



Digital way for operations in ZF

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Agenda

- **About ZF Group**
- **About ZF Serbia**
- **Digitalisation strategic road map**
- **Digital knowlage**
- **Q & A**

Financial Overview 2020



EUR 32.6 billion
sales



153,522
employees



EUR 2.5 billion
Research &
Development



EUR 1.0 billion
adjusted EBIT

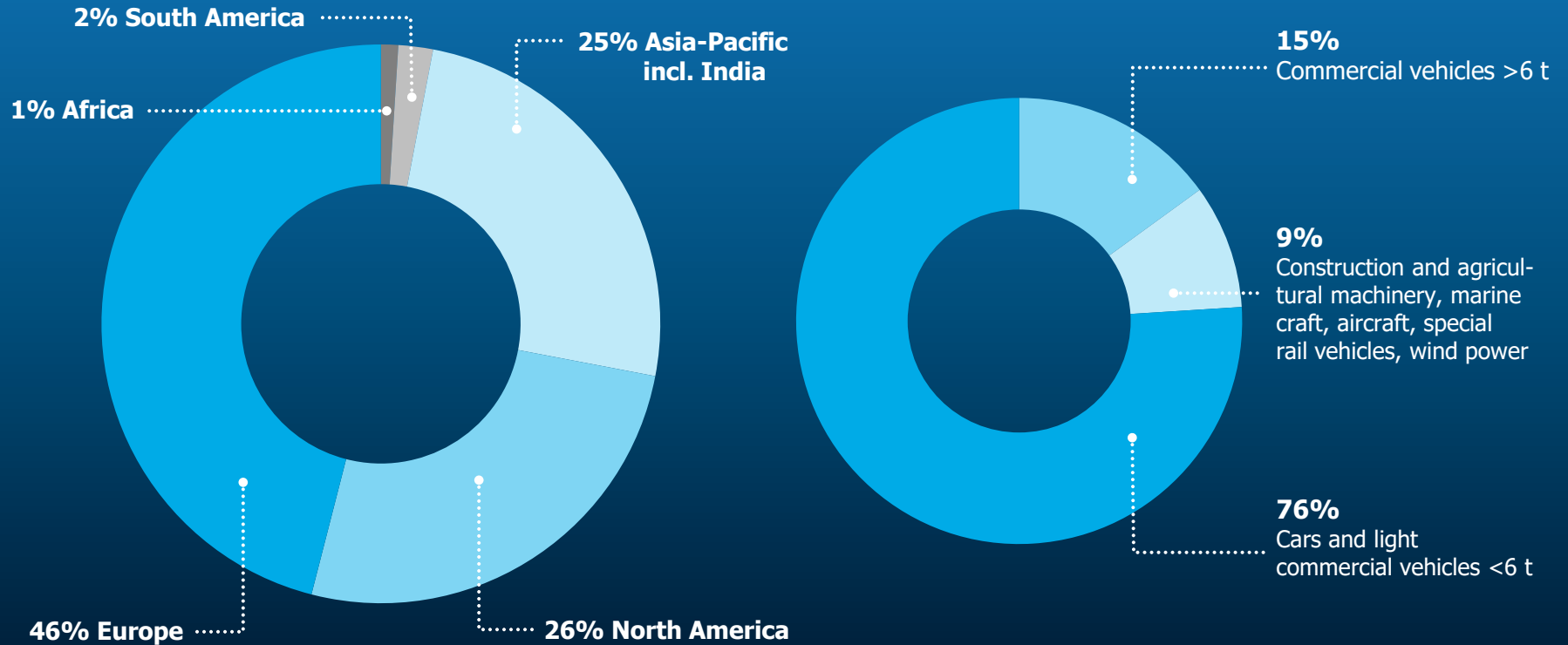


3.2%
adjusted
EBIT margin



EUR 1.4 billion
investments in
property, plant,
and equipment

Overall Sales €32.6 Billion in 2020



Division E at a glance 2020



27,701
Employees



36 Locations
12 Countries



9,642 Mio. €
Sales

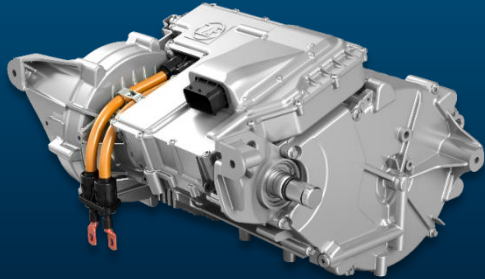


484 Mio. €
Invest

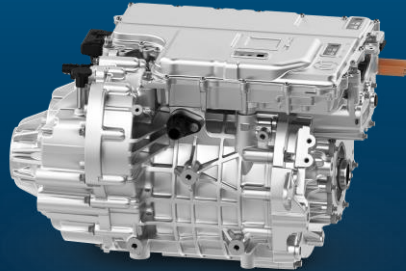
Product Portfolio – Electrified Powertrain Systems

Electric Vehicle Drives

eVD 400 V



eVD 800 V



Fully integrated electric axle drives with power electronics, e-motor, differential, drive shafts, parking lock and motor control software from a single source.

**Various performance categories:
low – mid – high**

Belgrade area & Pančevo - Overview



Population:

- Pančevo region: 123.000 people
 - Belgrade region including Pančevo: 1,7 mio
- slightly growing (2011-2016) 0,3%



Unemployment rate:

- 12,5% - Belgrade region
- 11,3% - Pančevo



Educated labor:

- 96.000 University students
- 60.000 Students of secondary education



Belgrade: Sava River and the old city of Belgrade

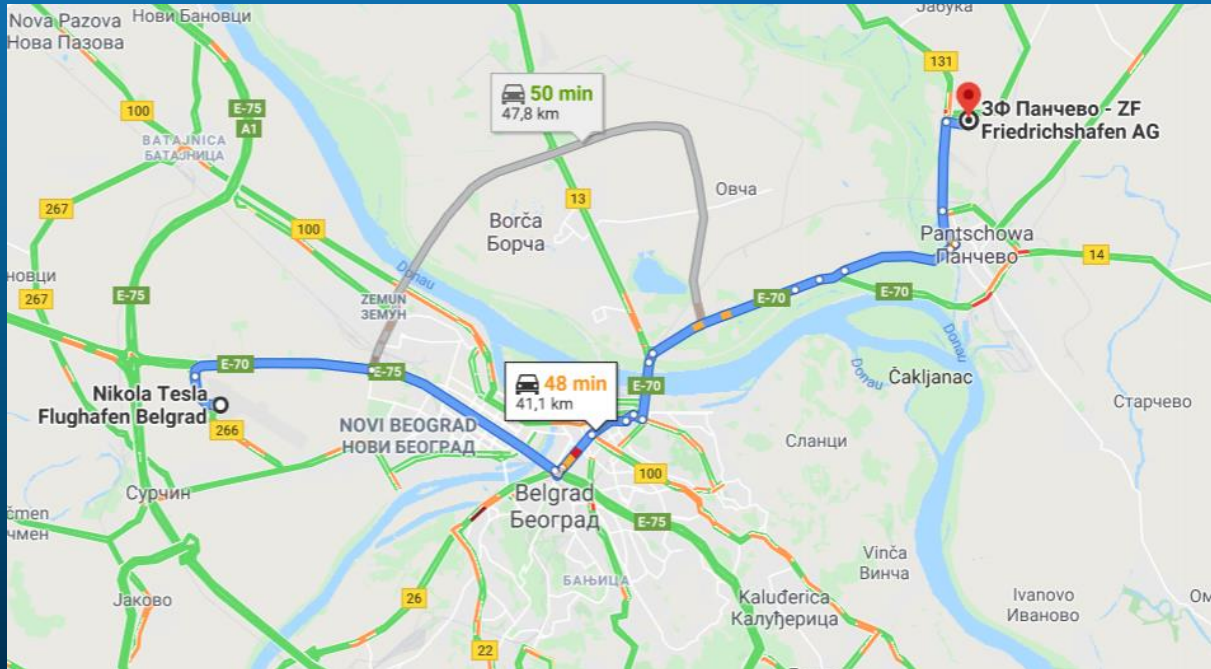


Pančevo: Pedestrian zone

Geographic position & Infrastructure links



ZF Serbia d.o.o. – Pančevo Location



Direct flight connections to all capitals

Good access to highway:

E75 Motorway

highway connecting to Western Europe through Hungary



E70 Motorway

Part of the International E-road network, extending from Norway to Greece



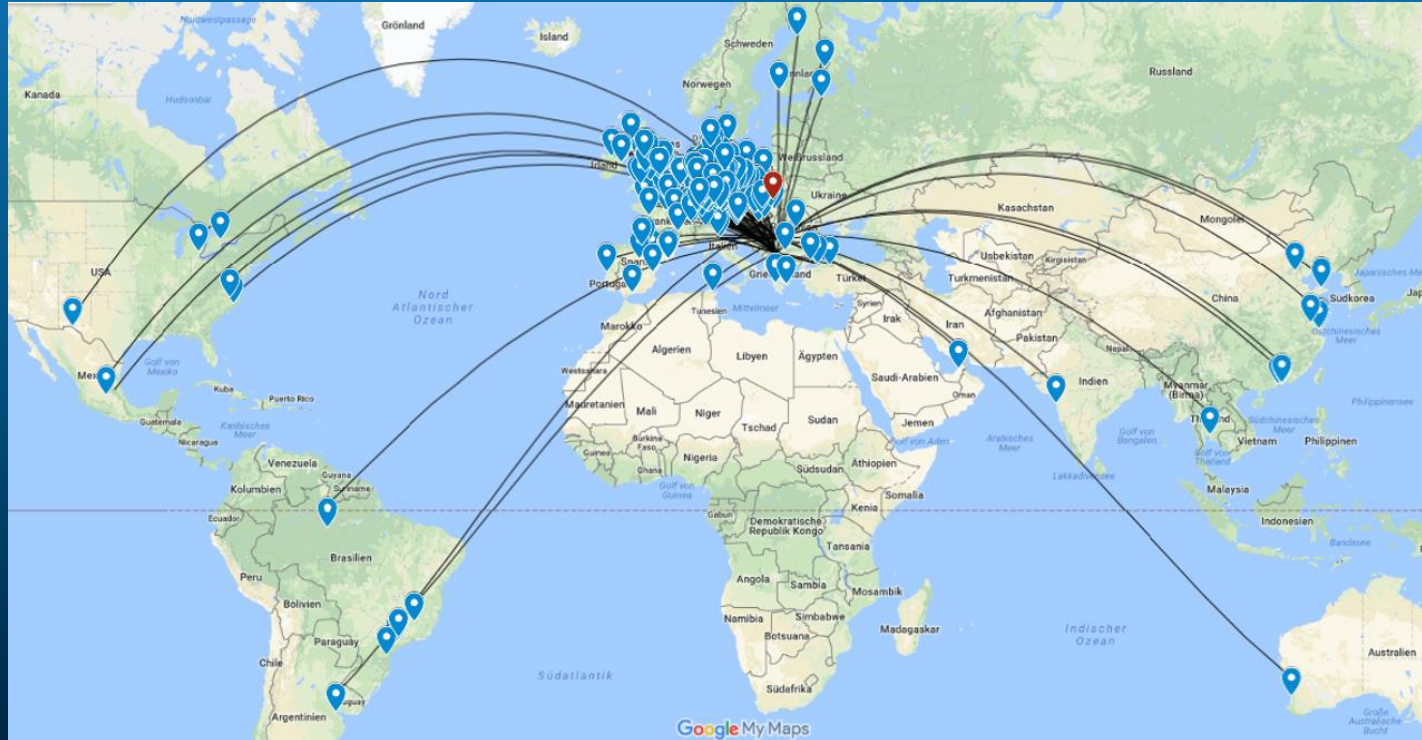
14 km away from Belgrade

40 km away from Belgrade Airport



Situated at confluence of the Tamiš and the Danube rivers, at the very edge of the Panonian Plain

Customer of ZF Serbia d.o.o. world wide - 2020



465 customers of ZF Serbia d.o.o.



Universities near Pančevo



University of Belgrade (22km from PNC)



University of Kragujevac (162 km from PNC)



University of Novi Sad (113 km from PNC)

Projects of ZF Serbia:

- ✓ ZF Subject at Faculty of Mechanical Engineering
- ✓ E - Formula Student contract ongoing
- ✓ Road show



Sponsorship Formula Student signed – November 2020



28.04.2021. Visit of students of the Faculty of Mechanical Engineering, University of Belgrade

High schools in Pančevo



Technical school „Nikola Tesla“ -
Pančevo



Mechanical school - Pančevo



Technical school „23 Maj“ - Pančevo

Implementation of Dual education in Pančevo High Schools
in progress:

Mechanical school – Pančevo



application submitted

Mechatronic profile - hiring

Internship for pupils and students:



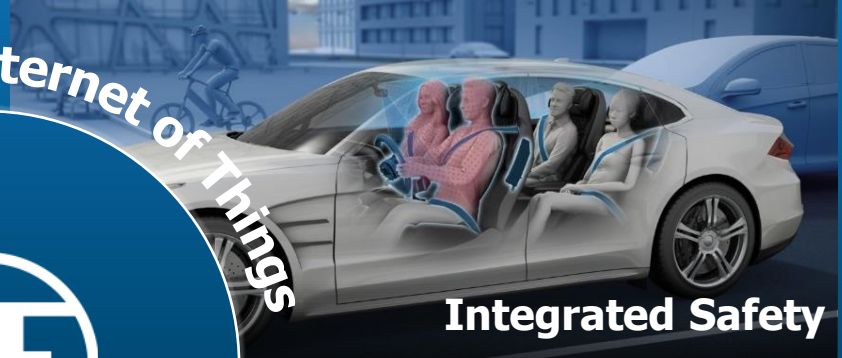
○ Technical profile

○ Mechanical profile

○ Mechatronic profile

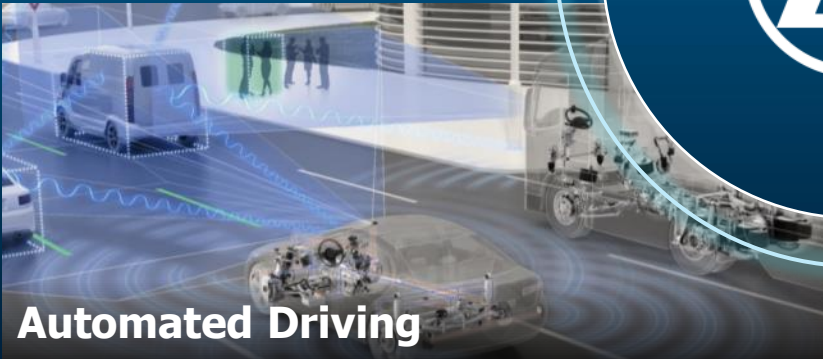


Vehicle Motion Control

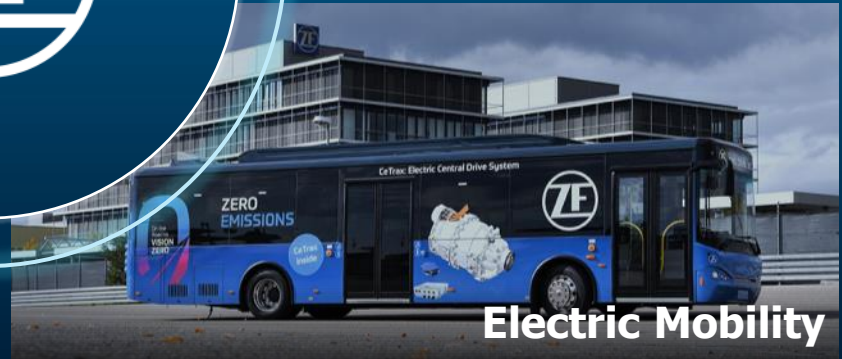


Integrated Safety

Digitalization / Internet of Things



Automated Driving



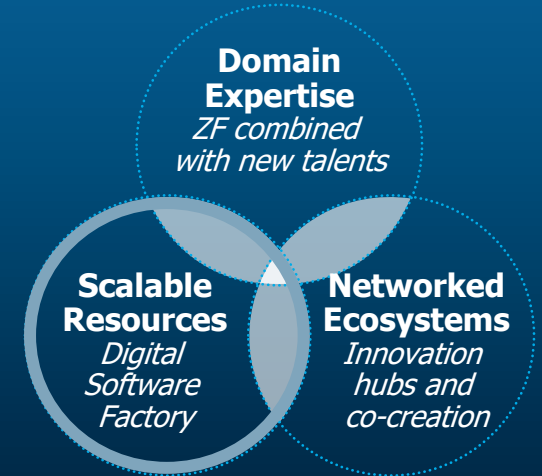
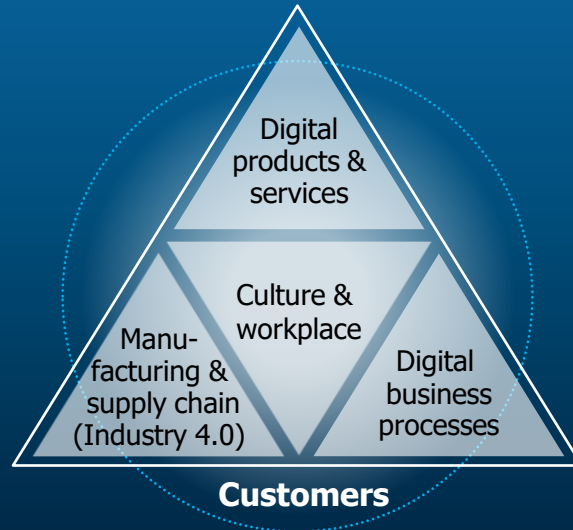
Electric Mobility

Our master plan for digital transformation

... balances portfolio
across 3 horizons ...

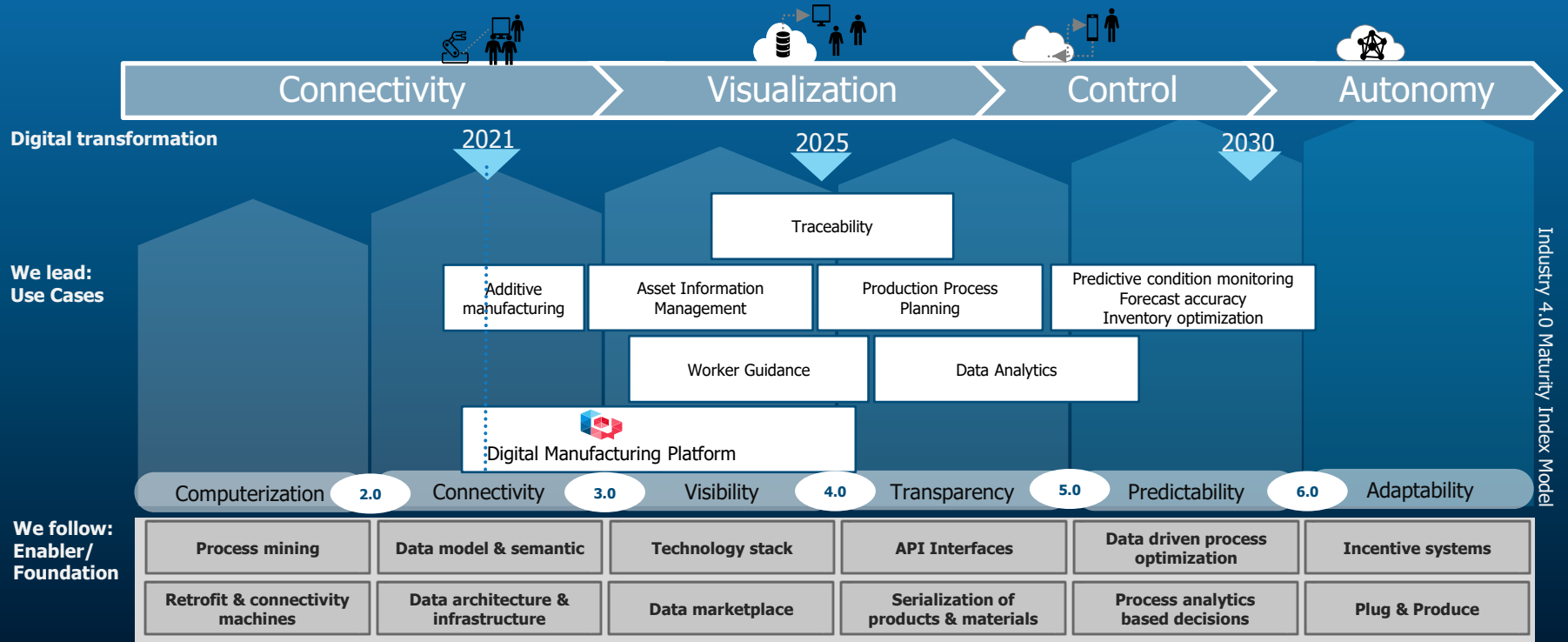
... to digitally transform all
aspects of our business ...

... by building a
3 legged operating model



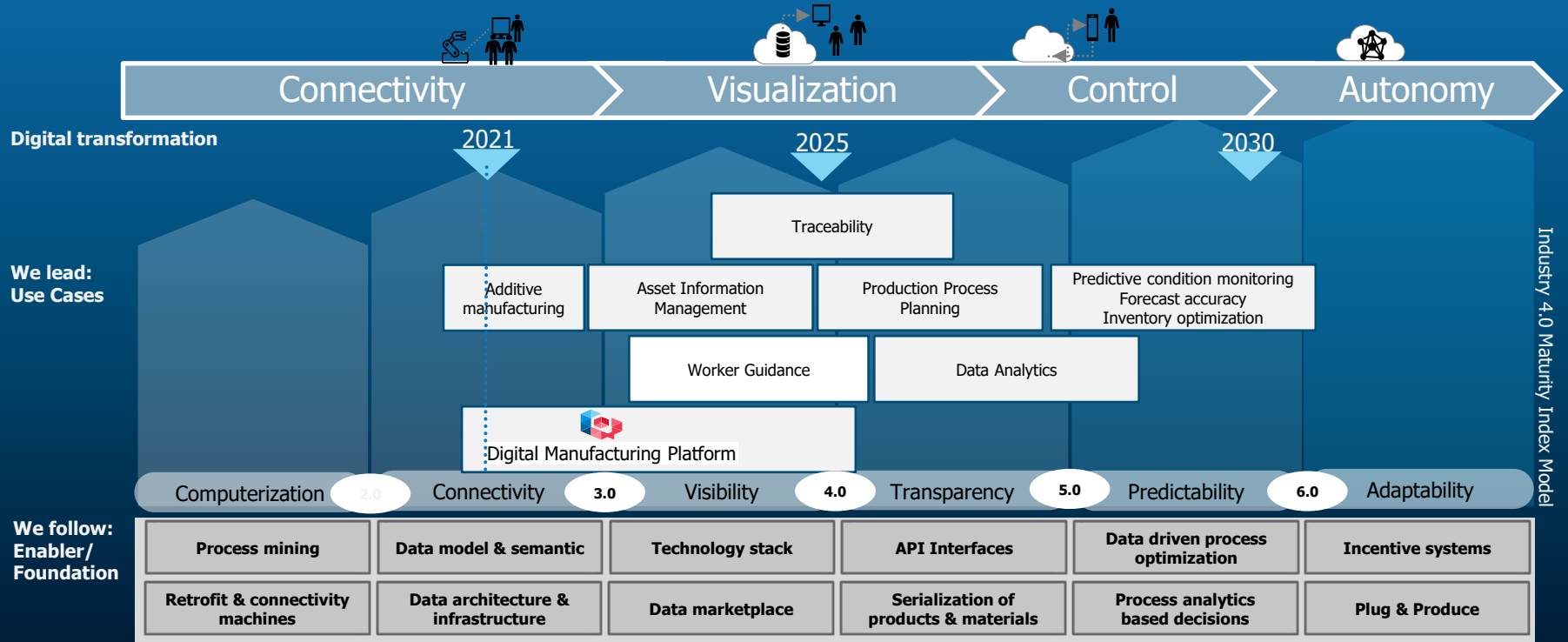
1 Big picture / Strategic Roadmap

Initiative 1: Digitalization



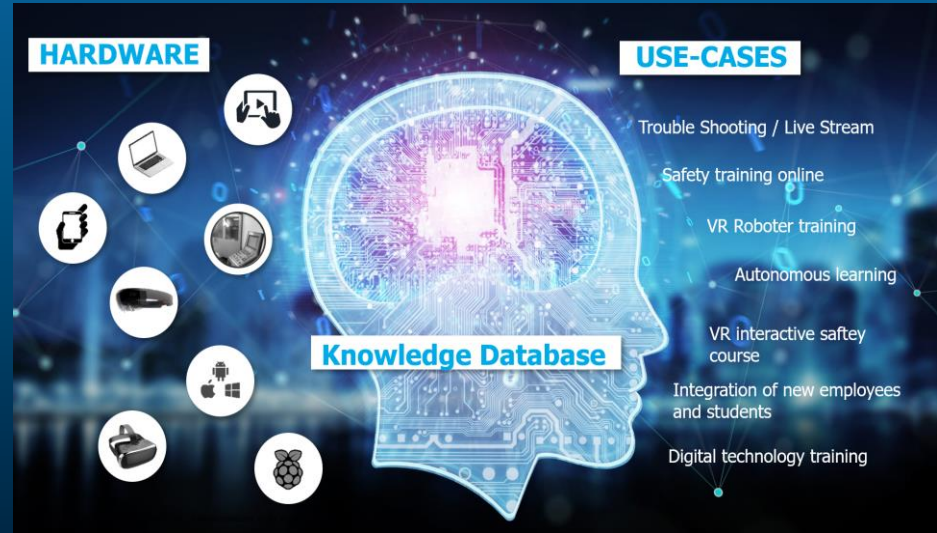
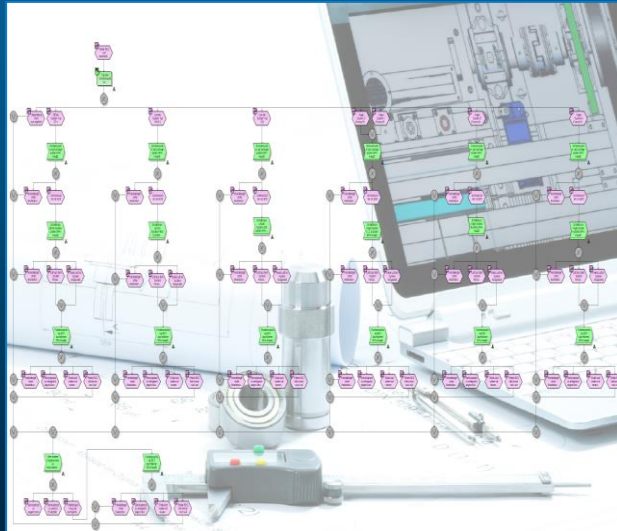
1 Big picture / Strategic Roadmap

Initiative 1: Digitalization



Status for the introduction of the assistance system

We have an **interactive kit**, with which a **wide variety of use cases** can be **easily implemented** in a creative way. Any processes can be transferred to the knowledge database on the basis of logical process models.



Safety briefing old vs. new School



Here we were able to send our pandemic instructions to the employees at home during lockdown. Performed in the E Division and B Division.

Duration of the instruction: approximately 20 min.

Status 06/2021:

11.000 Pandemic Instructions online from home



Digital safety instructions from ZF were rated as the best practice in the AMS Audit

Learning with a trainer vs. autonomously



Process knowledge becomes a resource that can be planned in **digital form**

- **Protection of the production Know-How** against effects of Covid-19
- **Preserving expert knowledge** even in the face of demographic changes

Status 06/2021:

5500 safety briefing with permanent staff online

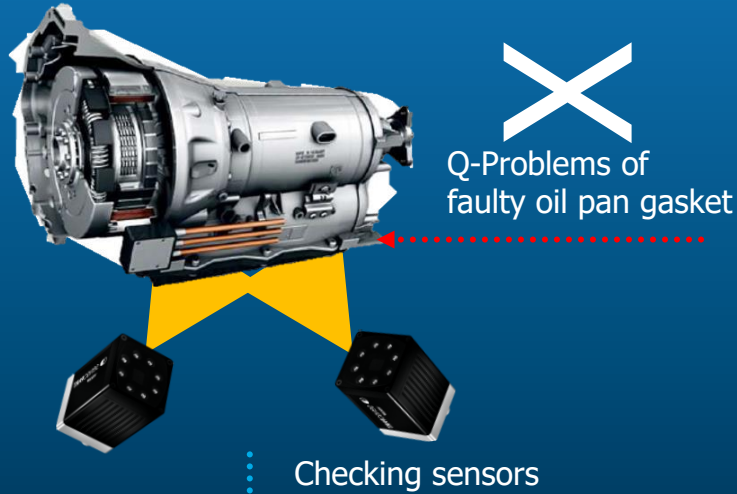
3000 instructions of student assistants

1800 autonomous learning processes guided by the system

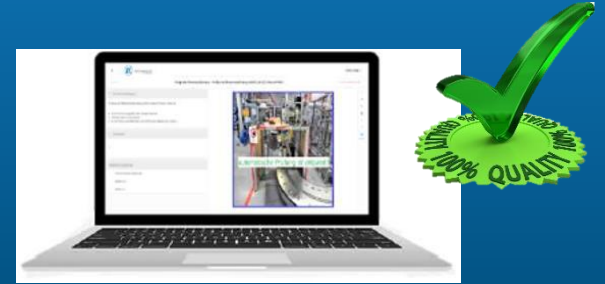


at Saarbrücken in use in over
400 workplaces

Hotfix + connection to the workplace



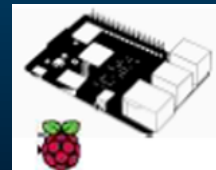
Assistance system to train the employees



Instructions for rework



Software for image evaluation



Raspberry Pi
with ZFs own Software



SPS System

Example Hotfix – Final assembly checking Station Hybrid 2



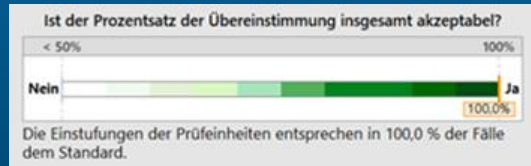
From trial to
checking station
in
2 Weeks!



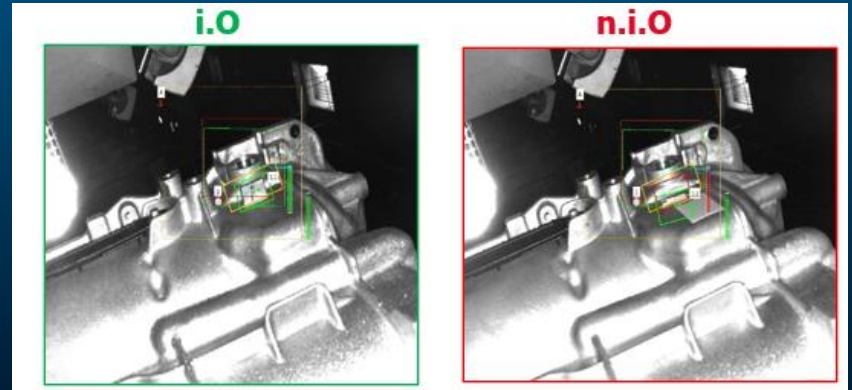
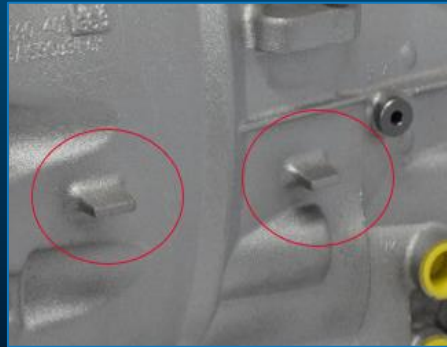
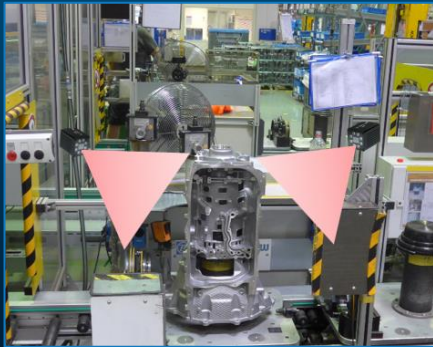
Potential through Hotfix - Assistance in Production

Currently 12 projects with Hotfix assistance in ZF, for example:

Checking station gearbox – Passda Rippen



Analysis MSA 1 to ensure the checking equipment capability, was passed with 100%. The first of 12 series stations is currently being built and put into operation.



Employee training in the VR room



Summary of the topics

Safety briefing online

VR Campus

Learning process autonomously



Assistance in real Time

KNOWLEDGE DATABASE

Development of own Software

Location themes

Trouble Shooting/ Live Support

Currently involved locations



Short Overview of the benefits for all use cases in tabular form

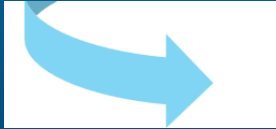
- All trainings can be done autonomously, by the own time and speed. There is no Trainer needed.
- In the VR you even don´t loose any machine time, because the training can be done without the real machine.
- Reduction of CO² through travel activities.
- Expert knowledge becomes a resource independent of experts.
- Qualifications are standardized across locations and divisions and will be digitally available.
- Proof of instruction and certificates, in the sense of I4.0, are digitally created, recorded online, archived automatically and managed in a system cockpit in a qualification matrix.
- The Artengis assistance system is available in the IT shopping cart as corporate software.

Conclusion on the project assistance system in the production

We combine knowledge management with processes



We combine the real world with the virtual world



We combine real Iot equipment with the production



within one System !

1 Toolset  **multiple Ideas**  **great Profit**



Part of Digitalization Operations

see. think. act.

