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Water for the service desert

Author: Dr. Matthias Gutknecht
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Intelligently networked data ensures a significantly increased efficiency in customer service – and is also a source of new business ideas.

The significance of after-sales services and customer service is constantly growing. Product prices and margins are already under the pressure of global competition. Competent, efficient and customer-friendly service increasingly decides market success. On the other hand, there is an increasing lack of skilled workers. The productivity of the available skilled workers must consequently be significantly increased, and quality and flexibility improved even further. After all, market-leading customer service only remains possible if the greatest productivity leaks in technical service and customer service are avoided. Intelligently networked data eliminates empty runs, helps with "upskilling" skilled workers and allows process control tailored to the context. In addition, optimum foundations are laid for new, attractive digital customer services.

The dilemma: Intensifying service – despite the lack of skilled workers

The study carried out in 2018 by IMPULS Management Consulting on service digitalization in the capital goods industry concludes that the revenue share of after-sales is about 30 per cent. In 2010, it was only around 20 per cent, and a share of roughly 40 per cent of the total revenue is expected in 2025 [1]. Due to huge upheavals, it does not look quite so rosy in the automotive industry [2]. But there, too, service has a market-dependent growth potential of up to eight per cent a year.

There are, therefore, opportunities for service growth in many markets and industries. However, a lack of skilled workers simultaneously prevails there [3]. A study carried out worldwide with CEOs from various sectors shows that 80 per cent are worried about the availability of qualified personnel – employees with expertise and experience in new technologies, combined with the capability to act autonomously, but in coordination with other employees/customers. Shares of service in total revenue can be gained or kept only if the increasingly low number of experienced skilled workers become more productive, and less well-qualified workers can carry out demanding service work of good quality.

This poses the question of where exactly productivity is being lost and how these "productivity leaks" can be eliminated based on intelligently networked data.

Stab in the dark: Operational planning without reliable information

Before a technician can even start maintenance or diagnostic work on a machine, system or complex device, they must overcome two important obstacles.

First, the *resources planning obstacle* – the resources required for a service must be tailored to the configuration of the system. A few questions must be answered on this: Is the available time frame sufficient, or does the product version in question require longer than usual? Are all consumables available on-site or in the service vehicle in the required quality and quantity, or must they first be ordered? Are the (special) tools available? Often, these questions can only be answered approximately, and this means further unplanned service applications at the additional expense of time and money for the customer, causing their satisfaction and loyalty to be decreased.

Authors
Dr. Matthias Gutknecht (STAR Group)

Contact
matthias.gutknecht@star-group.net

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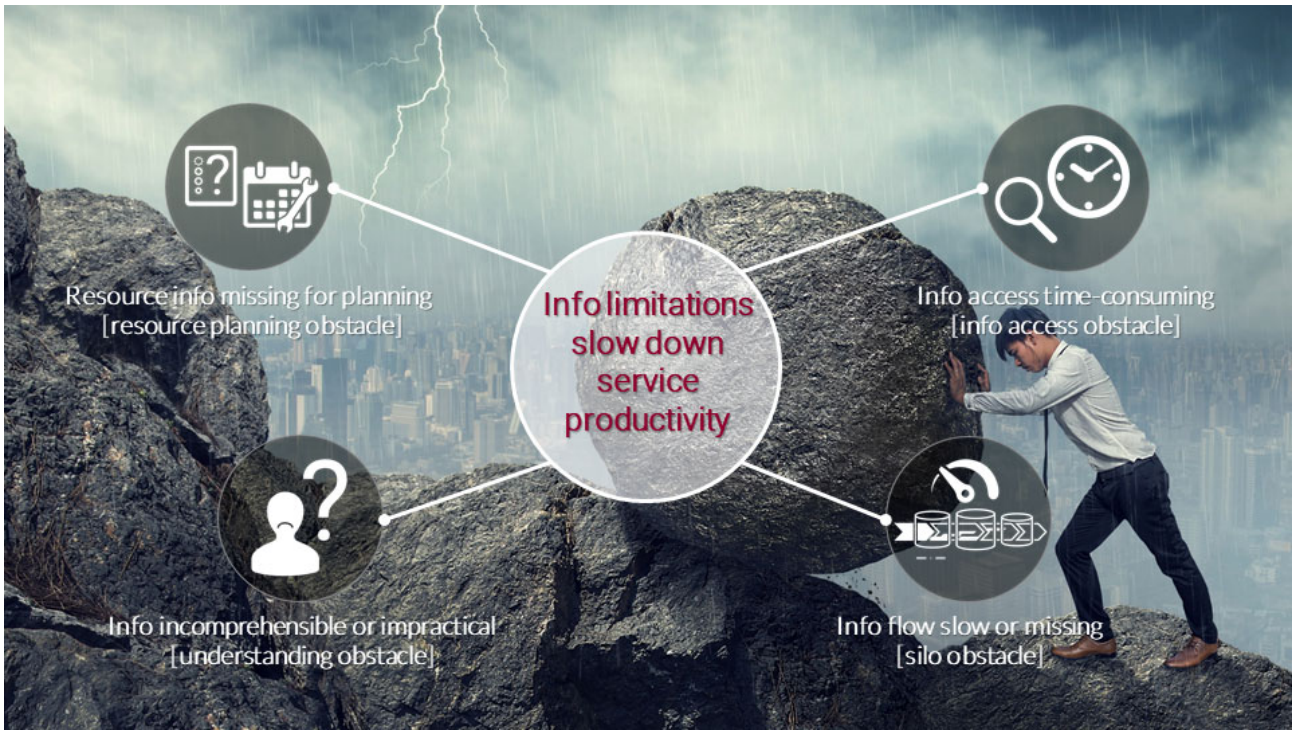

Fig. 1: The four information obstacles in technical service

The *information access obstacle* is closely connected with this – if service work is planned, the information required for use must be independently compiled. Often, however, only a website or content delivery portal is available, where the required data for each planned service task must be manually researched – with the consequence that up to 30 per cent of working time is being wasted with an unproductive information search, without added value for the end customer.

You can't see the wood for the trees: Specific instructions are missing

If the technician is on-site, they find themselves confronted with further challenges. So an *understanding obstacle* must often be overcome with service applications, as instructions mainly exist as step-by-step descriptions for beginners, but these are not precisely drawn up in accordance with the present product version. Experienced employees already know these basic work steps. However, what they also need is a specific compilation of technical data, tools, consumables, an overview of installation locations and all relevant hazard information. And it is precisely this information that you must painstakingly compile yourself from the detailed texts, images and videos. On the other hand, concise and focused information overloads less experienced employees.

Both cases have the consequence that employees lose time due to information prepared not “at the appropriate level”, make mistakes, barely take note of the service information any more and would rather just “muddle through”. This often leads to high goodwill costs, due to wrongly exchanged parts.

That's still from a couple of days ago: Current data is not accessible

Another point concerns the availability of current information. Even well-prepared documentation regularly becomes inapplicable and is replaced by a new version. In addition, field experience with notes on improved processes must be harnessed. To do so, a *silo obstacle* must be overcome, as information about changes in design, production or legislation must be made accessible across several system boundaries. So, in the event of design or production-related changes, an “engineering change note” is issued by the responsible place. The editorial department then decides which parts of the technical

documentation must be adapted in the editorial system. Change notes are then distributed and communicated to all places in the service organization affected by the change (workshops, technicians, etc.).

But service employees have often already forgotten the changes again when they have to service an affected system – as there are no contextual, personalized notes on changes. The consequences are, firstly, a time-consuming and error-prone distribution of change information to workshops and customers, and, secondly, an increasing risk of errors and warranty claims due to incomplete or outdated information. In addition, this leads to increasingly time-consuming reworking.

Bringing light into the darkness: After-sales hub with intelligently networked information

The basic problem with all four named obstacles is the way that information is made available. Generally, this is managed in the form of "topics" that correspond to the individual chapters or sections in the service manual. In each case, service work is managed and updated as a complete topic. Important details, such as the required consumables, tools, spare parts, time expenditure or technical data, are indeed contained in these topics, but are not separately accessible for a digital evaluation.

To solve the problem of these "topic black boxes", the most important items of the content are consequently duplicated once more in the form of metadata. But the dependency between content and metadata gets lost here. This makes variant management, for instance, very complex and error-prone. The automatic coordination of information with the level of experience of the recipient and the situation is also only possible with difficulty.

Increased flexibility can be achieved using information networks with their own information objects and correctly modeled dependencies between the information objects. "Knowledge graphs" are used for this [4]. If the relevant after-sales information is accessible in this way, service applications can be planned and carried out in a targeted manner.

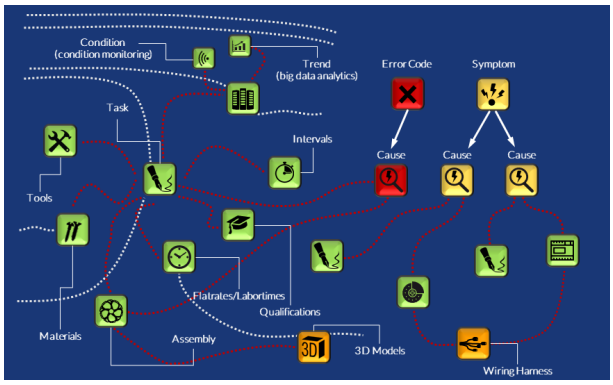

Fig. 2: Simplified example of a knowledge graph data model (by STAR)

Precision landing: Planning security for service applications

The information provision for this approach is based on networked master data, which is modeled with knowledge graphs and made available in a central after-sales data hub. An essential component here is *resources tailored to the context*. In the knowledge graphs, each individual work step is linked with resource information and can also be marked with where it is valid – with which device or product versions which work step is necessary. Assigning validity is not limited here to versions, but can include optional context parameters. This means that not only work instructions, but also the resources required for them, such as time, materials, tools or employee qualifications, can be planned, made available and issued in work instructions tailored to the context.

This works even for troubleshooting applications, where the possible causes of errors and measures to rectify errors can be restricted based on the known error codes and symptoms, and the minimum and maximum resources required for this can immediately be specified. The consequences include a higher First Time Fix Rate (FTFR) and a reduction in expensive, repeated service visits – a crucial factor in greater customer satisfaction and loyalty.

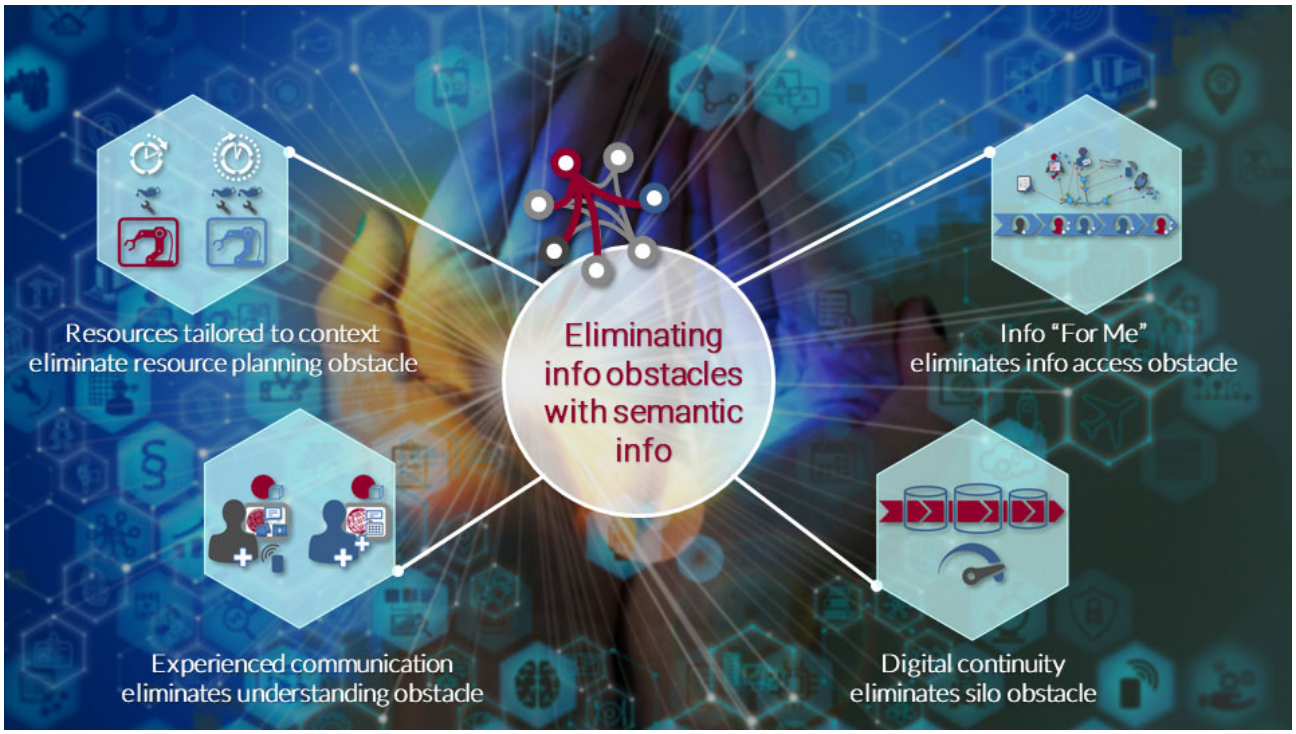

Fig. 3: Overcoming the information obstacles

For me: Process control, individually tailored

Service employees, too, expect nowadays that they will be *led through digital processes*. Master data based on a knowledge graph provides a remedy here as well. Information is automatically prepared for each process step, tailored to the current context and the experience of the employee (see next point), and released in the most suitable medium available.

High employee job satisfaction is a consequence of this approach. Support for applications includes not only information tailored to the context without a "troublesome" search, but also an automatic response to entries from the user (for example, the incorporation of a corrective measure at a measured value outside the tolerance). Directly connected with this is a significant reduction in the error rate and a shorter training period.

In addition, the principle of communication "at the appropriate level" is familiar to every teacher. However, working instructions generally satisfy the requirements only of less experienced users. In contrast, instructions prepared with experience and skill make things easier to understand, accelerate implementation and shorten learning. In digital media, there is no reason to neglect this aspect. Based on the experience profile of a user, instructions can, therefore, be generated from one and the same data model. For experts, they can be focused on what is essential (such as working title, overview image, technical data, safety information) and, for beginners, they can include lots of visual support – like videos, 3D models and, perhaps, augmented reality scenarios or interactive language assistants. What is interesting is that a model based on a knowledge graph greatly reduces the manual effort of supporting the latest interactive media.

One size fits all: Digital consistency

Data silos cost time and money, and lead to duplication of data. Best practice, on the other hand, is the amalgamation of all master data in a central data hub based on a knowledge graph. All recipients can make use of this via a web-service interface. This creates digital continuity and consistency, with which all information is recorded just once, perhaps also manually augmented and supplemented, then saved for optional reuse in the data hub. If the information

changes, all dependent applications are updated again immediately, once it has been recorded over in the data hub. In addition, information from the field can likewise be saved in the data hub together with plenty of context data, evaluated and made available again in the process chain right back to engineering.

This central "single source of truth" ensures a fast, partially automated distribution of changes, and a recording and distribution of feedback data and measurements, as well as settings from the field. Greater transparency and agility when implementing new apps and services that are based on the data hub is also achieved. Thanks to modern database technologies (e.g. NoSQL databases) and concepts that make lesser demands when it comes to structuring data (e.g. data lakes), the amalgamation of data in such a data hub will also succeed for older, less structured data.

Summary

The greatest obstacles and "productivity leaks" in service can be eliminated by preparing service knowledge and data in a networked, integrated data model and providing it in a digital data hub. Customer service, the workshops and the service technicians can consequently improve resource planning and logistics, make work support and the working environment more productive, and simplify and accelerate data flows between engineering, production and service in both directions. This makes service more customer-friendly, more employee-friendly, more flexible, faster and more successful – even at the time of a skills shortage.

The great advantage for the company is an increased transparency and agility for all after-sales processes, as well as consistently improved (and consequently more valuable) data, and insights into the life-cycle of the product and the process of drafting services with the customers.

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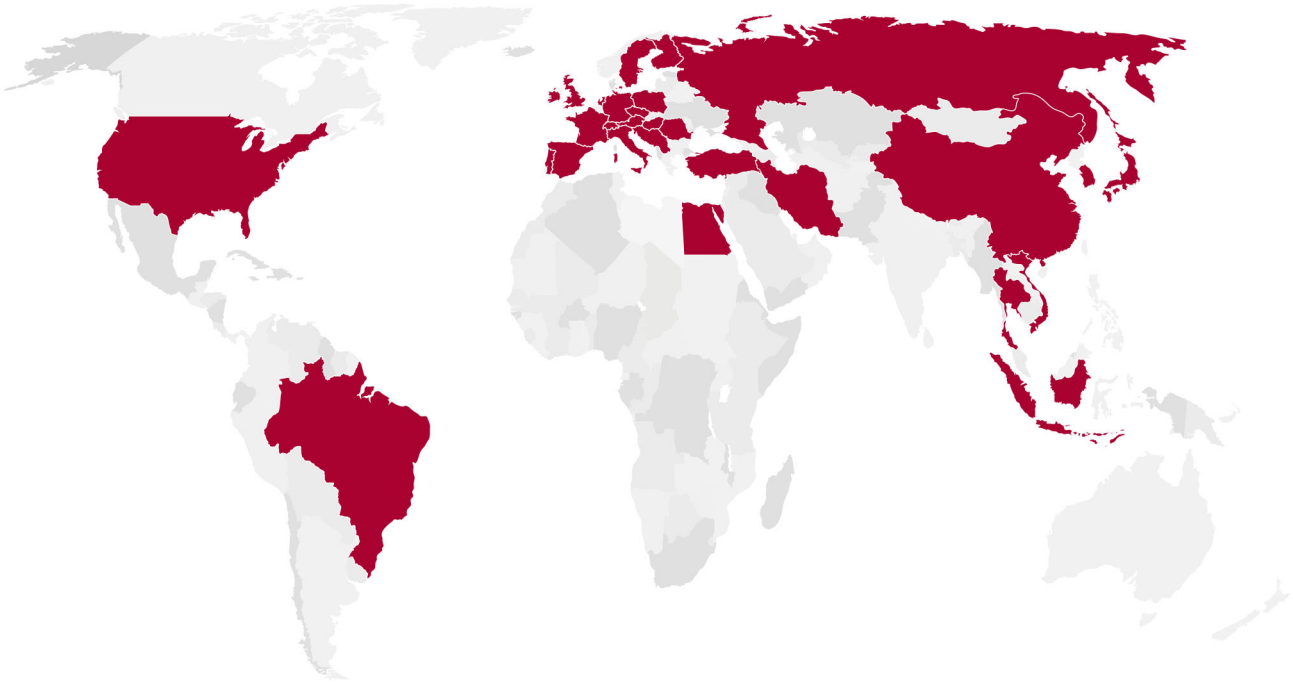

STAR Group Headquarters

STAR AG | Wiesholz 35 | 8262 Ramsen | Switzerland
www.star-group.net | info@star-group.net
Tel. +41 52 742 92 00 | Fax +41 52 742 92 92

Contact

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