

Proposition Service Logistics *summary*

April 2017



Proposition

to asset owners

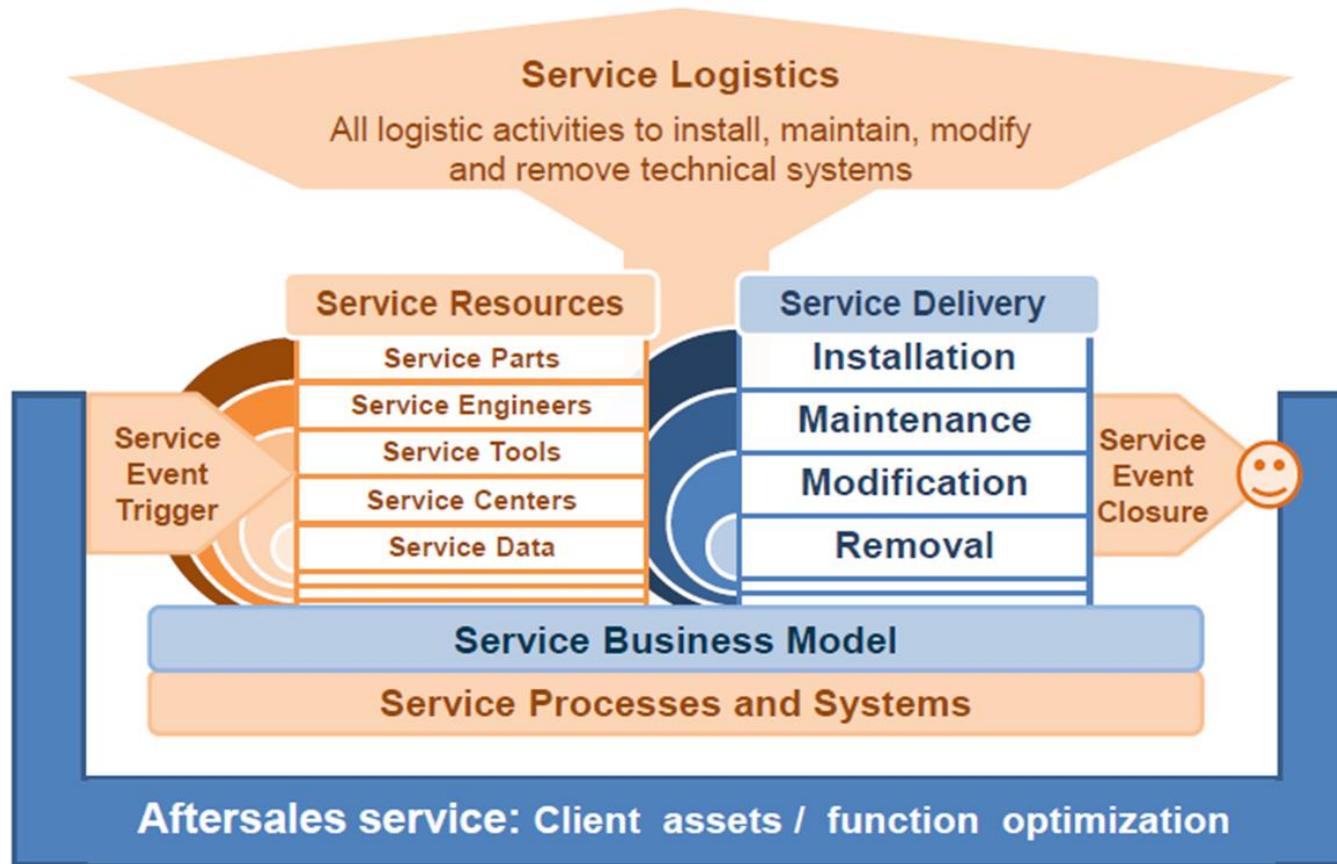
“ Dutch Service Logistics solutions enable your organization to improve worldwide system availability and reliability and reduce operational costs through intelligent and optimized forecasting, planning and scheduling of the service chain and cross-border delivery of its associated resources such as people, networks, information and other tangible (or intangible) assets. “

to OEMs

“ Dutch Service Logistics solutions enable your service organization to improve customer satisfaction by increased system availability and reliability and reduce operational costs through intelligent and optimized forecasting, planning and scheduling of the service chain (internal or external) and its associated resources such as people, networks, information and other tangible (or intangible) assets.”



Service Logistics



Source: Ben Graeve, 2013

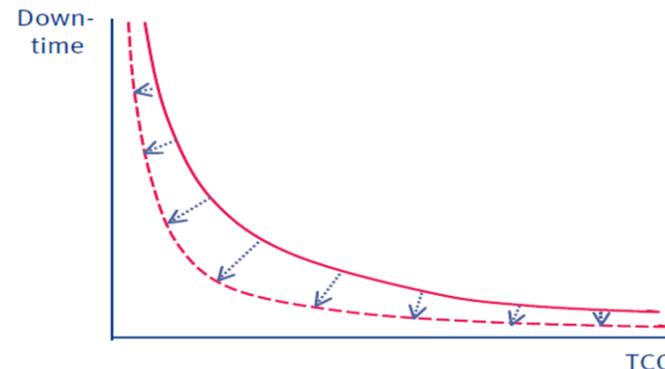


Total Cost of Ownership & service logistics

- The **acquisition costs** of a high tech system are high, but only a fraction of TCO
- **Maintenance costs** include spare parts, service engineers, infrastructure and management.
- **Downtime costs** include reduced output of a production process, as well as indirect costs such as loss of reputation or loss of future revenues.
- Service logistics aims at **minimizing downtime and minimizing TCO**
- The key to service logistics is to have the right **spare parts** at the **right time for maintenance**. Complexity of the planning management of the resources: engineers and spare parts



Division of Total Cost of Ownership for an engineer-to-order system (cf. Oner et al. [2007]).



Source: Van Houtum, 2008



Challenges faced by asset managers

Accurate
asset register



Asset
performance



Asset related
costs



Capital
investment



Optimal
maintenance



Risk
management



Safety



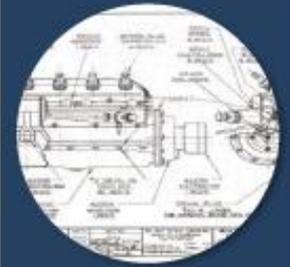
Competent
people



Spare parts
and material



Technical
information



Service logistics - Key B2B sectors



Aerospace & defense: maintenance, repair & overhaul delivery in a cost-effective way, is key in performance-based service contracts to customers.



Automotive: service and parts operation is key for the business model and brand reputation, for customer satisfaction and avoiding warranty costs and for sustaining profitable growth.



Advanced high-tech capital goods: move towards selling 'performance service offerings' instead of the product, guaranteeing performance level during the product's lifecycle and minimizing machine or vessel downtime.



Process and energy industries: integrated service supply of e.g. wind farms and process installations, minimizing downtime for preventive and corrective maintenance.

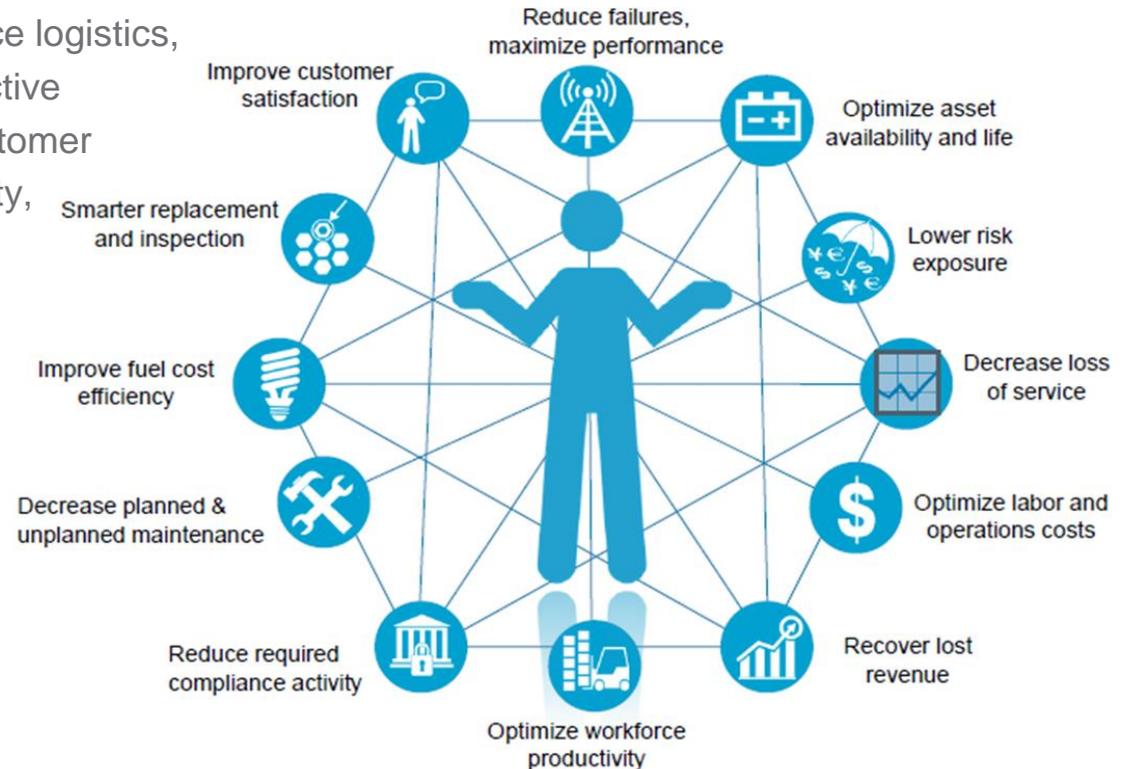


Healthcare and medical devices: requiring service level agreements with same-day service fulfillment, in need of fine-knit distribution and service networks enabling fast response.



Why invest in better after sales services? Drivers for service logistics

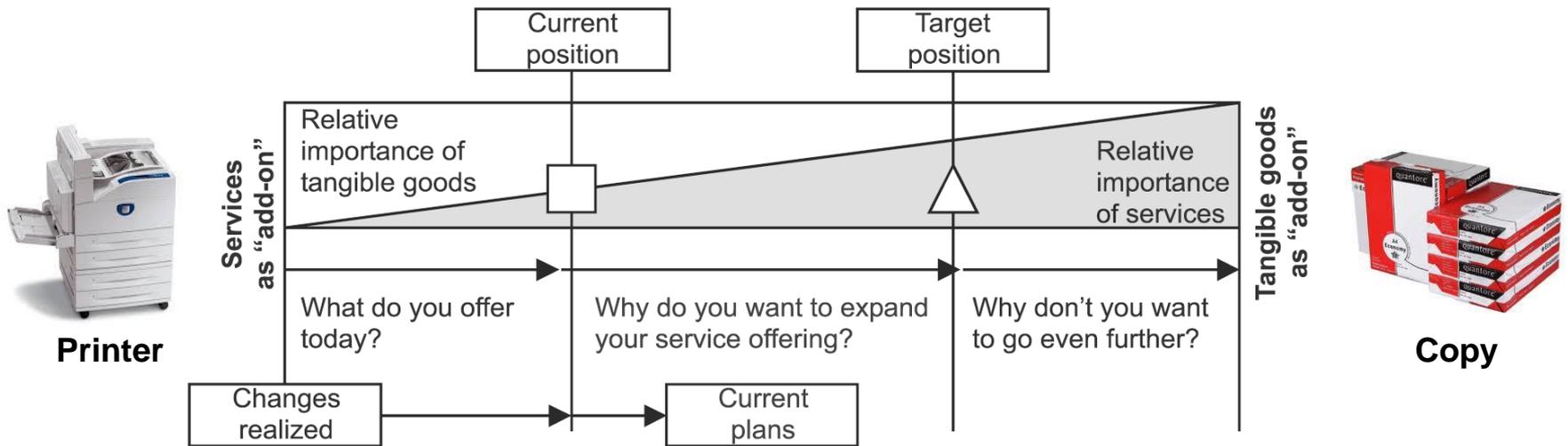
- Drivers for professional service logistics, and especially towards predictive maintenance, range from customer satisfaction to asset availability, productivity and compliance.



Source: Wannas Rosius, IBM, Predictive Maintenance
3 Nov2014 Eindhoven



Servitization: creating value by transition from product to services



Source: Oliva & Kallenberg (2003)



Profitability of service logistics

- Based on service contracts and remanufacturing of disposed systems, 25 to 60% of the turnover on complex systems is made in the after-sales period at higher margins.
- According to a Deloitte survey, firms that excel at aftermarket service report that average profitability of these operations is 75 percent higher than overall business unit profitability.
- Services provide a long revenue stream, particularly when customers own systems for a long time, e.g. with aircraft for up to 25 years.

25-60%
turnover
after sales

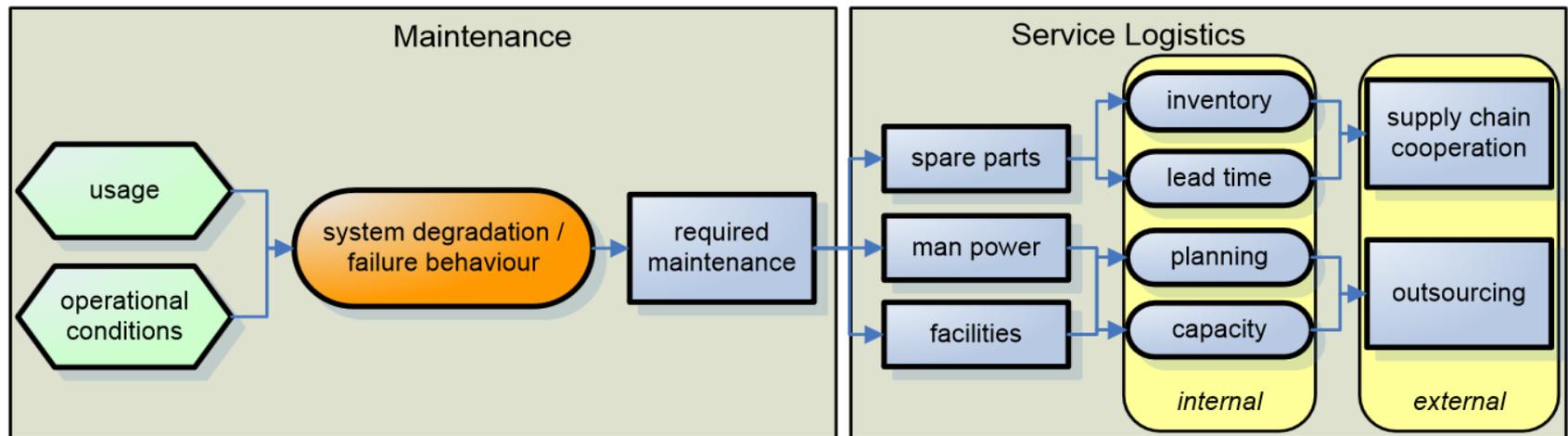
75%
higher
profitability

**Long
revenue
stream**



Service logistics supply chain

- The main function of the service supply chain is to deliver the maintenance resources within specified time constraints when a system has failed and specific maintenance resources are needed to repair it. In general, spare parts and service engineers are the most important resources.



Source: MaSelMa project plan, 2013



Supply chain characteristics

| Product supply chain | Service supply chain |
|--------------------------|--------------------------|
| 'Just-in-time' principle | 'Just in case' principle |
| High transport volumes | Low transport volumes |
| High stock turnover rate | Low stock turnover rate |

Source: Van Laarhoven, 2008

- Service supply chain management is more complicated than that of finished products.
- Service supply chain scenarios are highly uncertain and unstable because the random nature of situations requiring product support - a broken part threatening to bring down a production line, for instance - is nearly impossible to predict. These depend on the type of maintenance strategy (see next slide)
- Unique requirements - including forward and reverse repair flows across a network of customer and partner locations, managing repair facilities, and volatile engineering changes that result in part supersessions - further complicate matters.

Source: Gordian, 2013



Service logistics differentiation



1. Spare parts:

- Forecasting
- Planning
- Inventory
- Delivery



2. Maintenance:

- Corrective
- Predictive
- Condition-based

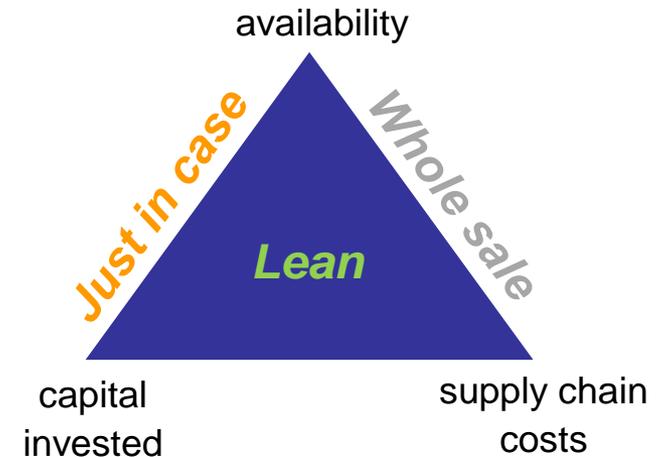
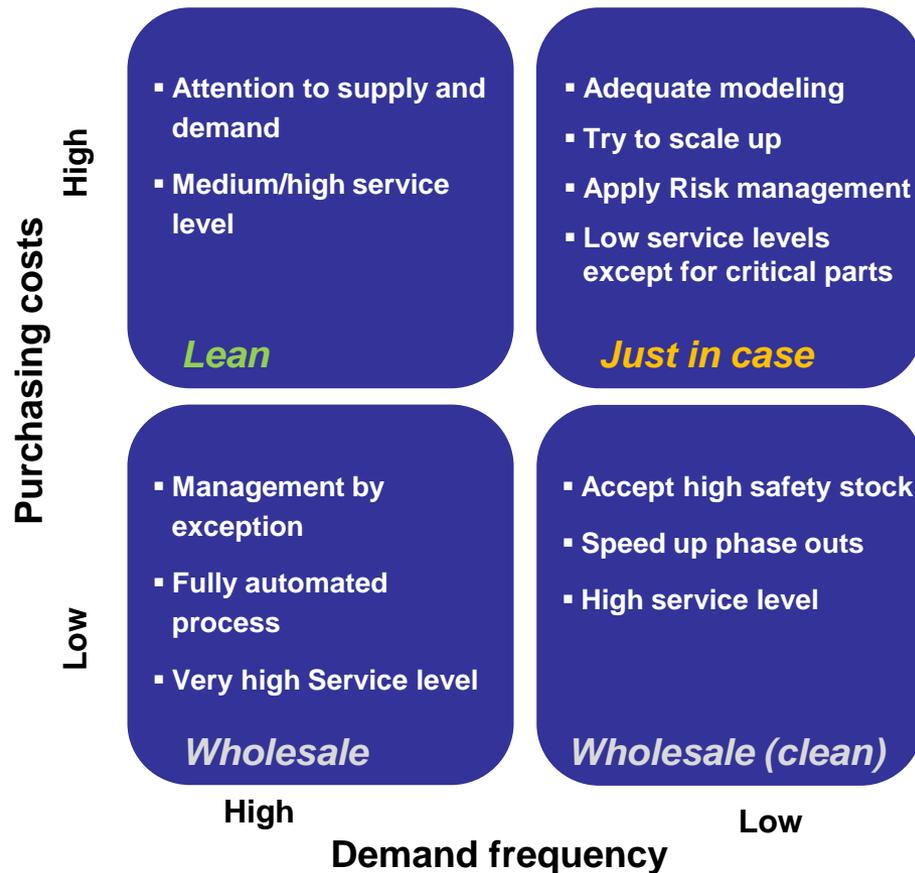


3. Services:

- Reversed logistics



1. Spare parts classification for planning strategies



Source: Rustenburg, Gordian, 2005



The Netherlands = Logistics



Geographical position as gateway to Europe



Excellent Mainports (Rotterdam, Schiphol/Amsterdam)



Excellent hinterland connections (road, rail, barge, shortsea)

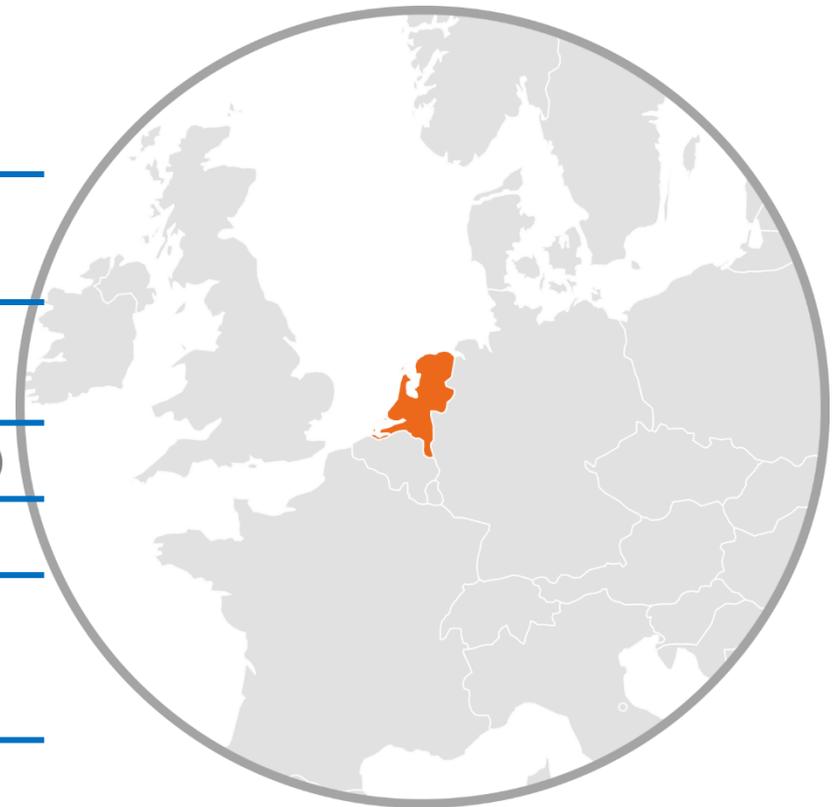


Logistics Service Providers (1PL-4PL)

Legislative framework & customs



High level of knowledge:
8 research universities and 11 Universities of Applied Sciences specialized in logistics,



**Logistics/ transport related GDP (2012):
55 billion euros (10 % of GDP); 813,000 jobs (12% of Dutch workforce)**



Service logistics expertise in the Netherlands



Strong position in high-quality service logistics

ASML



IBM

VANDERLANDE

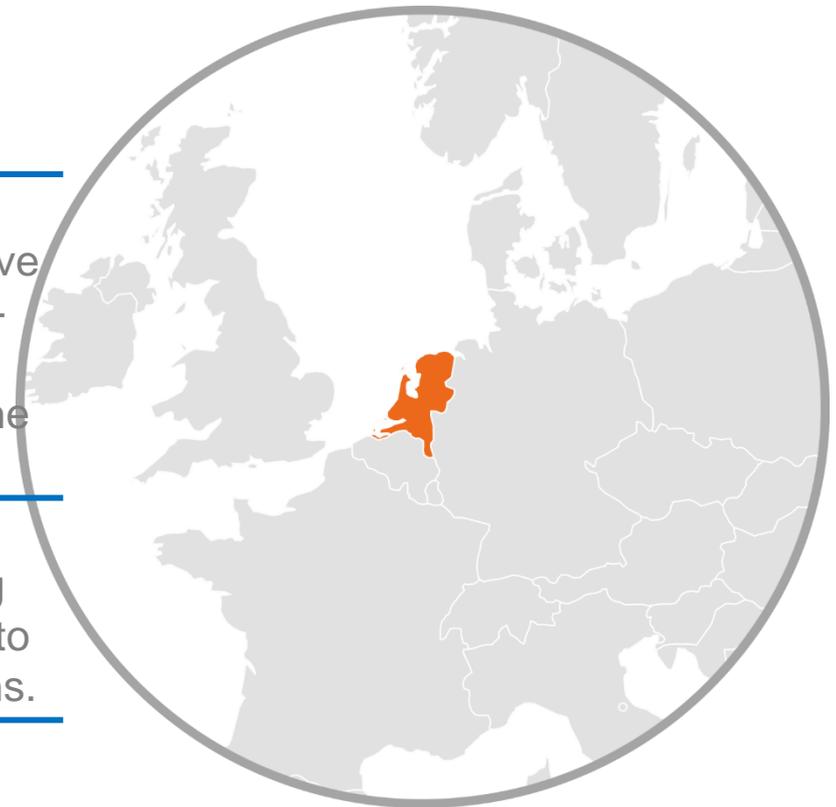
Large companies, including ASML, Océ, IBM and Vanderlande, which have already strongly developed their after-sales service, operate their European or worldwide Service Logistics from the Netherlands.



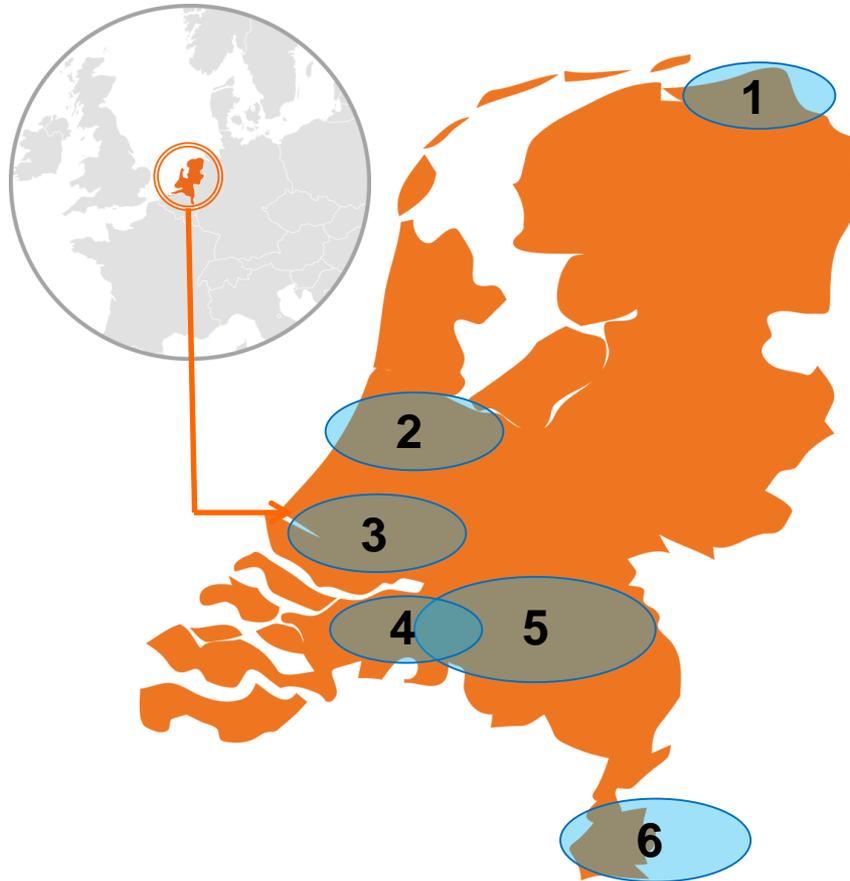
Dutch universities together with industry have carried out trend setting research in Service Logistics leading to knowledge intensive practical solutions.



Dutch education institutes offer highly skilled graduates.



Regional service clusters - examples



1. North Netherlands; Offshore wind maintenance

2. Schiphol Airport Area; Aircraft parts, maintenance of passenger aircraft and aircraft systems

3. Rotterdam; Service industry for marine vessels and process industry

4. South West-Brabant; Maintenance of helicopters and jets

5. North-Brabant, esp Eindhoven; DC's for electronics spare parts and companies for mechatronics maintenance and repair

6. Maastricht Maintenance Boulevard; maintenance repair and overhaul of regional and business aircraft



Service Logistics - Knowledge institutes and universities



1. University of Groningen

2. University of Twente

3. Delft University of Technology

4. Rotterdam University of Applied Science

5. Erasmus University Rotterdam

6. Eindhoven University of Technology

7. Tilburg University

8. Netherlands Defense Academy

9. Dutch Institute of Advanced Logistics

10. Dutch Institute World Class Maintenance



Innovation roadmap service logistics



The Netherlands has designated a special innovation program to Service Logistics, noting the importance and knowledge in the Netherlands, driven by the Dutch Institute for Advanced Logistics.



Service Concepts

- Reactive
- Proactive
- Predictive



Service Business Models

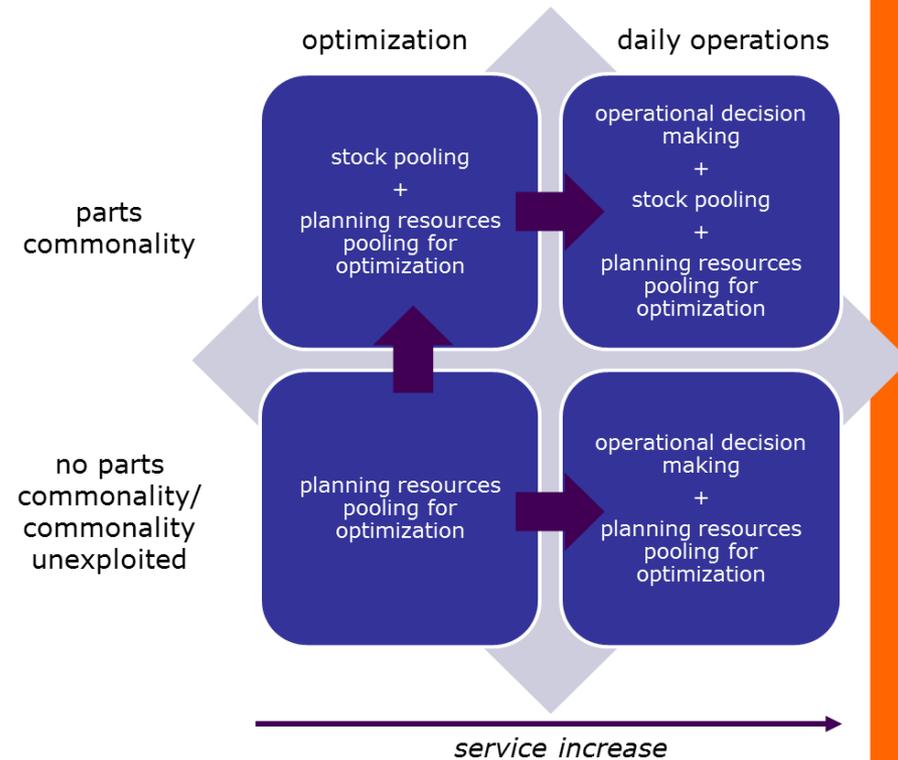
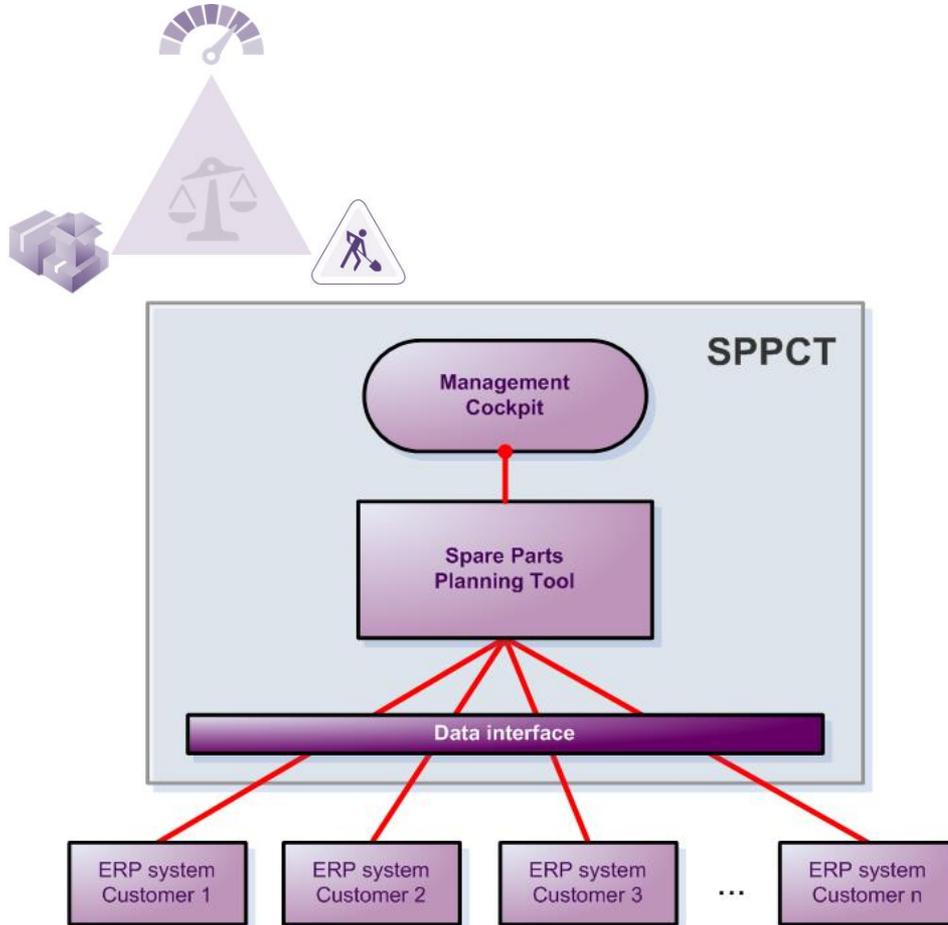
- Collaboration
- Servitization
- Profit model
- Organisation

Service Chain Management

- Control Tower
- Condition Monitoring
- Sense & Respond



Solution 1: service control towers



Source: Gordian Logistics Experts



Solution 2: Maintenance – proactive service management

- Sensors and data gathering for real-time monitoring
- Big Data Science for preventive maintenance
- Better planning by predictive condition-based maintenance



Infosys, Leveraging After-Sales Service to Gain Competitive Advantage, 2011



Solution 3: reverse logistics

Specialised reverse logistics business software and service providers

- Business software specifically designed for the reverse logistics process is able to track the returns, invoices, warranty's as well as third party contributors in the reverse logistics chain. Dynamic routing tools can optimize the return flows in complex multi-channel reverse chains by dynamic determination of the returns destination, either country or vendor driven. Furthermore specialized software with visualisation can support repair engineers but also personnel that has to package returns properly to retrieve product value, as return flows are smaller and less standard than forward flows.
- Specialised logistics partners with fully integrated software can shorten the link from return origination to the time of resell. One major challenge for logistics providers is performing all tasks for the retailer, including:
 - Collection and scanning
 - Credit store and invoice vendor
 - Product disposition

