

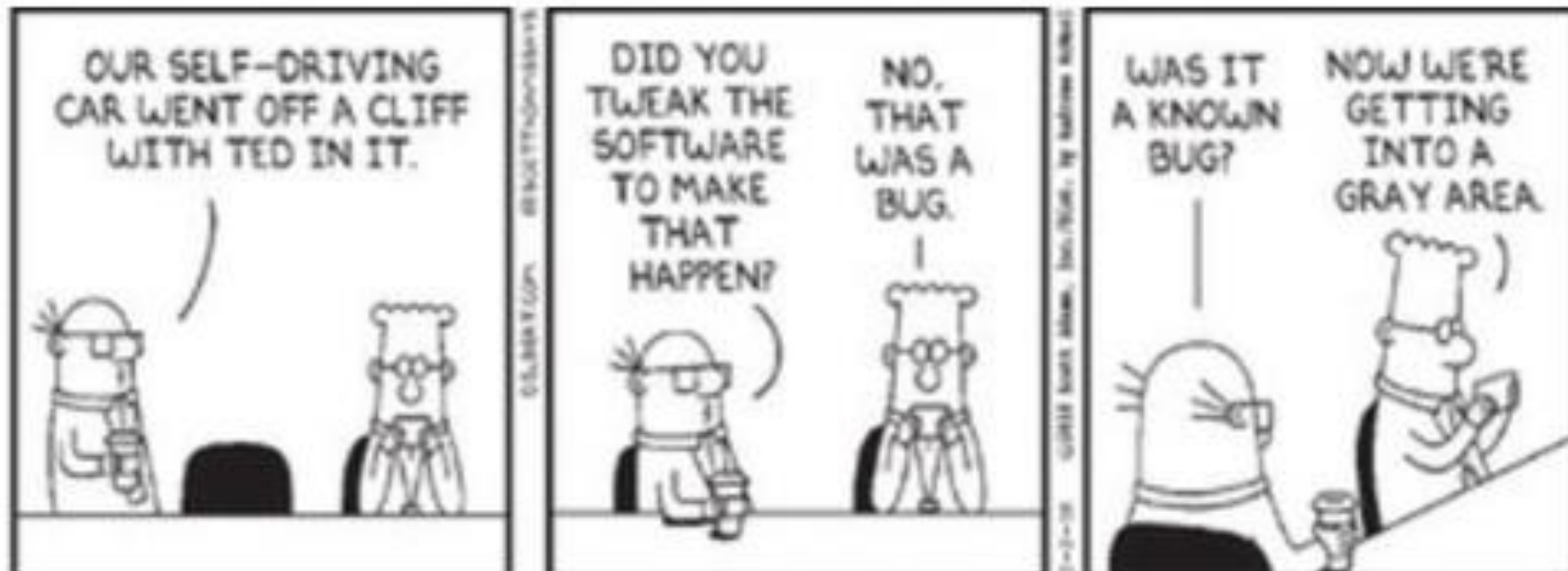
Technologies that Make Autonomous Smart Cities Transportation Possible

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*Transportation Business
Development Manager,
Kontron America*



2018 Fare Collection/Revenue Management
& TransTech Conferences



Dilbert by Scott Adams

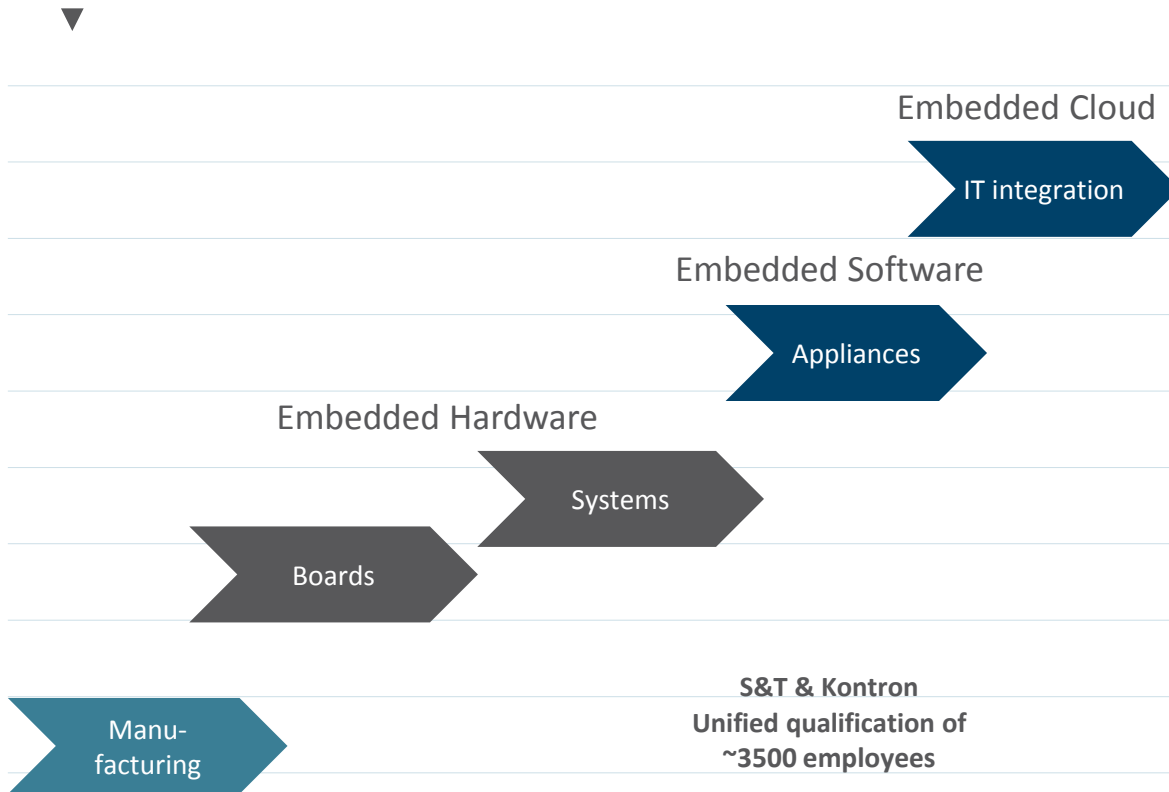
THE HUMAN SPIRIT MUST PREVAIL OVER TECHNOLOGY,
ALBERT EINSTEIN

Agenda

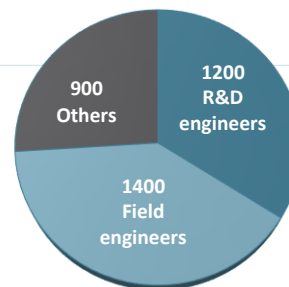
- Who We Are?
- Some Technology Challenges and Emerging Technologies
- Autonomous Anywhere
- Other Innovative Public Transportation Solutions

WHO WE ARE

E2E IOT SOLUTIONS FROM EDGE TO CLOUD TO ENTERPRISE



S&T & Kontron
 Unified qualification of
 ~3500 employees



s&t

- Application Software (1800 Engineers)
- Security SW for IoT solutions and private cloud offering
- IoT head end Systems – Embedded Cloud

kontron

- Installed base > 4 Mio. embedded Computers (operating)
- Strong embedded computer portfolio
- Security SW for IoT solutions and private cloud offering

innoconn
 An Innovative Foxconn Member

- #1 electronic assembly
- Strong Hardware Engineering
- Leader in Server farms (embedded Cloud)

ONBOARD RAIL PLATFORMS

TRACe™ RUGGED COMPUTERS



OUR PLATFORMS



TRACe B3xy



TRACe B40x

APPLICATION READY PLATFORMS

Network Video Recorder (NVR)



TRACe V30x-TR



TRACe V40x-TR

MVB Train Management



TRACe M304-TR

Gateway Wi-Fi/4G/LTE



TRACe G304-TR

Driver console



TRACe HMD104-CK

Generic Computer



TRACe B3yz-TR

SOLUTION READY PLATFORMS

LoRa to MQTT Gateway



TRACe LoRa-MQTT



TRACe Cloud SERVER

On-board Entertainment



TRACe RWAP



TRACe NET



Video Management System (VMS)



Control Room



Network Video Recorder

VITAL PROCESSING PLATFORMS FOR RAIL CONTROL SYSTEMS

- ▼
- ✓ Platforms for Railway Control Solution for rolling stocks (EN50155) or wayside
- ✓ 19" rack-mount chassis in Transportation for TCMS, Rail Control Solution , CBTC, from 2U to 5U height
- ✓ Most of 19" products are based on modular 3U VPX architecture for maximum flexibility
- ✓ Certified platforms: EN50155, SIL2/SIL4
- ✓ Various cooling systems in multiple environments: Fanless conduction cooled, passive cooling, or redundant fans



ONBOARD IN-VEHICLE PLATFORMS

EVOTRAC RUGGED COMPUTERS



**Rugged Gateway for Buses /
Trucks / Tractors**



**Embedded Computer for
Emergency Vehicles**



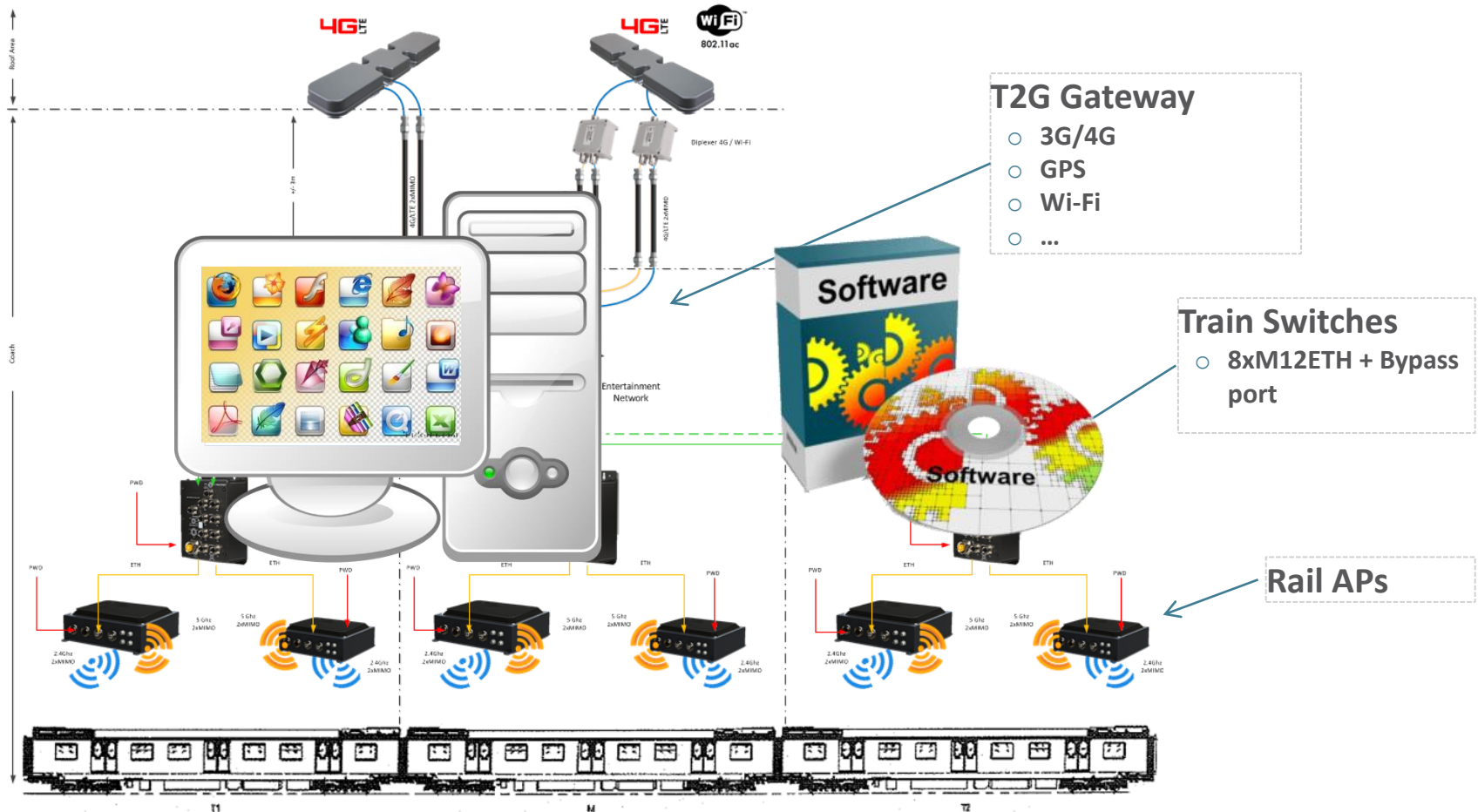
**High Performance Embedded Computing
(HPEC) / Deep Learning**



Mobile Data Logger

SOME PRESENT TECHNOLOGY CHALLENGES

MOST MODERN SYSTEMS HAVE EVOLVED TOWARDS IP BASED & INDUSTRY STANDARD WAN/LAN ARCHITECTURES



BUT UNLIKE THE IT INDUSTRY PUBLIC TRANSIT OPERATORS STILL USE **PROPRIETARY BASED HW/SW SYSTEMS** AND MANY ARE LOCKED INTO A LEGACY OF AGING, INCOMPATIBLE SYSTEMS **THAT ARE COSTLY TO UPGRADE**

EMERGING TREND TO ADOPT COTS BASED ONBOARD HW/SW SYSTEMS



- ▶ Get access to **best of breed Commercial-Off-The-Shelf (COTS) SW and HW** platforms and **IaaS / SaaS** providing a much more contemporary and open environment
- ▶ **More affordable** way of taking advantage of industry leading edge technologies and applications
- ▶ Standards-based solutions, unlike previous proprietary ones ensure **long-term scalability and interoperability**



BEST OF BREED COTS LEADING EDGE SW AND HW PLATFORMS

OTHER EMERGING TECHNOLOGIES THAT STARTED TO IMPACT THE ONBOARD TR INDUSTRY

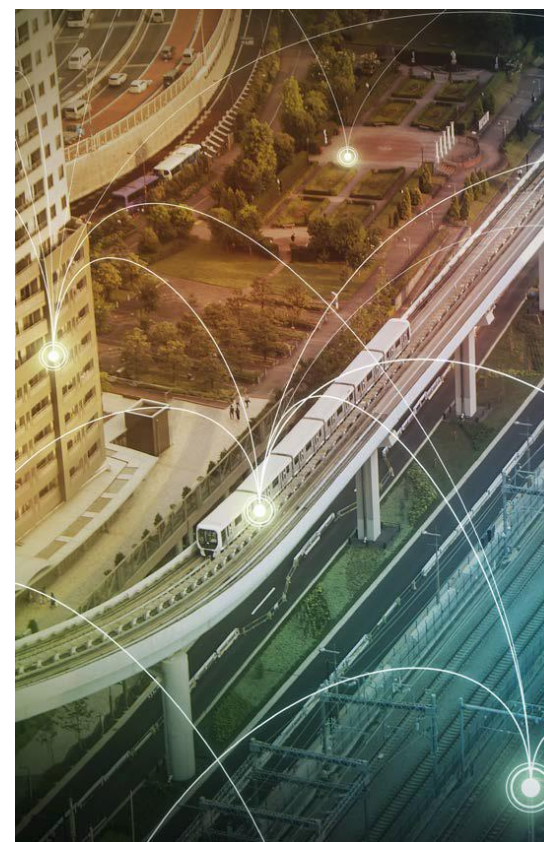


- ▶ IoT gateways with Edge, Fog and Central Cloud Analytics and Big Data processing

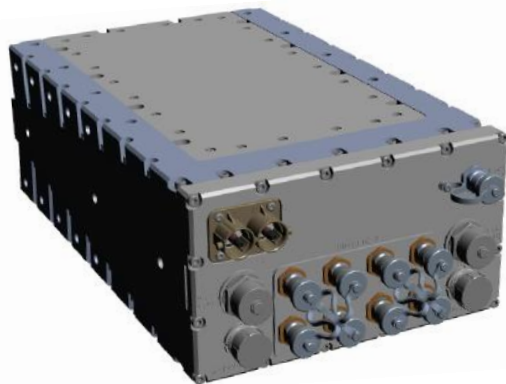
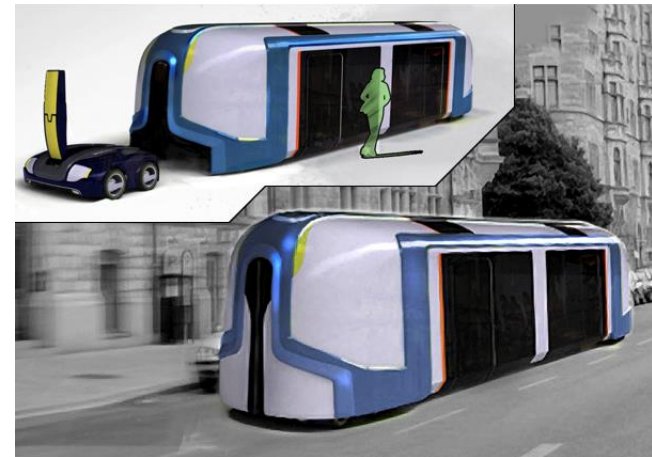
- ▶ HPEC HW platforms with AI/ Deep Learning / Data Fusion SW engines

- ▶ Virtual Machines (VMs), Containers/Orchestrators, Network Functions Virtualization (NFV) and Software Defined Networking (SDN)

- ▶ MaaS (Mobility as a Service)



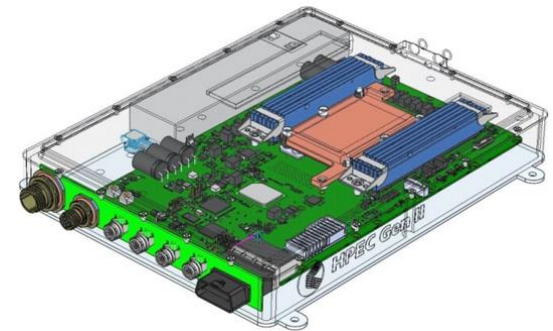
HPEC ONBOARD HW PLATFORMS WITH AI / DEEP LEARNING / DATA FUSION SW ENGINES RUNNING VMS



Kontron S1X
AV
HPEC

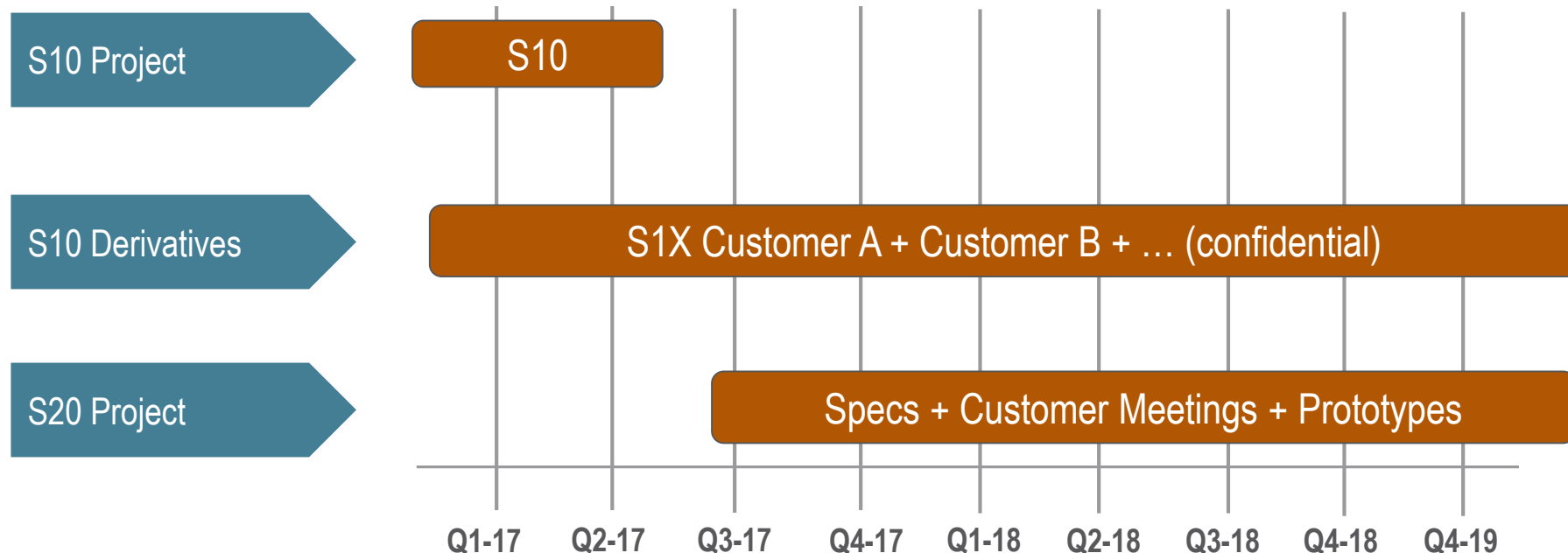


Autonomous
"Anywhere"
Solutions



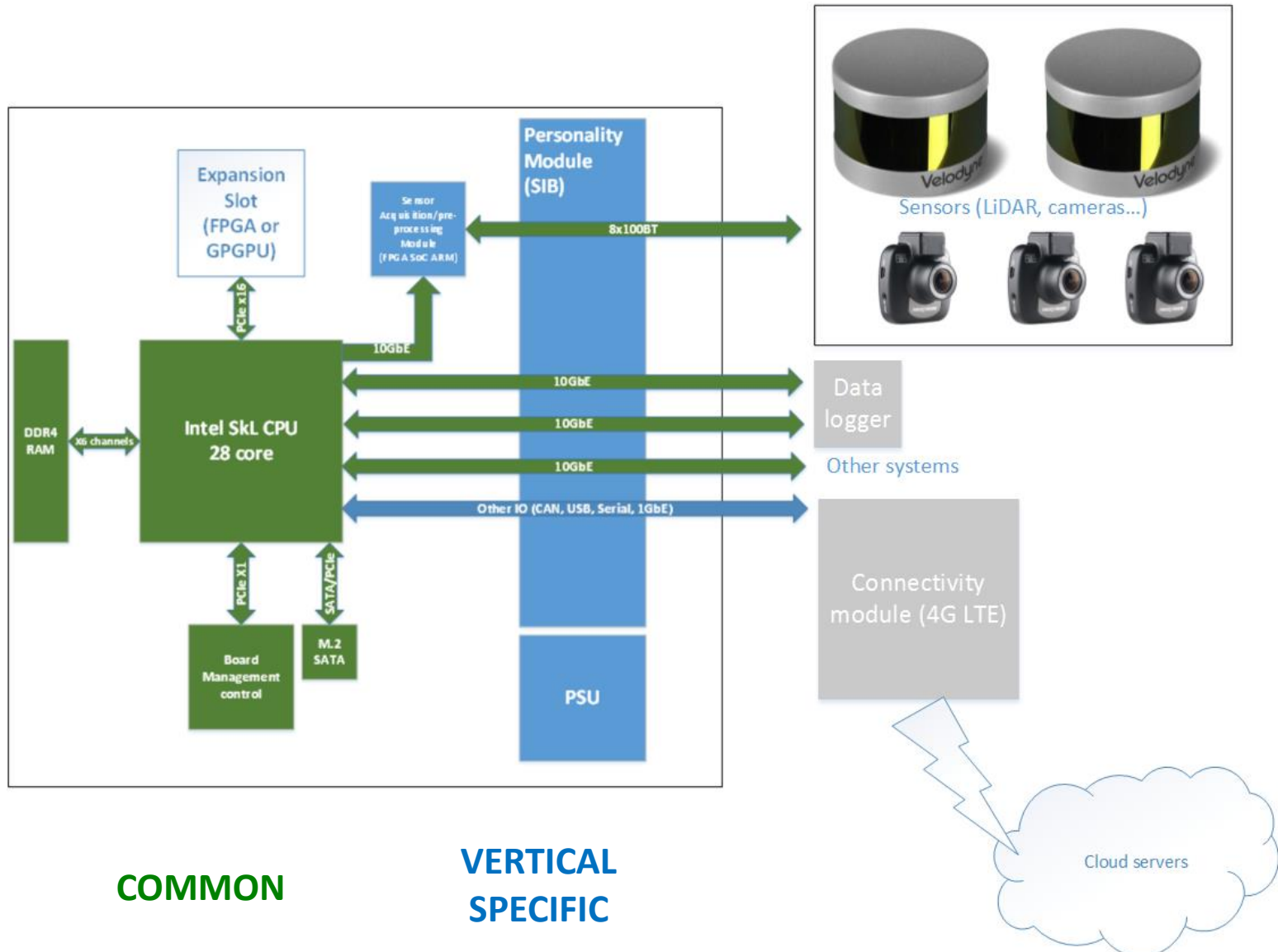
THE DEVELOPMENT OF AUTONOMOUS VEHICLE (AV) TECHNOLOGY IN RAIL IS ALREADY BEING PLANNED ON LINES AROUND THE WORLD AS THE NEXT GENERATION OF DRIVERLESS TRAINS

KONTRON S10/S20 TIMELINE OVERVIEW



- S10 – JOINT KONTRON & PARTNER IP, 2016 & 2017
- S20 – KONTRON IP, PHASE 1: 2018: PROTOTYPE & REQS CLARIFICATION
- S20 – KONTRON IP, PHASE 2: 2019: FIRST PRODUCT ITERATION

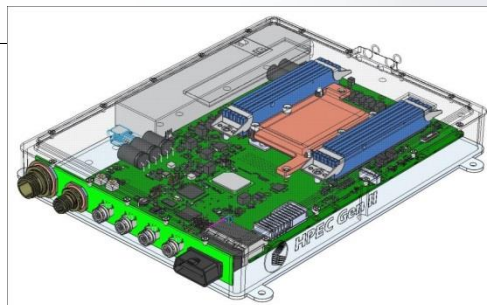
S20 PLATFORM – HARDWARE ARCHITECTURE



S20 PLATFORM – CONCEPT DESIGNS



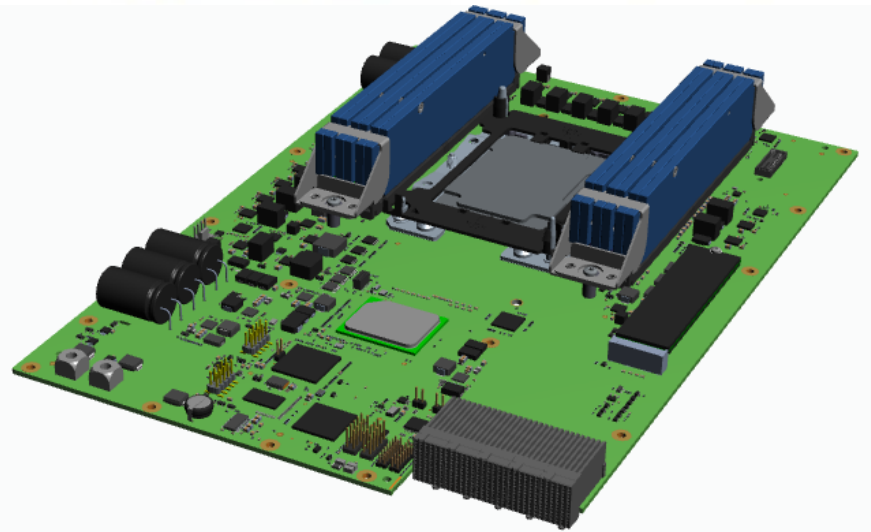
Single CPU system



Dual CPU system
(common cooling system)



KONTRON S10 AND S11 HPEC BOARDS FOR AD DEVELOPMENT



24 CORE INTEL® XEON® PROCESSOR

- ▶ Hardware Platform for Autonomous Driving
- ▶ Intel® XEON® Scalable 8160T 24-Core Processor with up to 192GB ECC DDR4
- ▶ 4-port 10 gigabit Ethernet (10 GbE) and two PCIe x16 ports
- ▶ Optimized For Liquid Cooling

KONTRON S19 HPEC AUTONOMOUS MINING SYSTEM



AUTONOMOUS MINING

- ▶ Using the data from technology equipped machines provides more information and insight into equipment operations
- ▶ Remote operations driving consistency to improve efficiency



- ▶ HEAVY EQUIPMENT COMPANY

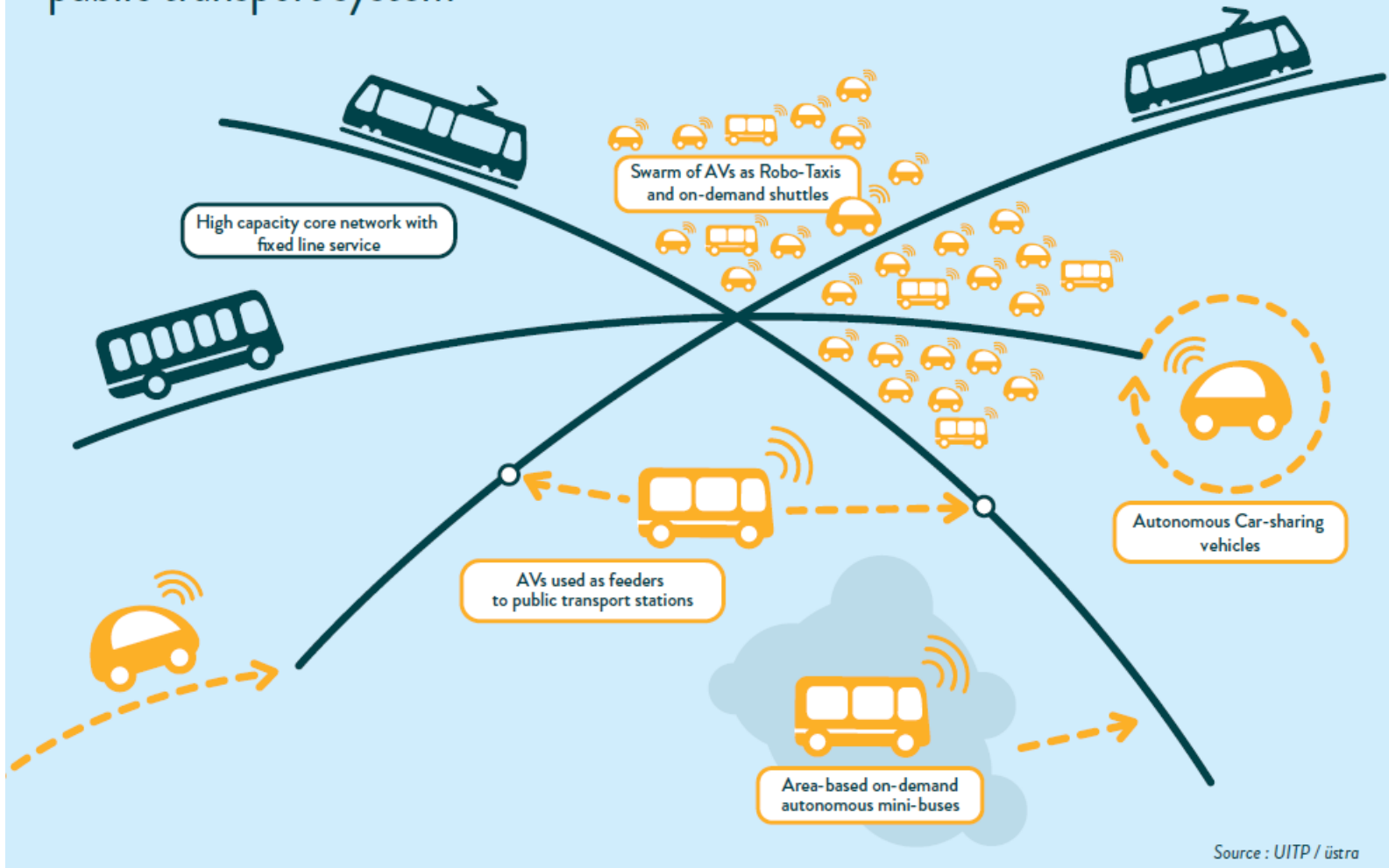
PRODUCT key features

- ▶ Control unit allows for future expansion IoT and data analytics
- ▶ 8-core version Intel® Xeon® D-1540 (Broadwell DE) processor for higher data rates and virtualization
- ▶ Full certification



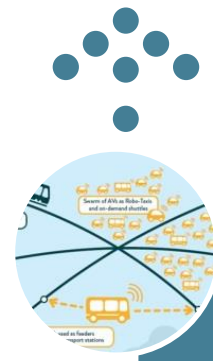
MOBILITY AS A SERVICE (MAAS)

Possible applications of autonomous vehicles (AVs) as part of a diversified public transport system



Source : UITP / üstra

VAL'S ONBOARD PUBLIC TRANSPORTATION SYSTEMS EVOLUTION ROADMAP



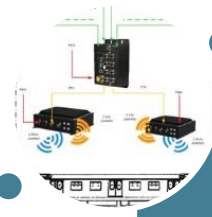
TR 5.0: AV/HPEC, CTs/ORs, SDT/TFV, MaaS



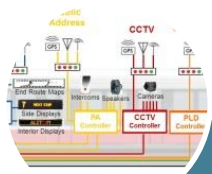
TR 4.0: IoT, Cloud, Big Data, Analytics, VMs



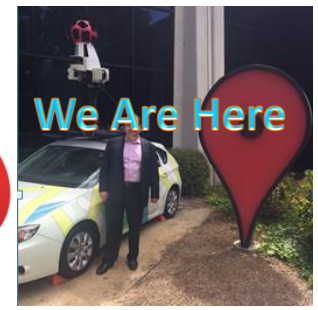
TR 3.0: COTS HW & SW, IaaS / SaaS



TR 2.0: IP Networks & Wireless Connectivity



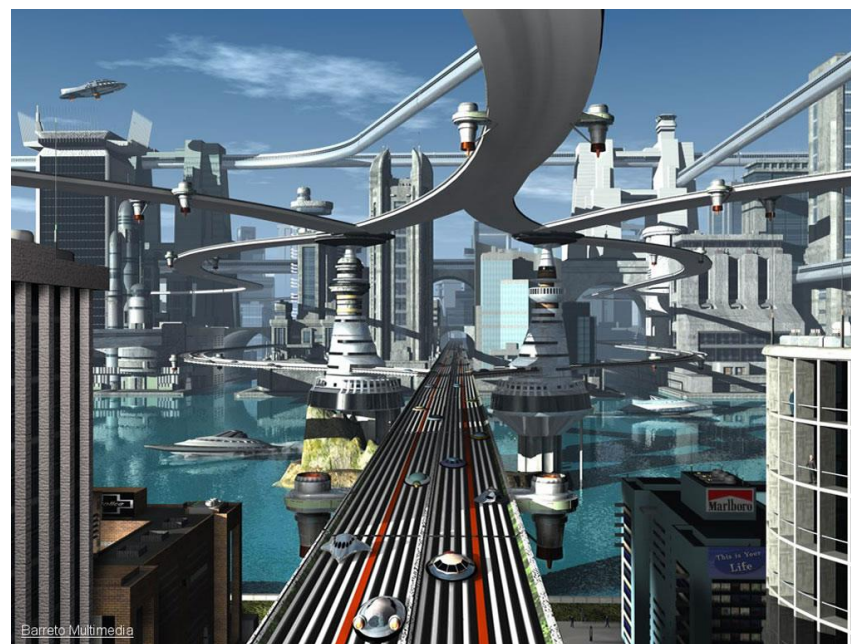
TR 1.0: Onboard Computers



TAKE- AWAYS OF WHAT CAN WE EXPECT IN THE NEXT DECADE?



- ⊕ IoT fixed and mobile meshed Gateways connected to wireless sensors with optimized Edge, Fog and IaaS / SaaS, Central Cloud Analytics processing Big Data
- ⊕ Autonomous “Anywhere” Systems running VMs on HPEC HW platforms with AI/ Deep Learning / Data Fusion SW engines
- ⊕ Software Defined Trains/Vehicles (SDT/VDT) and Train/Vehicle Function Virtualization (TFV/VFV)
- ⊕ MaaS in an integrated multimodal transportation world



And here it comes !!!

The One and Only
Autonomous Camel

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