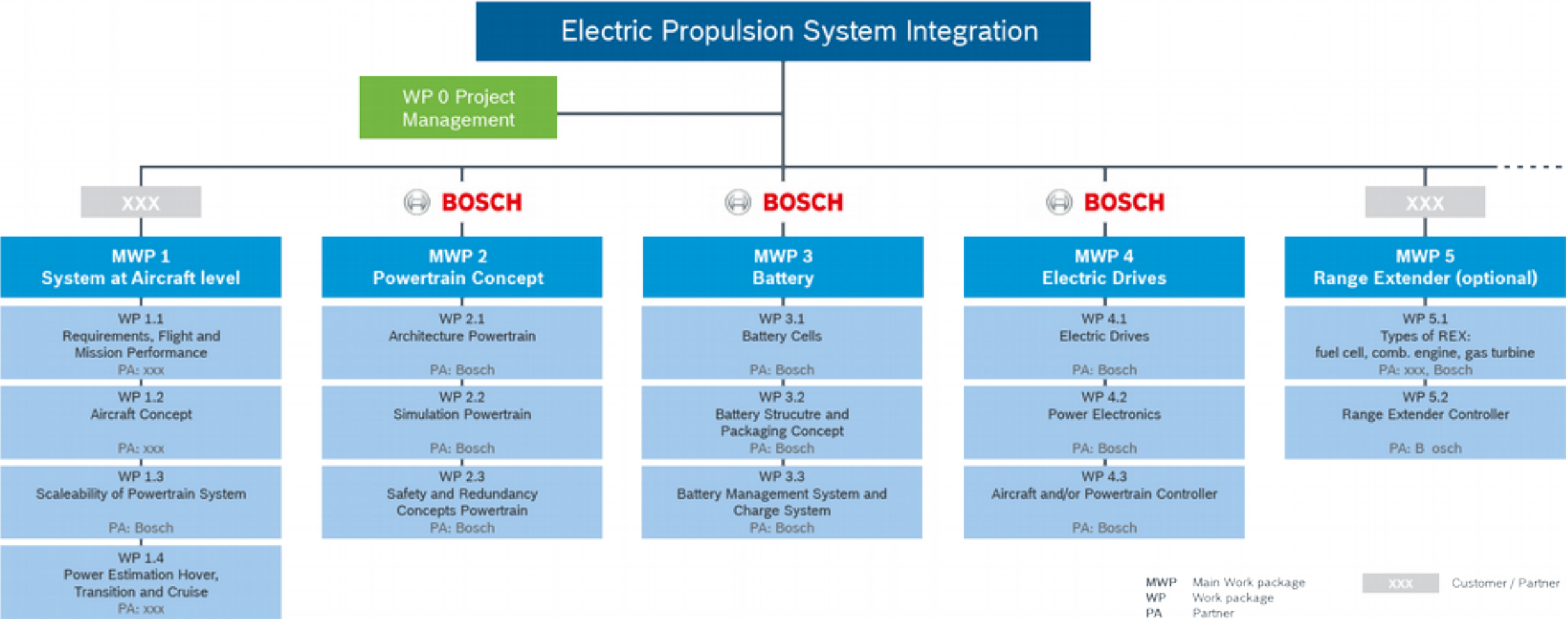
# Bosch Aviation Technology

## Value Chain / 价值链



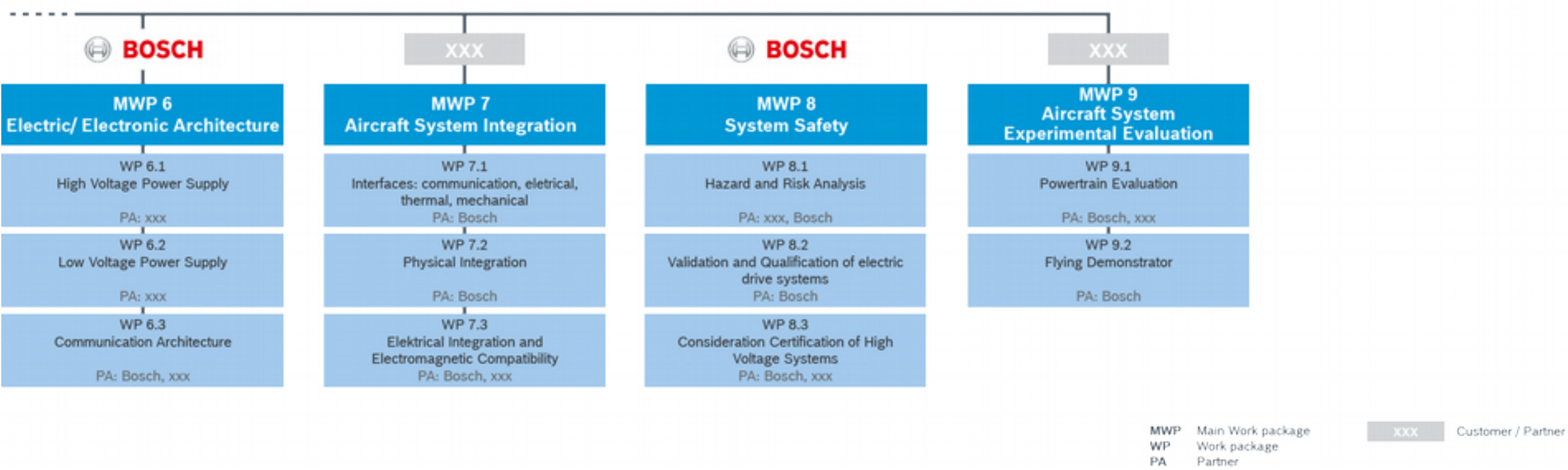
# Bosch Aviation Technology

## Electric Propulsion System Integration / 电动推进系统集成



# Bosch Aviation Technology

## Electric Propulsion System Integration



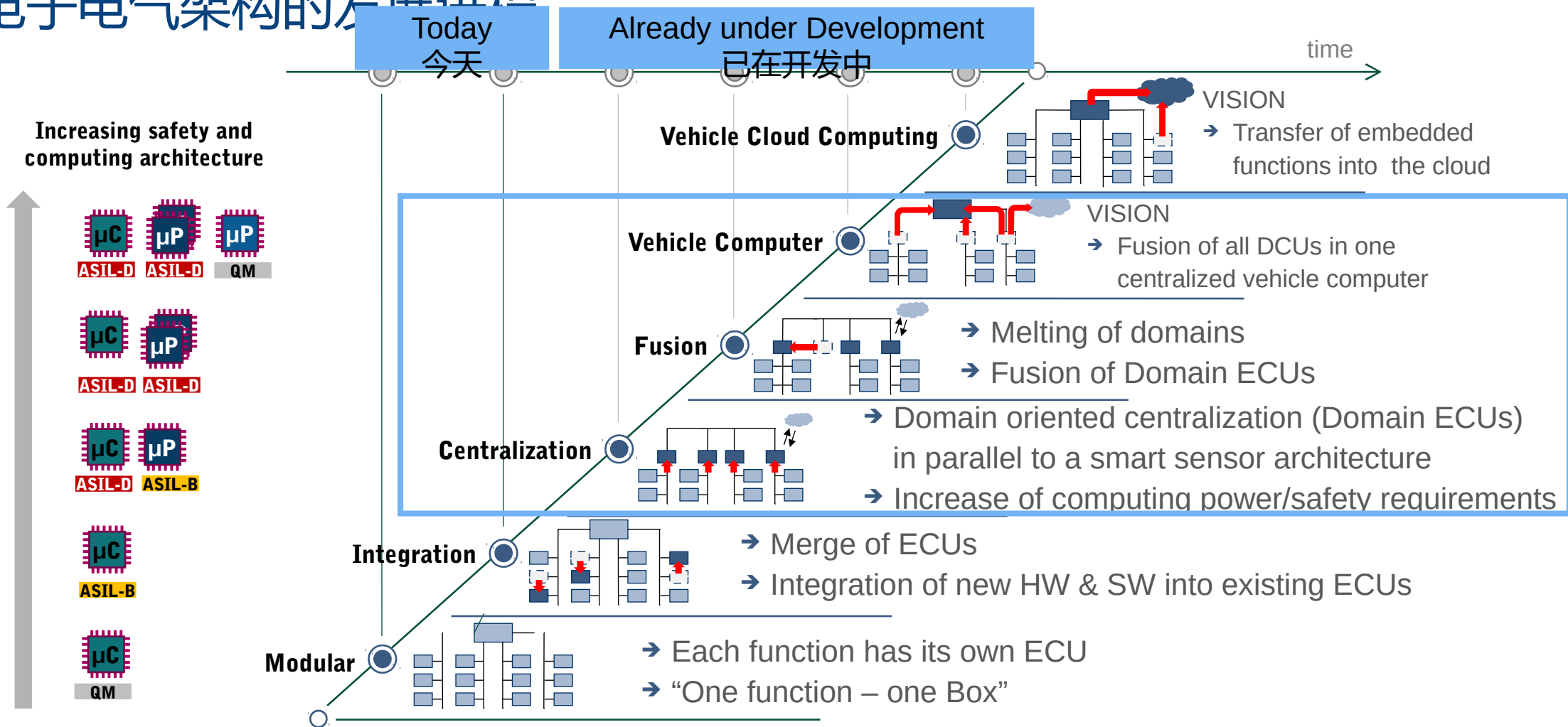
# NEXT GENERATION CONTROL UNIT 下一代控制单元

“VEHICLE COMPUTER”  
“机载电脑”

# Safe Computing – Next generation Electronic Control Unit

## (r)evolution of the E/E Architecture (Automotive)

电子电气架构的发展进程



STUDIES AND  
POTENTIAL PRODUCTS  
TRANSFERRED FROM  
AUTOMOTIVE

汽车业可以被转移应用的研究和零部件



# Potential Bosch Components

BGAT – Study Electric Demonstrator with AutoGyro

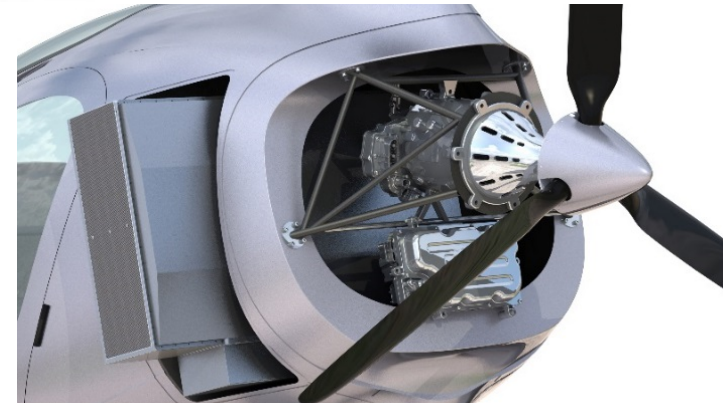
BGAT – 与 AutoGyro 合作的电动示范研究项目

Gyrocopter gasoline power-train replacement

Gyrocopter 汽油机动力总成置换



FULL ELECTRIC  
纯电动



- ▶ EU and Land Niedersachsen funded project
- ▶ Conversion based on RB standard automotive 400V product portfolio for aviation
- ▶ Power output / flight behavior similar to basic version
- ▶ 16kWh installed battery capacity (150 kg)
- ▶ Operation duration target up to 30min
- ▶ Slight increase of maximum take off weight

## ▶ BGAT Services

- ▶ System configuration and specification (safety)
- ▶ Battery specification and battery management
- ▶ SW development inverter and VCU (aviation specific)
- ▶ Installation and “first firing” support
- ▶ Components: SMG180/120, INVCON2.3, ME17.2



# Bosch Components FADEC-System for Austro Engine AE300 (Jet Fuel)



# Electronic Engine Control Unit MS640

## SOP 03.2009

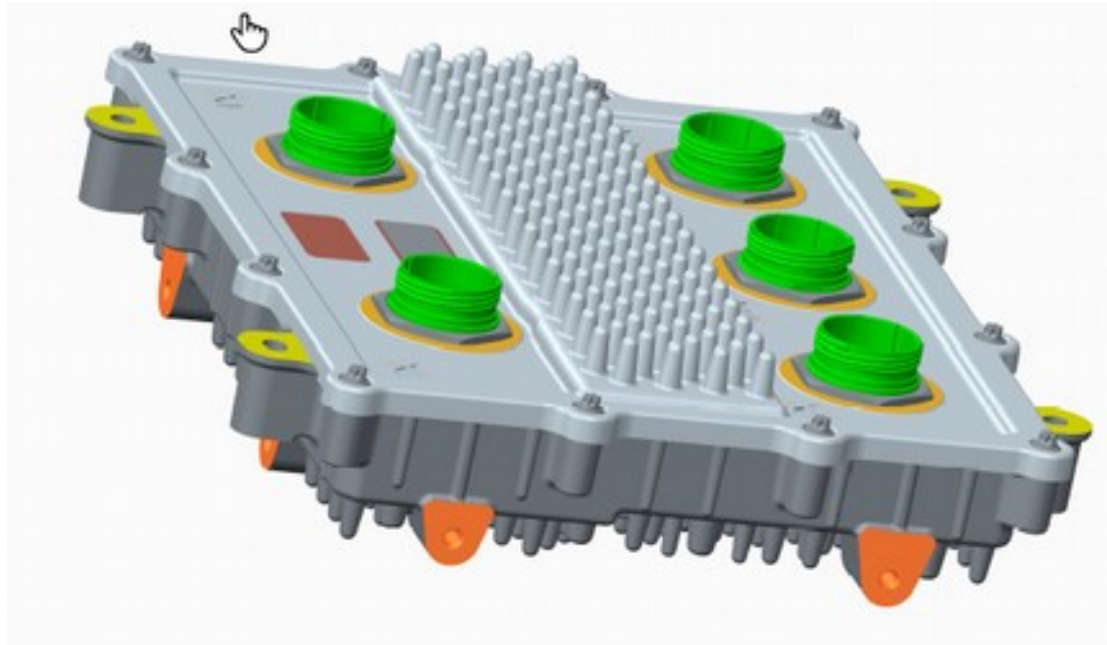


# Bosch Components

## Next Generation FADEC-System

Electronic Engine Control Unit AV8 (DAL B)

- SOP 2018



Development according aviation specific requirements (DO178C, DO254, DO160)

# Potential Bosch Components

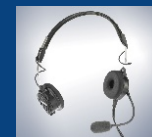
## Electric Flying Vehicle / 电动飞行车辆

### Power Train and Battery 动力总成和电池



### Security / 安防

- ▶ Cabin camera / 机舱摄像头
- ▶ Sound system / 播音系统
- ▶ Headsets / 耳机



### Battery Charger / Charge Station 电池充电器 / 充电站



### Comfort & Connected 舒适与互联

- ▶ 48V climatronic / 48V 空调系统
- ▶ Wiper system / 雨刮系统
- ▶ HeadUp Displays / Dual View Displays / 抬头显示 / 双视觉显示
- ▶ Haptic Displays / 触屏
- ▶ Human Machine Interface / 人机交互界面
- ▶ Seat, door and window motors / 座椅, 门窗的驱动电机



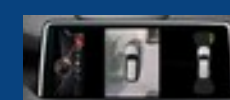
### Automated / 自动化

- ▶ Integrated automotive MEMS for Flight Control and Flight Stabilization / 集成汽车 MEMS 的飞行控制和飞行稳定系统
- ▶ Connected gateway (service) / 互联网关
- ▶ Safety components (Airbags, ...) / 安全零部件 (安全气囊等)
- ▶ ECU for full redundant systems 全冗余系统控制器



### Sense and Avoid / 传感和蔽障

- ▶ Sensors for autonomous flight Radar, Ultrasonic, Stereo camera, Laser, ... 自动飞行传感器, 包括雷达, 超声波, 立体摄像头等
- ▶ Parking Pilot / Landing Pilot / Surround View 入库导航 / 降落导航 / 环视系统
- ▶ ECU for avoid algorithm 蔽障算法控制器



THANK  
YOU  
感谢聆听