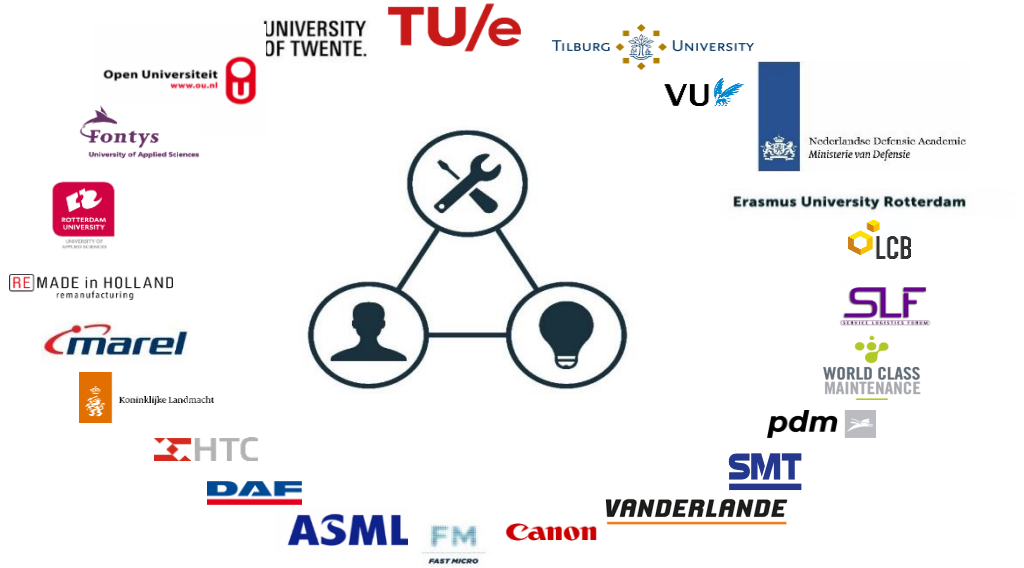

OpsCenter

Operations control centers for sustainable after-sales services

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OpsCenter project

Goal: ***Minimize the footprint*** of high-tech equipment

Complication: High-tech equipment is ***increasingly complex*** and its users require ***high equipment availability*** and ***low costs***

Solution: Set the ***new standard of delivering after-sales services***, so that equipment is maintained just-in-time, and all required resources, such as service engineers and spare parts, are available at the right place and time, with minimal use of emergency shipments by air, for example

Operations Control Centers

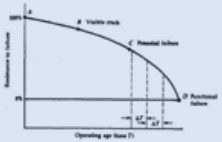
- ***Continuous monitoring*** of equipment and the after-sales service supply chain
- Combining resulting data with ***domain knowledge***, and using hybrid machine learning to enable pro-active decision making
- **Quantitative insights in the footprint** ensure that the right decisions are made
- ***Explainable AI*** allows human decision makers to understand and trust the proposed decisions and to finalize these decisions, whenever needed
- Supporting ***supply chains are redesigned*** and use all supply possibilities, including 3D printing of spare parts
- **Redesigned business models**, i.e., servitization, allow data collection, maximal exploitation of useful life, and re-use of scarce materials at the end of the life

Governance

Use cases

WP1: Supply chain design

WP2: Demand predictions



WP2: Supply predictions

WP3: Short term maintenance planning

WP3: Operational interventions on maintenance and the supply chain

WP3: Human-Machine Interaction

WP4: Business models & sustainability footprint

Pilot OpsCenters

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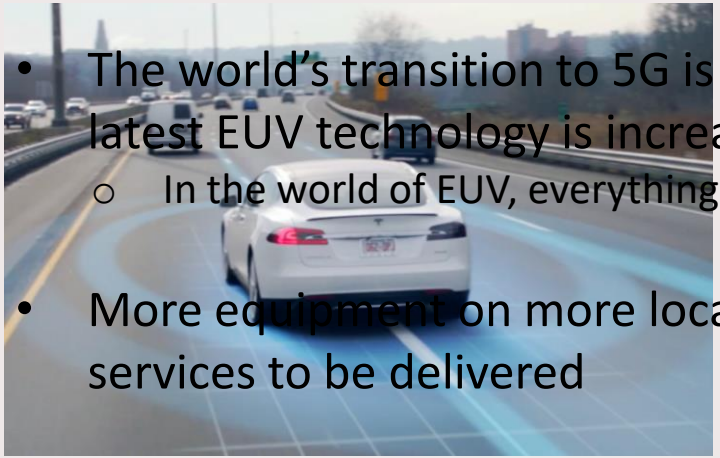
The electronics industry just keeps going

- The demand for chips continues to grow



- The world's transition to 5G is just starting and demand for latest EUV technology is increasing.
  - In the world of EUV, everything is bigger
- More equipment on more locations with more after-sales services to be delivered

➢ Keep equipment up and running and IC's affordable, preventing exponential growth of workforce, costs and footprint

Importance of collaboration


Complex supply chain with over 60 sites


Data availability significantly advanced over the years


Scheduled maintenance becoming integral in after-sales services


Control Center in place to put results into practice directly


Learn from different industries and latest research developments


Demand for chips is here now

DISCUSSION

Dilemma – Impact on Supply Chain

Maintenance planning will change from static to dynamic. We need to be agile in the supply chain to react adequately on upcoming failures and other issues.

How will the future supply chain be different from the current one?

Dilemma – Impact on service contracts

Currently, many services are paid on a time & material basis. With an OpsCenter we aim for a higher service level against low costs and low footprint. Service contracts have to change to capture the value.

How should we shift to the desired business model and how do we take along customers in this journey?

Dilemma – Sustainability versus Commercial

With an OpsCenter, we aim to reduce waste both by increasing the system uptime at customers and by reducing the efforts to keep the systems up and running. This is also a commercial trade-off to be made by the customer: More efforts to keep the systems up leads to higher uptime.

How do we ensure that we come to an optimal trade-off respecting commercial and sustainability aspects?

Dilemma – Involvement of human judgement

We increasingly collect and use data to make decisions. However, data is not always complete and correct.

To which extent will human decision makers remain involved?