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CONNECTED VALUE

WHITE PAPER

Sharing value creation with Equipment as a Service

Machines, vehicles and new equipment are no longer operating in isolation. They are becoming connected and integrated:

- **Connectedness** – Usage and machine data are collected by industrial controls and can be accessed via “Internet of Things” (IoT) platforms.
- **Integration –** Connecting equipment facilitates the evolution of integrated solution offerings, e.g., of equipment, consumables, maintenance services and digital productivity tools. More advanced offerings embed equipment and (digital) solutions closely in production processes, operations and business models.

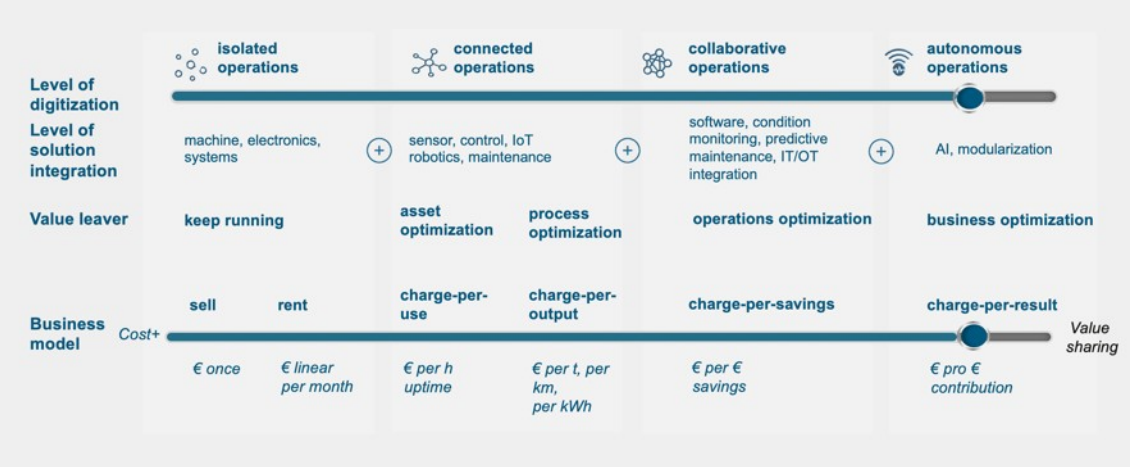


Exhibit 1: As value creation shifts … business models follow

Business success will depend on the ability to deliver value-added solutions in the ecosystem and to share the value creation with customers and suppliers. Digitization requires and enables the switch from the traditional product-driven asset transfer model to value-based "Equipment-as-a-Service" (EaaS) offerings:

1. **Monetizing value-creating solutions such as electrification, automation, autonomy, and capacity management requires appropriate ways to capture, to guarantee and to distribute value**: Providing customer-centric solutions means creating value beyond "keeping the machinery running" through asset optimization, process optimization, operations optimization and even business optimization. But how can the new value creation be shared between the OEM and the industrial user? Depending on the value you create, business and pricing models have to shift from selling and renting to output- or outcome-related models such as pay-per-use, pay-per-output, pay-per-savings or even pay-per-result. With faster and more customer-specific innovation cycles, the traditional "product-driven" business model is increasingly being replaced by a continuous "easy to start, low upfront investments, continuous improvement" logic building on usage and machine data.
2. **Value creation can be priced now:** By connecting equipment, the foundation for offering users billing "according to use or value" has been established. Such billing models are already known from other industries which are advanced on their digitization journey or have established the infrastructure to measure usage, e.g., software ("SaaS"), mobility ("pay-as-you-go") and engines ("power-by-the-hour"). If the use can be measured by the electronically transmitted machine data, the invoices can be generated automatically.

By switching from the traditional product-driven asset transfer model to value-based as-a-Service offerings, a new continuous customer relationship model can be implemented.

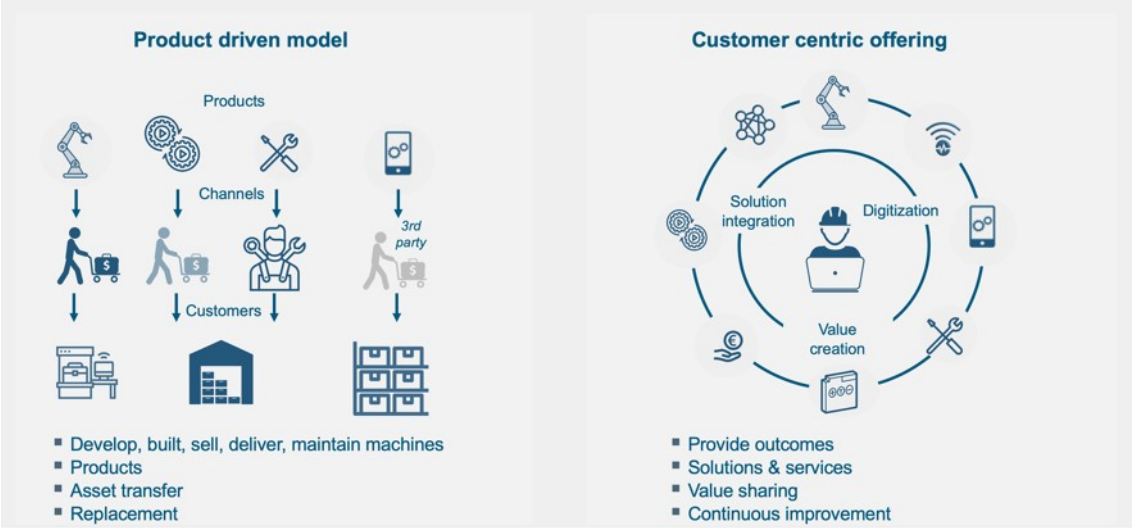


Exhibit 2: Shift from a product-driven approach to a customer-centric relationship model

Where are as-a-Service business models implemented in the mobility and industrial sectors?

Industrial as-a-Service business models are highly domain-specific. However, at a high level, there are three areas in which as-a-Service business models are emerging.



Exhibit 3: Where industrial markets are switching from owning to providing solutions "as-a-Service"

Industrial Software-as-a-Service

As manufacturers are starting to offer data and software-based solutions such as equipment automation, they find the traditional asset transfer (or licensing) models are not adequate:

- The cost+ logic does not work, since variable costs are low and do not reflect the value creation potential of the services; moreover, value creation typically differs across customer segments and usage patterns calling for price differentiation.
- Given shorter innovation cycles and a cost structure with high fixed and low variable costs, it is important to implement the "low upfront investment, easy to get started" model of software-as-a-Service companies.

Customer example 1 – Automation solutions in mining & construction: *A global mining equipment manufacturer has developed automation solutions that can be retrofitted to their mining equipment, providing different degrees of automation ranging from the adjustment of drilling speed and remote-controlled vehicles to fully autonomous drilling. Based on a segmentation of offerings and customers that reflects the value potential (sector and size) and the maturity to implement the software-based solutions (infrastructure), we are developing a pricing model based on drilling performance to replace the static licensing. This allows revenues to be adjusted over time as the solutions mature and customers are upgrading to higher degrees of automation.*

Some companies are building ecosystems of third-party applications around their IoT platforms in order to benefit from positive effects on their core products following the success of app stores in the consumer space. There is, however, a significant difference: industrial purchasing is much more professional with elaborate supplier onboarding processes.

Customer example 2 – 3rd party app store in healthcare: *A global manufacturer of medical imaging technologies is building a two-sided platform, simultaneously attracting 3rd party offerings as well as users (doctors, hospitals). To facilitate transactions, seamless ordering, purchasing, invoicing and payment processes are important enablers. However, unlike in the consumer world, hospitals, like most corporate customers, have very stringent purchasing processes. An individual billing model (like eBay) would require each hospital to onboard each provider; the distributor model (e.g., Mercateo or Amazon Business) would shift the liability fully to the medical technology company. To solve this issue, we developed a purchasing aggregator model: The individual purchasing process is bundled for the users as-a-Service by the platform, without the platform being the reseller of the products.*

Equipment-as-a-Service – supplier-driven

Manufacturers are taking first steps to include machinery and commercial vehicles into the "pay-for-what-you-get" commercialization package. In mature markets, this makes particular sense if there are strong technical and/or economic interdependencies between the software/service solutions and the equipment as well as a need to increase the share in the aftermarket. Take the example of Heidelberger Druckmaschinen AG. As they are increasing the productivity of their printing machines by workflow optimization in a stagnating market, the company is facing the risk of losing revenues from machine sales. This is one of the motivations to offer a pay-per-imprint model.

Customer example 3 – Secure benefits: *A manufacturer of industrial shafts offers to install sensors for its customers to measure and control vibrations. This will enable the customer to benefit from condition-based maintenance services. The shaft lifetime will be extended, unplanned outages will be reduced. Bottom-line benefit will be created as the additional value exceeds the costs of connecting the shafts. However, customers are hesitant to move to the new technology as they would have to carry investment, operating and implementation costs. They have limited insights into the benefits of such an investment. Therefore, some pilot customers have been chosen and contracted with a new pricing model that includes sensor costs as part of their service agreement, flexing this capital cost component. Additionally, shafts and motors have been integrated into the arrangement and are offered on a "flat-fee" basis. The customer pays for output. The manufacturer guarantees availability and services the machines.*

Additional push towards value-based business models comes with new technologies such as electrical drives & engines or autonomous machines and vehicles. Why? Because there are significant hurdles on the customer side (upfront investments and unclear value); with autonomy, the responsibility for operations shifts to the manufacturer; and often the products can be optimized over time, given that software development cycles are faster (e.g., in automation).

Customer example 4 – Forklift trucks with lithium-ion batteries*: New lithium-ion batteries promise higher efficiency and productivity, easier handling routines and improved operational safety. The company is hesitant to carry the full cost of transitioning to the new battery technology as it does not have sufficient operational experience with this technology. Therefore, a new pricing model is being developed with manufacturers as well as financing providers to establish a "per kWh tariff" scheme. Instead of guaranteeing a repurchase value after 2 years, the battery manufacturer guarantees the total electricity throughput and charging cycles. A key enabler for this pricing and financing model is the fact that with each loading cycle the throughput is being captured. There is a fringe benefit of this setup: The manufacturer can access this data which allows it to better understand influences on the battery life. This provides additional input on how best to advance R&D activities.*

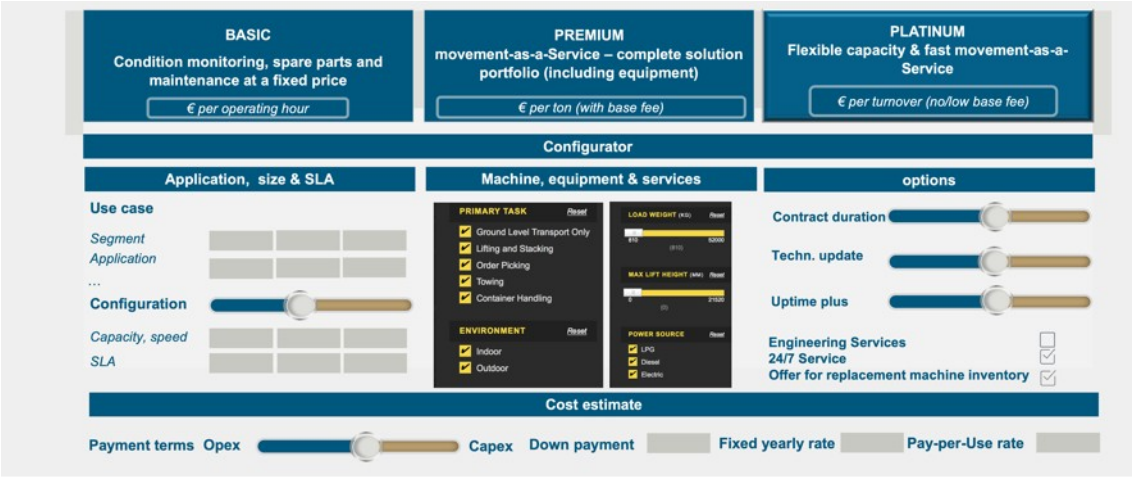


Exhibit 4: Motion-as-a-Service – what an Equipment-as-a-Service offering looks like

Targeted to the specific needs of customer segments, an Equipment-as-a-Service model should be designed in a very simple way from a customer perspective. However, the precondition is that there is additional value to share: If the pay-per-pick cost of a robot is higher than that of the current manual solution, pricing it on a per-pick basis does not solve the issue but makes it more transparent.

Customer example 5 – Automation-as-a-Service: *The robots of a market-leading company have been developed for the harsh conditions of automotive and heavy industries and built for a long lifetime of more than 10 years. Attackers have been entering the market with lower-quality solutions promising break-even after 130 days and have captured fast-growing segments such as pharma, consumer goods or electronics. But why not turn this "disadvantage" into an advantage by offering break-even from day one – by designing an "easy to get started", "ready to use" low-upfront-investment solution for SMEs and an integrated bundle for more complex applications with system integrators, all on a "pay-per-job" pricing basis? Key for this Automation-as-a-Service solution is to build the financing structure into the solution bundle leveraging the long lifetime of the hardware. As an important side effect this new business model allows the manufacturer to be in constant interaction with the user and therefore to build up customer intimacy allowing for continuous optimization as well as up- and cross-selling.*

Asset light 4.0 – driven by demand aggregators

From an industrial user perspective, sourcing as-a-Service relieves the balance sheet and (contrary to leasing and renting) also stabilizes cash flows, as it aligns usage, risks, revenues and costs. We are exploring these opportunities in several transportation ecosystems. Aggregators such as mobility providers (e.g., bus companies) and forwarders are responsible for route planning and network optimization while operators (sub-providers) are operating the transports with their own or leased vehicles. Given a growing shortage of drivers and subcontractors, there is a significant interest in advancing the current asset-light model to "asset light 4.0". Leveraging telematics data makes it possible to optimize costs and to increase control of the end-to-end logistics chain right through the subcontractors without owning the assets.

Demand-side-driven Equipment-as-a-Service models can also be applied to facilitate technology change, especially if different parties in the ecosystems benefit to different degrees from switching to a new technology.

Customer example 6 – Digitization of rolling stock: *For decades, rolling stock has been using the same type of manual couplings. Due to the high number of couplings to be retrofitted, a considerable capital expenditure is expected for the conversion to digital automatic couplings (DAC). Two special*

circumstances require an innovative billing and financing concept leveraging the usage data to ensure the success of the migration:

- *The investment costs are incurred immediately, but the benefits of the DAC will only be realized over the long service life of the coupling. This results in a funding gap.*
- *The benefits of switching to a DAC are distributed to varying degrees among those involved in rail freight transport. Ideally, therefore, the billing amount should take this into account and be adequately designed to promote a broad willingness to switch to the DAC.*

A usage-based invoicing concept is being developed that allows a utility-based cost distribution, support and guarantees from the public sector, and integration into the capital markets for refinancing.

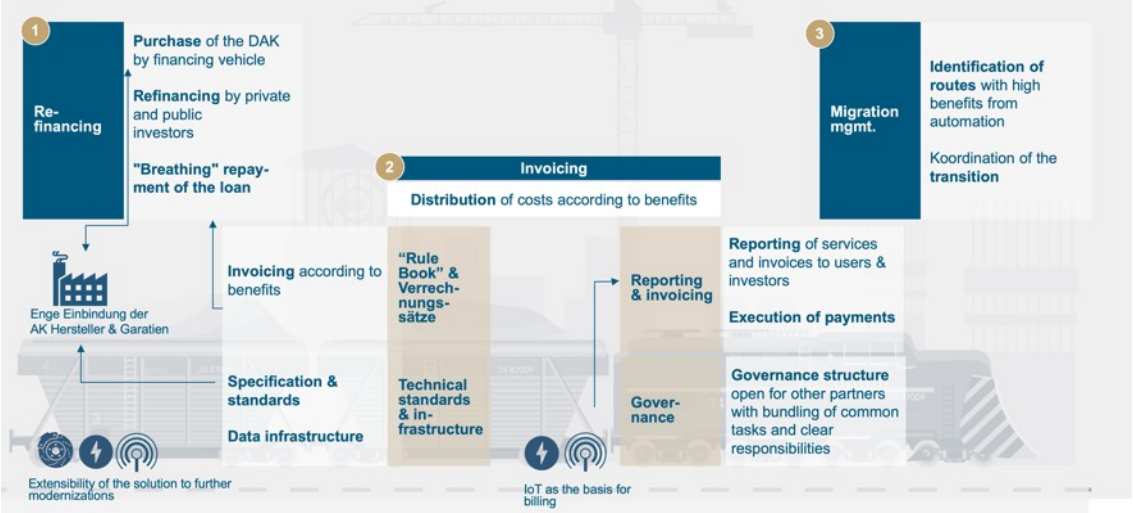


Exhibit 5: Managing the transition of an ecosystem to a new technology – example: rolling stock

What does it take to implement as-a-Service business models?

Offering flexibly priced solutions requires more than switching pricing parameters. It requires sound and attractive product bundles (machine, services, digital solutions, spare parts, performance guarantees) and value-based pricing solutions that are integrated with the existing data, accounting processes and financing infrastructure. Different organizational units such as sales, product development, aftermarket service, controlling, finance, treasury need to be aligned and orchestrated to move from product sales (and rental) only to value-based solutions.

Two fundamentally different transformation paths can be adopted to drive the change:

- A **"concept-driven"** approach, following the "target image, gap analysis, concept, implementation" principle.
- A **"use case" approach**, based on an agile "design, learn & transfer" logic. Use cases are rapidly developed and piloted according to the strategic priorities. Based on the results of the pilots, use cases are transferred to other customer segments and product areas and the next wave of solution offerings.

Most customers prefer the pragmatic step-by-step "use case" approach because it allows for testing market success, the customer response as well as the "right" configuration. This provides comfort before investing into larger scale implementation with infrastructure build out and changes of organizational structures. Implementation and market risks will be managed, and misallocation of resources avoided.

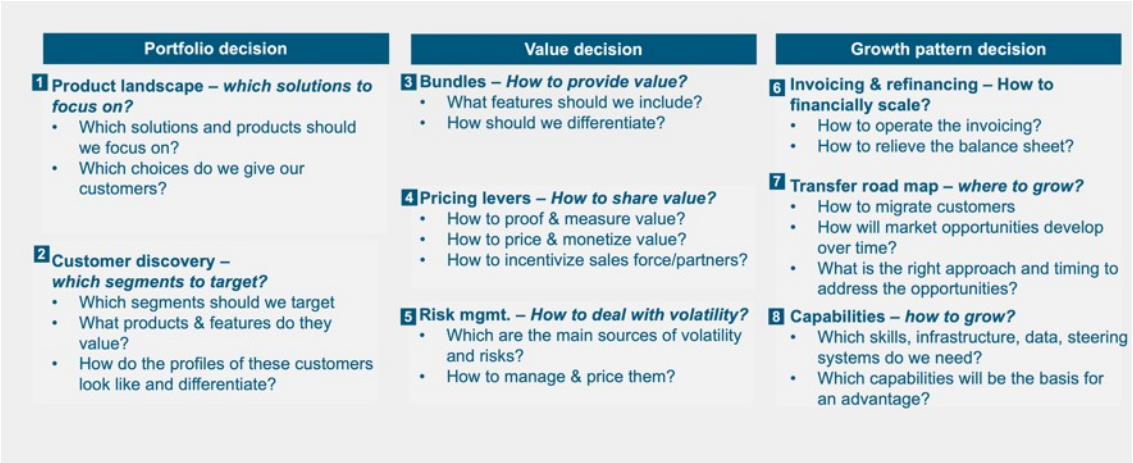


Exhibit 6: Developing as-a-Service offerings is centered around 8 strategic decisions

Starting the first successful as-a-Service pilots is a great achievement. But how can a manufacturer or aggregator scale its offering? There are some critical aspects of scaling:

- The pricing needs to be optimized and the piloted solutions transferred to new customers and solutions. If prices are calculated too conservatively and with a very short amortization period, one will attract bad risks leading to a vicious cycle of higher costs, higher prices and even worse customer selection.
- At some point in time "true sales" need to be realized and therefore a flexible refinancing solution to avoid inflating the balance sheet and to protect the current P&L is required. The OEM might also pass on some volatilities, e.g., the flexibility of the payments made by the users.
- Finally, invoicing is different from a sales or rental model with a fixed amount to be paid every month. In the piloting phase, it is OK to be pragmatic. But if Equipment-as-a-Service becomes an important part of the business and external refinancing is involved, a robust and auditable invoicing solution should be installed while avoiding starting a large IT project.

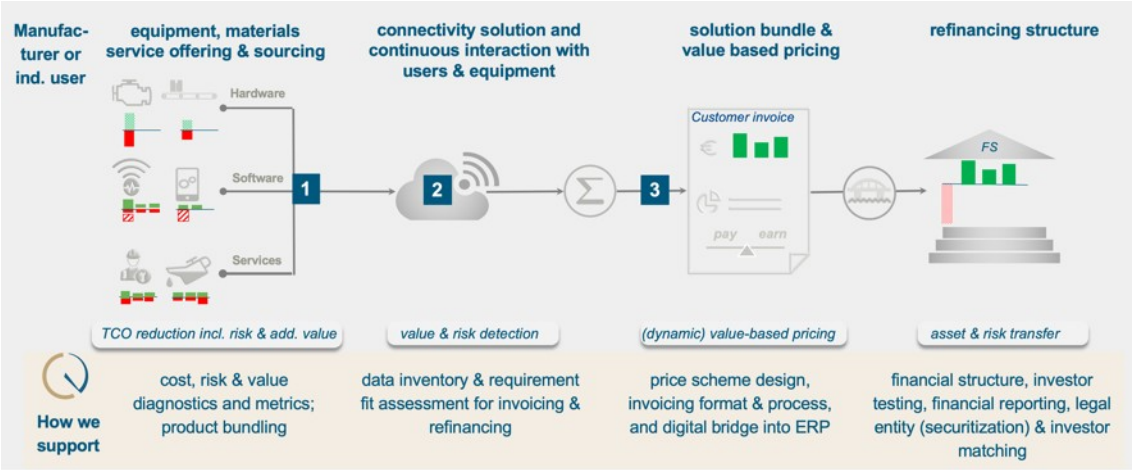


Exhibit 7: How to scale an Equipment-as-a-Service offering

Exhibit 7 illustrates how we support and work together with the manufacturers on these issues. In a nutshell, we are adding to the product and connectivity layer of the manufacturer a pay-per-use pricing and refinancing layer. The usage and machine data from the connectivity solution are transformed into invoices and fed back into the ERP system. For refinancing the asset, a special purpose vehicle (SPV) can be set up to create a ring-fenced investment opportunity in assets for institutional investors. The machines are sold to the SPV after a new contract has been closed. The OEM is free to choose the best

possible partners based on its strategic goals, the risk-return profile, the asset characteristics and the volumes. Of course, the pay-per-use solutions can also be integrated into existing refinancing infrastructure, e.g., into a leasing vehicle.

What does it take to get started?

It is important to plan for how to scale the pilots if they perform according to expectations. Starting the first pilots can, however, be done in a pragmatic manner. Here is a list of what is typically required for kicking off the first pilots:

Solution, value drivers and pricing
- A first set of solutions with a clear view on the customer value.
- Pricing parameters and price curve (EUR/output)

Infrastructure
- Data relevant for pricing, e.g., through IIoT infrastructure
- Invoicing infrastructure (optional), formats and processes

Servicing
- Arrangement to commission, maintain, service and take back equipment – either directly or through partners (integrated with OEM guarantees)

Robust business case
- Balance sheet and P&L targets and constraints
- Capital to refinance the pilots (optional)

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CONNECTED VALUE

ConnectedValue is the specialist for industrial Equipment-as-a-Service. Together with our clients, we develop and implement capital- and carbon-light business models, their invoicing, the management and transfer of risks, and their (off-balance-sheet) financing as an integrated whole. In more than 50 projects with leading industrial users and manufacturers, we have built up this unique combination of competencies.

The Author



Dr. Titus Kehrmann is the Co-Founder of ConnectedValue. He has 30 years of experience in consulting top executives in finance, payments and manufacturing (e.g., as a Partner and co-head of the payments practice with The Boston Consulting Group and Stern Stewart & Co.) as well as in senior management roles in a leading German banking and insurance company and in professional service firms. He applies his know-how in digital transformation, finance and pricing to help industrial companies develop, price, and refinance digitally enabled products and solutions.