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Reference Data Model For Customer Success Management In The Subscription Business Of Manufacturing Companies: Findings From The German Manufacturing Industry

Lennard Holst[1], Günther Schuh[1], Volker Stich[1]

[1]Institute for Industrial Management (FIR) at RWTH Aachen University, Aachen, Germany

Abstract

Competitive differentiation in the manufacturing sector is no longer based on product and service innovations alone but on the ability to monetize the usage phase of products and services. To this end, manufacturers are increasingly looking at so-called subscription business models as a way of supplementing the traditional sale of products and services. Since supplier success in the subscription business is directly dependent on customer success, the setup and expansion of a so-called Customer Success Management (CSM) is required. While CSM has already been established in the software industry for several years, companies in the manufacturing sector are often still in the conceptual phase of a CSM, parallel to the setup and expansion of their subscription business. Therefore, this paper aims to support the set-up of a CSM by providing a reference data model, based on case study research, that can be used to support the organizational or daily CSM tasks and to serve as a blueprint for conceptualizing CSM-specific IT systems.

Keywords

Customer Success Management; Subscription Business; Product-as-a-Service Business; Value-in-use, Manufacturing Firms; Reference Data Model

1. Introduction

The Covid-19 crisis once again showed the world its natural limits. For individuals and companies alike, the ability to adapt to the radically changing environmental conditions has become a decisive survival criterion [1]. Covid-19 thus accelerated two global, industrial trends to an unexpected extent: on the one hand, the need for consistent digitization of existing value creation activities [2], and on the other hand, the paradigm shift in industry, from the "throwaway economy" to a circular economy geared towards the preservation of resources [3]. The manufacturing sector, as an integral part of the German economy [4], has been dealing with the digitization of value-added activities in the course of Industry 4.0 for several years [5]. It is currently much easier for companies that have already invested in digital technologies before the crisis to adapt to the new environmental conditions [6]. Nevertheless, despite the considerable investments in the development of digital infrastructures and forecasted annual sales increases of 2.5 percent on average due to digitization and Industry 4.0 in 2014 [7], there is still no broad breakthrough in monetizing digital solutions in 2020 [6]. According to Schuh et al. the lack of monetization of digitization in the manufacturing sector is due to the fact that above all, there is still a focus on (digital) service and product innovations while at the same time sticking to the transactional business model based on the principles "money for products" and "money for service hours" [8]. However, differentiation in the competition of manufacturing companies is no longer taking place solely through innovations of (digital) services, products and their functionalities [9], but rather through the ability to monetize the usage phase of smart connected products within a so-called subscription business [10]. In the subscription business, a service is "subscribed" by the customer and thus regularly

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purchased or rented after signing a subscription contract [11]. The possibilities of digitization lead to a reinterpretation of the term subscription in manufacturing contexts [12]. Subscription businesses in manufacturing contexts can occur in various forms [13, 14]: Starting with the offer of the availability of a machine or a software, billed e.g., via pay-per-availability, up to the provision of complex product service systems that are remunerated based on usage time or intensity, e.g., via pay-per-use, or depending on the production result, e.g., via pay-per-outcome [15].

However, the establishment and expansion of the subscription business, in which the manufacturer links its economic success to the individual success of its customers, is fraught with numerous problems. From the supplier's point of view, success in the subscription business is determined not only by the number and volume of subscription contracts sold, but above all by the improvement in the utilization phase, the result achieved in the customer process, the "share of wallet" achieved with the customer, the duration of the customer relationship and thus the long-term recurring monthly or annual sales [16]. Existing organizational units in manufacturing companies, which are traditionally responsible for customer management, are often not equipped to perform these proactive tasks aimed at customer success [10]. For example, marketing traditionally acquires customers and generates new prospects, sales or key account management explain the product or service benefits and close the (repeat) sale, while service is responsible for mostly reactive problem solving in the event of a claim [17].

For this reason, a new management system is establishing itself in the context of the subscription business in manufacturing companies that is completely focused on individual customer success. The so-called Customer Success Management (CSM) operates in the overlap zone of the common, aligned interests between manufacturer and customer [18]. The CSM has a counterpart in the subscription business of the software industry in which it acts as the trustworthy partner for the customer in order to support customer goal achievement and thus individual customer success through the use of the software solution [10, 19]. In literature, first contributions exist to describe CSM tasks in manufacturing companies and differentiate them from established customer-oriented functions like Customer Relationship Management, Key Account Management or Service [18-20]. However, given the data-driven and proactive focus of CSM tasks, there is a lack of reference to necessary data entities (defined as real life data objects within a data model) in order to support CSM processes and the alignment of IT-system functionalities. The research question of this paper is therefore: What data entities are sufficient for CSM in manufacturing companies, leading towards a conceptual reference data model for easy reuse and adjustment in company specific CSM contexts?

2. State of research

2.1 Subscription Business in Manufacturing

In the current scientific literature and in practice, there are numerous terms that are related to the term "subscription" in manufacturing contexts, which are subsumed under the term "subscription" in the following, e.g., "equipment-as-a-service" [21, 22], "everything-as-a-service" [23] or pay-per-use business models [24, 25]. The principle of subscription business in manufacturing contexts is to offer customers access to a constantly improving digital performance system in return for regular fees instead of a one-off sale of products and services [8]. In the subscription business, the customer pays continuously for the availability, use, or result of a digital performance system and no longer for the individual performance components such as products or services [17]. Manufacturers and customers thus align their interests and benefit equally from increasing customer performance [12].

As a result, risks of low customer productivity, system failures, operating errors, or low efficiency in service delivery increasingly shift to the provider [8, 26]. The distinction from a classic operator model, in which the manufacturer is also responsible for operations and production staff [24], is fluid due to the close, collaborative service relationship with the customer in the subscription business [17].

Considering the current state of research, the following four attributes can be used for a characterization of the subscription business in manufacturing contexts [10, 28]:

- **Recurring, performance-based revenues** via various revenue mechanisms such as pay-per-use or pay-per-outcome
- **Focus on actual realized customer success**, such as increasing productivity, saving energy costs, or achieving other customer goals in the customer process
- **Dynamic, digital and continuously improving performance systems**, consisting of machines or plants, services and software, which are networked with each other via the so-called "Internet of Things" (IoT)
- **A long-term, collaborative customer relationship** with high value customers, i.e., customers with projected growth potential via sharing of future economic profits.

2.2 Customer Success Management

The overarching task of the CSM is to proactively support customer success, i.e., the achievement of measurable customer goals, at all levels of the customer organization using suitable, data-based methods and processes, to ensure consistently positive customer experiences, and to prevent customer churn [10]. In the subscription business, the success of the customers is linked to the entrepreneurial success of the provider via a participative, performance-based revenue model, so that the provider's interest in achieving or exceeding previously agreed customer goals [18-20]. A core question that the CSM in the subscription business must answer to this end is: "How do I succeed in getting my customers to use my product more often [author's note: more efficiently and effectively]?" [17, p. 202]. In the scientific and the management-oriented literature, various definitions of the terminology of Customer Success Management exist, which differ primarily in scope, concretization, and regarding the responsibilities of CSM tasks. Table 1 provides an overview of current definitional approaches. However, the authors of previous CSM literature focus mainly on the general definition of tasks for a CSM in the subscription business of software companies [19, 20, 28, 29]. Furthermore, there is no contribution, that puts focus on the necessary data entities that are sufficient for performing CSM related tasks in the subscription business of manufacturing firms.

Table 1: Existing definitions of the term "Customer Success Management"

Definition of the term Customer Success Management	Source
„[CSM] takes charge of the ongoing customer relationship and ensures that customers gain maximum value from the product." „This task is crucial with smart, connected products, especially to ensure renewals in product-as-a-service models. The customer success management unit does not necessarily replace sales or service units but assumes primary responsibility for customer relationships after the sale. This unit performs roles that traditional sales and service organizations are not equipped for and don't have incentives to adopt: monitoring product use and performance data to gauge the value customers capture and identifying ways to increase it."	[10, p. 15 f.]
„[CSM] is a management process comprising all activities of the customer and the provider firm aiming at aligning their customer and supplier goal achievement."	[18, p. 124]
„[CSM is] the proactive (versus reactive) relational engagement of customers to ensure the value potential of product offerings is realized by the customer."	[19, p. 3]
„[CSM] is generally a non-billable service that provides post-implementation assistance to the customer to help them generate value from the products/services they have purchased. It typically provides advice, assistance and resources relating to adopting and using the products/services and to measuring and reporting on the value attained from their use."	[28, p. 12]
"CSM draws on the foundation of CRM by considering customers' demographic and transactional data but goes further by utilizing streaming sensor data and other unstructured customer data to	[20, p. 362]

derive value-in-use insights and predict customers' future value-in-use. CSM draws on a foundation of Customer Experience by seeking to improve customers' product experience, but CSM goes further by prioritizing customers' more distant financial, social, operational, and strategic goals. CSM draws on a foundation of Customer Engagement by considering customers' loyalty but goes further by prioritizing customers' goal achievement over engagement behavior."	
"With complex and evolving technology products, customers need ongoing help to adapt and realize value. Customer value realization is the flywheel that keeps customers coming back. The CSM can be the power that accelerates the flywheel."	[29, p. 1]

3. Methodology

3.1 Research approach

The selection and application of the research methods described below are based on a grounded theory approach according to Glaser and Strauss for the systematic collection and comparative analysis of data with the aim of generating theories from (management) practice [30, 31]. For this purpose, data collection is carried out as so-called "theoretical sampling", i.e., data are collected and analyzed in a cyclical process based on preliminary theoretical considerations. During the research process, the researcher decides which data and research methods will be used next for the investigation [30, 32]. Based on the collected data, recurring elements are identified, from which action patterns and categories are derived, also referred to as "coding" in grounded theory [30]. In this work, these are referenceable data attributes related to performing CSM tasks in manufacturing contexts. The identification of the action patterns and categories takes place iteratively over the entire research process of this work, until a theoretical saturation is reached, i.e., no more new relevant action patterns and categories can be added [30]. Data analysis is carried out with the aid of "memo writing," i.e., after each round of data collection, hypotheses about the relationships between the data are recorded and the theory, i.e., the reference data model of CSM, is continuously refined [30]. In addition, the results of the literature analysis will be used to enrich the reference model with secondary data.

3.2 Data collection

The application of the research process took place between the years 2019 and 2021 with a focus on collecting data from German manufacturing companies, which have already a proven record of successful subscription business and CSM attempts. Table 2 gives an overview of the examined companies, the CSM status within the company, the role of the interview partner and the specific research methods that were applied.

Table 2: Overview of the data collection phase [35]

Company	CSM status	Interview partner role	Applied research methods
Machine tool manufacturer	CSM in preparation	Head of Subscription Head of Process Management	3 interviews, 1 company visit, 2 joint workshops between 2019 and 2020
Printing press manufacturer	CSM in action	Head of Customer Success Management Operative CS Manager	4 interviews, 1 observation of a customer success meeting with customers between 2019 and 2021
Machine tool manufacturer	CSM in action	Operative CS Manager	1 interview in 2020
Software as a Service	CSM in action	Director Marketing Campaigns & Channels	3 interviews, 1 joint workshop in 2020
Software as a Service	CSM in action	Success Management Lead	2 interviews in 2019

| Various manufacturing companies | CSM in preparation | Various roles | Focus group in the context of a joint remote workshop in 2020 |

4. Research Outcome

The reference data model, developed based on the ARIS framework [33, 34], is used to provide researchers and practitioners a structured overview of the data entities and attributes required to perform the core CSM functions in manufacturing contexts. Based on this overview, IT systems can be conceptualized or adapted. It also provides operational CSM managers with a tool to navigate within the complex system of co-creation of value with subscription customers during the utilization phase. Figure 1 shows the conceptual data model developed in the course of this research process focusing on a provider, a customer and a joint interaction pillar. The 13 data entities are described in further detail within the next sections. must be positioned and aligned organizationally in the company of the CSM provider. To this end, the internal objectives of CSM and the human and technological resources required to achieve them must be defined.
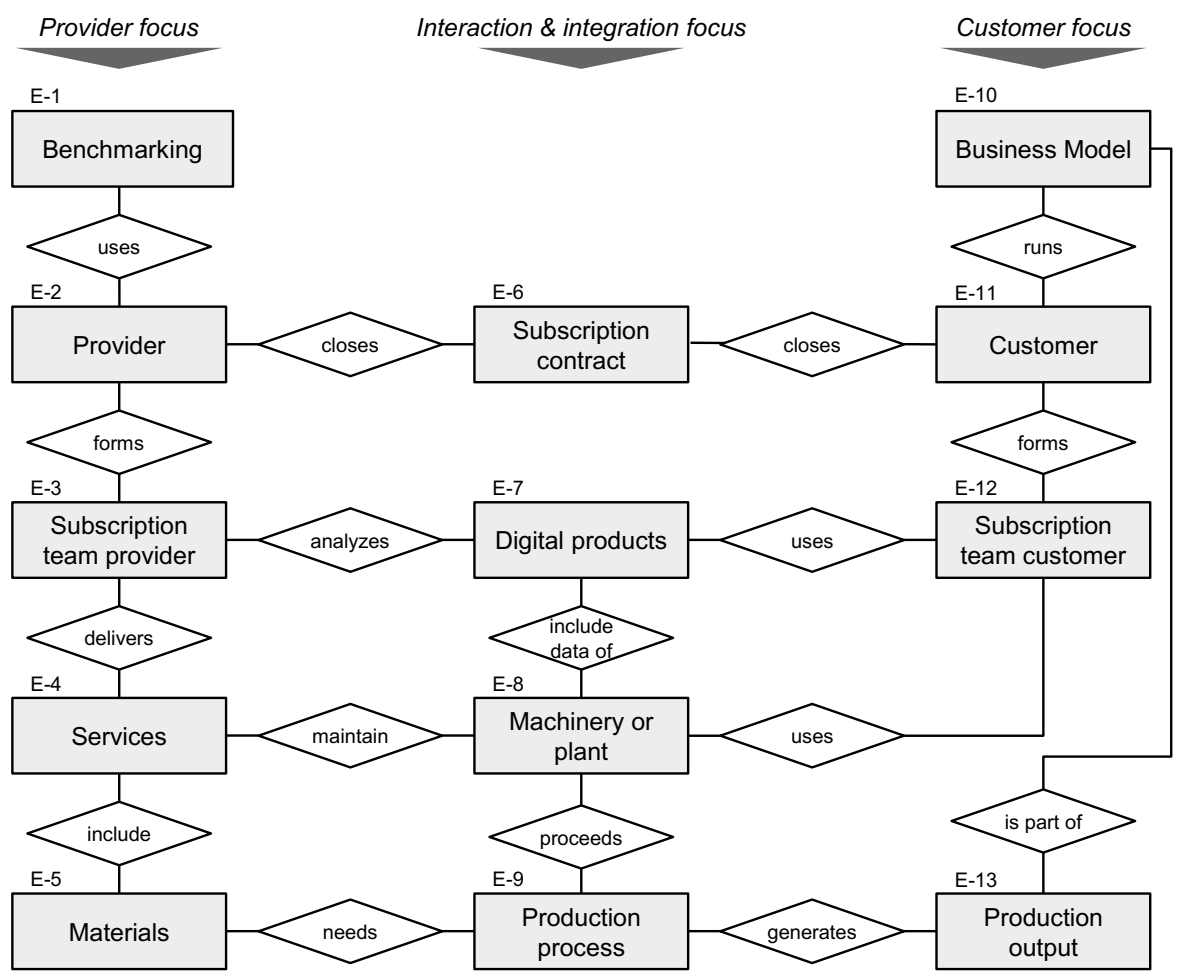

Figure 1: Reference data model for CSM in manufacturing

4.1 The Entity E-1: Benchmarking

All relevant benchmarking data for comparing individual customer performance with "best-in-class" reference customers are subsumed under the "benchmarking" entity. Best-in-class reference customers are companies that produce significantly better than others or use subscription services more effectively based on defined comparison criteria. A premise for the supplier to increasingly assume risks from the customer process is the data-based learning from the subscription business with other customers and the determination

of benchmarks. The benchmarking data is also one of the initial reasons for the individual customer to enter into a subscription relationship and to share their own data with the provider. This is done in the hope or under the promise of the provider to use the shared data anonymously for comparison purposes and thus help each individual customer to succeed.

4.2 Entity E-2: Provider (collective)

The "provider" entity includes the subscription provider as a collective of people and subsumes the internal, provider-side data in the service system, e.g., on the individual subscription components, costs, and prices. Furthermore, the entity "provider" includes the data for measuring targets or key figures of the CSM. This includes, for example, the monetary growth targets with specific subscription customers and the data required on the supplier side to determine and increase the customer lifetime value.

4.3 Entity E-3: Subscription team of the provider (individual)

The entity "subscription team of the provider (individual)" subsumes all natural persons on the provider side who are deployed to implement the subscription services at the individual customer. In addition to the CSM team, this primarily includes the service and sales departments. Attributes include, for example, the names, contact details, experience such as industry or language skills, and the organizational roles of the people involved on the provider side.

4.4 Entity E-4: Services

The entity "services" subsumes the services required to maintain production on the part of the supplier or by service partners. Services are provided by both the technical service and the CSM itself. Services form the central basis for a functional subscription business. From a CSM perspective, relevant attributes for technical services to maintain the availability of a machine or system are, for example, the date of a service ticket, the content of a service message, a customer's interaction with the service, or the status of a specific service order. Attributes for consulting-intensive services, such as user training conducted by the CSM, include, for example, the date of training, the content, and the specific training participants.

4.5 Entity E-5: Materials

The entity "materials" includes all raw materials, consumables and supplies that are provided by the supplier and fed into the customer's production process, especially in results-based subscription transactions. The supply can also take place by partners in the ecosystem of the subscription. Attributes include, for example, inventory levels or changes in inventory levels over time. In the subscription business, the vendor needs insight into the enterprise resource planning system or supplementary IT systems for the customer's inventory and materials management for the so-called vendor-managed inventory. Furthermore, so-called consignment warehouses may be set up in the subscription business. Consignment warehouses are warehouses supplied with goods by the supplier on the customer's premises or in the vicinity, which are used, for example, to supply customer processes with consumables and service materials, such as spare parts and tools.

4.6 Entity E-6: Subscription contract

The entity "subscription contract" subsumes the contractual framework data for the subscription relationship between provider and customer. Attributes include, for example, the subscription contract number, the start and end date of the subscription, the specific scope of the subscription, and contractually agreed subscription guarantees. In particular, the contractually agreed risk allocation between customer and provider in the subscription business is of central importance for the CSM as the entity responsible for realizing the customer's success.

4.7 Entity E-7: Digital products

The entity "digital products" primarily subsumes the interaction data of the customer with the software solutions provided by the provider. The focus is on cloud-capable software for which the provider can collect and evaluate near-real-time interaction data. Furthermore, continuous functional improvements and enhancements, so-called releases, can be made via cloud software. In some cases, the provider can use cloud-based software or the IoT to access the machine control system or the operating panel of the machine directly and make changes here as well. In the CSM, the focus is on specific cloud software for continuous communication with subscribers. This communication software serves a digital assistance system used by both the customer and the provider or CSM for the presentation and automated analysis of relevant data about the usage phase of the subscription in the cloud. In the practice of the subscription business in the manufacturing industry, an increasing integration of various, previously separate functionalities in the communication software can currently be observed. Such assistance systems increasingly integrate numerous functionalities for production optimization in customer operations. At the same time, the software serves as a (communication) platform for collaboration or co-value creation with customers on a personal level. It enables self-services, i.e., the customer can carry out certain activities himself, such as searching for instructions or viewing the status of a machine, without having to contact the manufacturer. For the manufacturer, in turn, there are no direct, resource-intensive efforts. Further attributes for the entity "digital products" are, for example, core functions used, times of login and logout by software users, and all click activities in the so-called user interface.

4.8 Entity E-8: Machinery or plant

The "machine or plant" entity subsumes the status data of the physical core products. This includes, for example, the attributes "machine type or number", the "temporal and local geodata of the machine", the "connectivity status of the machine" and the "machine status", e.g., in the form of machine hours (time during which the machine is switched on) or existing fault reports. In particular, monitoring the connectivity status of the machines, i.e., an existing data connection to the provider via the IoT, is essential not least for performance-based billing. Any other products used, such as sensor systems, can generally be treated in the same way as entity E-8 and described by means of the attributes mentioned.

4.9 Entity E-9: Production process

The entity "production process" subsumes the data of a specific production process in the customer usage phase of the subscription. This includes attributes such as parameter settings, production times, downtimes, energy consumption or temperature and vibration data. Furthermore, supplementary data about the specific production order as well as planning data for the production process, such as quantity, shift or maintenance plans, can be counted here. In the course of the production process, further peripheral data, such as ambient temperature or noise, can be collected.

4.10   Entity E-10: Business model (customer)

The entity "business model (customer)" subsumes the data on the current business situation of the individual customer. Particularly in the case of deep integration into the customer's value chain, e.g., in the course of results-oriented subscription transactions, the provider must obtain comprehensive knowledge about the customer's customers, the value proposition, the value chain with its own or competing products, and the revenue mechanics, i.e., also the pricing modalities of the products. Furthermore, the supplier must obtain in-depth insights into the economic situation of the customer in order to be able to estimate possible production or payment defaults for the individual customer.

4.11   Entity E-11: Customer (collective)

The entity "customer (collective)" includes all available data about the customer as a collective, i.e., about the specific customer account. This primarily includes the available, interaction-related customer data from the CRM system, such as:

- Master data (e.g., company name, industry, legal form, customer type).
- Sales activities (e.g., last meetings, last inquiries, last orders)
- Reactions to sales campaigns (e.g., trade fair offers)
- Order overview with sales values for new and used machines
- Last service call and last spare parts order
- Description of quality problems on installed machines

At the level of the customer as a collective, data on the customer's business objectives, i.e., the customer's economic, factual, environmental, or social objectives, are relevant for Customer Success Management. Customer success is measured on the basis of the achievement of these customer goals. Furthermore, the payment behaviour and any open invoice items of the individual customers are also of interest for the CSM and the proactive assessment of the customer status in a subscription relationship.

4.12   Entity E-12: Subscription team of the customer (individual)

Analogue to the provider's subscription team, the entity "subscription team of the customer (individual)" subsumes all natural persons of the customer involved in the subscription. As CSM-relevant attributes, the roles of the persons in the buying or usage center, the contact data, the interaction data of the persons with the CSM, and the possibly anonymized, individual usage data of the persons with the subscription services are of high relevance. From the CSM perspective, in addition to the customer's business goals, it is also a matter of capturing and fulfilling the personal goals of the customers in the buying and usage center.

4.13   Entity E-13: Production output

The "production output" entity subsumes all product-related data following the production process. This includes, for example, attributes such as the product quantity, the number of good and reject parts, and quality data such as geometry specifications, surface quality, and tolerances.

5. Conclusion

In this paper, a model with 13 data entities and corresponding data attributes was developed that can serve as a reference for designing the tasks and IT systems for a Customer Success Management in the manufacturing sector. The model was developed and tested based on research with practitioners in German mechanical engineering. By its very nature, the model in this paper only represents an excerpt in the temporal course of the development of the subscription business and the CSM, so there is a need for further development with regard to quality assurance, adaptation and further development of the reference model regarding upcoming research projects. In the future, parallel to the company-specific development of a CSM, it will be necessary to measure the effects and performance of the CSM in order to quantify the long-term benefits of the CSM and its corresponding data entities. On the other hand, from a research perspective, the comparison of different organizational variants of the CSM should also be addressed in this course in order to support companies in the still open question regarding the most suitable company-specific form of CSM (IT) organization. A central object of further investigation can be the future integration of sales, service and CSM in companies of the manufacturing industry. While the basic orientation of the CSM reference data model developed in this work is based on the role of the CSM as a integrator for value co-creation with the customer coexistence with sales or key account management in particular still appears questionable.

Especially the questions who "owns" the customer in the long run and whether a "one face" or "one team to the customer" approach is more successful cannot be answered with this work yet.

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Biography

Dr.-Ing. Lennard Holst is head of the department of Service Management at the Institute for Industrial Management (FIR) at the RWTH Aachen University since 2021. Dr.-Ing. Lennard Holst leads various research and industrial projects in the fields of subscription business management, digital business model transformation and industrial service management.

Prof. Dr.-Ing. Volker Stich is head of the Institute for Industrial Management (FIR) at the RWTH Aachen University since 1997. Prof. Dr.-Ing. Volker Stich worked for the St. Gobain Automotive Group for 10 years and led the management of European plant logistics. In addition, he was responsible for the worldwide coordination of vehicle development projects.

Prof. Dr.-Ing. Dipl.-Wirt. Ing. Günther Schuh is director of the Institute for Industrial Management (FIR) at the RWTH Aachen, holds the Chair of Production Systems at the Laboratory for Machine Tools and Production Engineering WZL at RWTH Aachen University and is a member of the board of directors of the Fraunhofer Institute for Production Technology IPT. He is the founder of Schuh & Co. Group and the e.GO Mobile AG. Prof. Schuh is a member of several supervisory boards and boards of directors.