I. Introduction

The introduction to this dissertation is composed of five part. First, I present the motivation of this work. Subsequently, I describe research gaps in the field of technology acceptance and corresponding research questions. Next, Section A.I.3 outlines the structure of the dissertation. In Section A.I.4, the contexts and designs of the studies carried out in Part B are described. Finally, I conclude this chapter by providing an overview of the anticipated contributions for both research and practice.

I.1 Motivation

> "*I think there is a world market for maybe five computers*." (Thomas Watson, chairman of IBM, 1943)

The Internet offers numerous examples of sceptical predictions that were made about the future development of computers and technology in general like the one by Thomas Watson, the chairman of IBM in 1943. However, especially in the last 20 years these have been proven to be wrong: it is not too much of a stretch to say that the ongoing digitalization has changed the world as we know it. The creation of a cheap and easy-to-use world-wide digital infrastructure of computers, mobile devices, broadband network connections, and advanced application platforms have accelerated the emergence of new digital technologies such as social media, cloud computing, big data analytics, or wearable devices (e.g., Fichman et al. 2014; Tilson et al. 2010). These technologies, in turn, enabled transformations in the way we live and work, how companies organize, and the structure of entire industries (e.g., Baskerville et al. 2020; Yoo 2010). As Baskerville et al. (2020, p. 512) state: "With mobile devices linked to ubiquitous information systems in the cloud, the Internet of Things, and digital sensors monitoring virtually all movements we make, there is no longer any hard and fast distinction between the digital and the physical world". Thus, it is not surprising that scholars and practitioners have paid much attention to the phenomenon of DT (e.g., Andriole 2017; Li et al. 2017; Vial 2019), working on guidelines for organizations on how to perform a successful DT (e.g., Berman 2012; Hess et al. 2016; Westerman and Bonnet 2015), and rendering it probably *the* technology-related phenomenon of our times (Wessel et al. 2020).

A brief glance at research on DT shows how multi-faceted this phenomenon and its implications for organizations and industries are. Agarwal et al. (2010), for example, illustrate how the DT of healthcare through health information technology (IT) such as electronic health records can significantly reduce costs and improve quality within the healthcare sector, thereby supporting the health and well-being of populations. Authors such as Chen et al. (2017), Dremel et al. (2017), or Sia et al. (2016) describe how companies coming from diverse sectors (e.g., airlines, automotive, banking) use digital technologies for business model renovation, leading to substantial organizational transformation as well as new organizational structures and business processes. As a final example, various scholars describe and examine how the relationships and the communication between companies and

their customers are changing as part of an organization's DT (e.g., Aral et al. 2013; Lucas et al. 2013). Advanced technologies on smartphones and other devices such as augmented reality "are blurring the boundaries between traditional and Internet retailing, enabling retailers to interact with consumers through multiple touch points and expose them to a rich blend of offline sensory information and online content" (Brynjolfsson et al. 2013, pp. 1-2).

Consequently, integrating and exploiting new digital technologies is one of the biggest challenges companies currently face; no sector or organization is immune to the effects of DT (Hess et al. 2016). While DT has already been a high priority for organizations in recent years, the majority of senior executives and experts expect that the amounts of investments in DT will further increase in the future (e.g., BCG 2020). However, in contrast to earlier transformational revolutions such as the steam power, using electric power for assembly line and mass production, or the computerization of production, the ongoing digitalization no longer plays a role limited to the corporate realm – DT also has expanded to the individual level (Matt et al. 2019). A large spectrum of devices and applications are changing and facilitating our private lives – "from apps in the networked car, to heating controls, or mobile fitness and health assistants" (Hess et al. 2014, p. 247). It has become natural for us to carry our smartphones, laptops, or wearables wherever we go and considering the digital environments that surround us and connectedness to them as part of our personalities (Carter and Grover 2015; Vodanovich et al. 2010). This development led to a new paradigm of heavily digitized individuals, calling for a "deeper, contextualized understanding of how digital technologies shape individuals' behaviors and interactions, and what consequences such developments entail for individuals, organizations, and societies" (Matt et al. 2019, p. 1).

Studying individual behavior as well as understanding how and why users accept and adopt technology has a long tradition in information systems (IS) research. Over the last decades, a variety of theoretical models was developed to explain human behavior, such as the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975) or the Theory of Planned Behavior (TPB) (Ajzen 1991). In the context of technology adoption and acceptance, two of the most applied theories however are the Technology Acceptance Model (TAM) as proposed by Davis et al. (1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) as well as its extension UTAUT2, developed by Venkatesh et al. (2003; 2012). These models have been used in numerous studies, both within organizational (e.g., Brown et al. 2010; Karahanna et al. 2006) and private contexts (e.g., Hong and Tam 2006; Workman 2014). In this regard, scholars have also presented different extentions to traditional models, for example by developing new moderation effects or outcome mechanisms (i.e., consequences of behavioral intention and technology use) (Venkatesh et al. 2016).

All these theories helped in understanding individual behavior in the past and provided valuable insights for both research and practice. However, given the developments and fundamental changes related to DT we have witnessed over the last years, the question arises whether traditional acceptance models such as TAM and UTAUT are still applicable in

the digital age. In general, studies in the field of technology acceptance encompass three factors: a certain type of technology (that can also be a product or a service), individuals or groups using these technologies, and the context in which the usage occurs. All these factors were subject to significant change in recent years. First, digital technologies differ considerably from earlier technologies. Due to their unique characteristics that enable them, among others, to be reprogrammed and process data coming from heterogeneous sources (Yoo et al. 2010), they are described as dynamic and adaptable, providing their users with a plethora of options for configuration and modes of use (Jung 2014). Furthermore, they are not used in isolation anymore, but are embedded within a variety of different digital devices and services owned and used by their users (Hoffman and Novak 2018; Matt et al. 2019; Yoo 2010). Second, we are dealing with a completely different kind of users. Traditional acceptance theories assume that people tend to resist new technologies and systems (Vodanovich et al. 2010). However, as individuals are nowadays surrounded by technology and grow up with them (Prensky 2001), they eagerly adopt new technologies, considering themselves to be technologically savvy (Vodanovich et al. 2010) and even building emotional relations to IT (Carter and Grover 2015). Third, while technology acceptance has primarily been examined in organizational contexts, understanding how and why individuals adopt technologies in their everyday lives becomes increasingly important. Although there have been attempts to adapt traditional models coming from organizational contexts to private contexts, for example through the extension of UTAUT to UTAUT2, specific characteristics of digital everyday life contexts are still under-theorized. Overall, given these changes we can witness related to the technologies under investigation in technology acceptance research as well as to the users and the usage contexts, several scholars have already called for new ways to study technology acceptance in the digital age (e.g., Jung 2014; Vodanovich et al. 2010; Yoo 2010).

Following this train of thoughts, this dissertation draws on the extensive body of knowledge on technology acceptance to address the shortcomings of traditional theories and models and to provide new insights into individual behavior in the digital age. Therefore, as a first step and to set the context of this thesis, the phenomenon of DT is examined in detail to gain further insights into its nature and specific characteristics. Subsequently, a new construct as well as a theoretical framework are developed that both consider changes related to the use of technology and individuals' mindsets in the digital age by drawing on the concept of connected objects. Finally, the role of personalization related to technology acceptance and the design of firm offerings is examined. At the end of this dissertation, I review the contributions of the individual studies, describe their combined overall contributions, discuss implications for research and practice as well as limitations of this work, and outline opportunities for future reseach.

I.2 Research Agenda

The focus of this research lies on technology acceptance in the context of DT. Thus, before one can examine new developments related to human behavior in the digital age, it is necessary to understand the context in which these changes occur. The extensive and

diverse literature on DT, however, suffers from a lacking common agreement on what DT exactly means (Vial 2019; Wessel et al. 2020), leading to a considerable ambiguity regarding its understanding and scope. The notion of DT has been extensively used to broadly describe the transformational impact of digital technology on organizations and industries. For example, Westerman et al. (2014, p. 1) define DT as "the use of technology to radically improve performance or reach of enterprises". Similarly, according to Hess et al. (2016, p. 124), DT is "concerned with the changes digital technologies can bring about in a company's business model, which result in changed products or organizational structures or in the automation of processes". Wessel et al. (2020) characterize DT by the emergence of a new organizational identity and state that the DT of an organization redefines its value propositions. Other scholars focus their definition on the impact on specific processes, like value creation processes (Liu et al. 2011; Reddy and Reinartz 2017).

While the focus on organizations is prevailing, some scholars define DT in a broader way. For example, Vial (2019, p. 118) defines DT as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies", while Hinings et al. (2018, p. 53) describe DT as "the combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations, ecosystems, industries or fields". Stolterman and Fors (2004, p. 689) follow an even broader perspective by defining DT as "the changes that the digital technology causes or influences in all aspects of human life".

While different notions of DT were used in the past, scholars and practicioners are in agreement that organizations have to actively deal with and accelerate their DT (e.g., Singh and Hess 2017; Westerman and Bonnet 2015). Especially in times of crisis like the current COVID-19 pandemic, the move towards digital is seen for many companies as the only way to survive such challenges (McKinsey 2020; strategy& 2020). Hence, establishing a common understanding of DT is crucial for scholars to build on each other's work and to provide more informed guidance for practicioners for the successful management of an organization's DT. Therefore, the state of confusion related to the phenomenon of DT leads me to the first research question of this dissertation, which seeks to answer the following question:

RQ 1. How can the phenomenon of digital transformation be defined and what are its specific characteristics?

Despite the inconsistent definitions of DT, there is a common agreement among scholars and practicioners that understanding the behavior, preferences, and choices of digital consumers is crucial for a successful DT (e.g., Narayanan 2015; Seufert and Meier 2016; Westerman and Bonnet 2015). Consequently, the topic of consumer-centricity is much-discussed in the context of DT (e.g., Berman and Marshall 2014). Hence, the research field of technology acceptance could provide profound knowledge on individual behavior and expectations regarding digital technology. Therefore, after defining and clarifying its context, I will proceed to the main focus of this dissertation and work on new concepts to study

individual behavior and expectations in the context of DT. Thereby, the thesis addresses shortcomings of traditional technology acceptance models related to the adoption and use of digital technologies. Although these technologies share certain characteristics, a plethora of diverse digital technologies and services exists such as smartphones, video streaming platforms, social media, or e-books. Hence, developing constructs or frameworks considering every facet of every kind of digital technology seems to be impossible. Thus, I will focus my studies on a certain type of digital technologies, namely connected objects, and their ability to connect to other devices and services as well as to connect individuals with each other. In the following, I will explain this focus.

In their research commentary, Orlikowski and Iacono (2001) examine the conceptualization of IT artifacts in articles published in Information Systems Research during the 1990s. According to the authors, the field of IS had not engaged enough its core subject matter in the past, namely the IT artifact, and instead focused its theoretical attention for example on the context within some technology is expected to operate. Consequently, Orlikowski and Iacono (2001, pp. 121-122) conclude that "much IS research draws on commonplace and received notions of technology, resulting in conceptualizations of IT artifacts as relatively stable, discrete, independent, and fixed. As a consequence, IT artifacts in IS research tend to be taken for granted or are assumed to be unproblematic"; a concern that has been expressed repeatedly in the following years, for example by Ekbia (2009). Based on their review, Orlikowski and Iacono (2001) identify 14 distinct approaches to the IT artifact, grouping these into five more general views (i.e., nominal, tool, computational, proxy, and ensemble). They argue that the ensemble view that focuses on the dynamic interactions between people and technology is the only one of these five that is able to capture the complexity, dynamism, and context dependence of IT artifacts which are in the other cases "either absent, black-boxed, abstract from social life, or reduced to surrogate measures" (Orlikowski and Iacono 2001, p. 130) and thus, under-theorized.

Orlikowski and Iacono (2001) calculated that only 12.4% of the articles within their sample adopted the ensemble view. Similar and more recent studies (Akhlaghpour et al. 2013; Ayanso et al. 2007; Grover and Lyytinen 2015) concluded that this situation has not improved since then. Thus, it is not surprising that IS scholars in the last years are repeating the call for a stronger emphasis on the ensemble view (Baskerville et al. 2020; Faulkner and Runde 2019).

The call for a shift towards the ensemble view also has implications for studies on the adoption and use of IT. As Yoo (2010) states, individuals nowadays often interact with their surroundings in continuously changing contexts and by using multiple tools simultaneously. Thus, Yoo (2010, p. 222) notes that in the digital age, "it will be more meaningful to examine the mobilization and remobilization of entanglement of artifacts and activities than to study a discrete adoption decision for a single IT tool". Similarly, Hoffman and Novak (2018) illustrate how through the addition of network connectivity, previously unrelated objects and products increasingly work together as assemblages, thereby expanding what both consumers and objects can do. Consequently, understanding the effect connected objects have on their

users as well as the motivations leading individuals to use connected objects have become a high priority for researchers and practitioners (Touzani et al. 2018). Furthermore, these connected objects enable unprecedented levels of connectivity between customers and businesses worldwide, thus having major implications for organizations and their relationships to their customers (Berman and Marshall 2014). Hence, considering the embeddedness of singular digital, connected objects into their use contexts, their ability to connect to other technologies on the one side and to connect their users with other technologies, services, data, or users on the other side, as well as understanding drivers that motivate the use of such connected objects becomes crucial in the digital age.

Therefore, build around the concept of connected objects, following two research questions are formulated:

RQ 2. How can we conceptualize and measure customer expectations related to connected objects?

RQ 3. What motivates the use of connected objects?

The characteristics of connected objects and their ability to connect to other devices or services, thereby sharing and processing data on their environment and usage patterns, enable them to be tailored to the user's personal preferences (Touzani et al. 2018). Thus, the topic of connected objects and how individuals use them is closely connected to the theme of personalization. In general, personalization can be understood as "the practice of using information technology to treat customers on an individual basis by tailoring products, customer services, and other interactions uniquely for each customer" (Wattal et al. 2009, p. 70). Numerous studies have been conducted in recent years that illustrate the potential of advanced technologies for organizations to gather data on their customers and to provide their offerings according to the customer's individual preferences or past usage behaviors, for example in the contexts of websites and online shops (e.g., Benlian 2015; Ho and Bodoff 2014; Ho and Lim 2018), mobile news (e.g., Chung et al. 2016), or recommendation agents (e.g., Karwatzki et al. 2017; Komiak and Benbasat 2006). Due to the ever-increasing abundance of data and advances in the field of big data analytics, personalization has gained additional importance for organizations in recent years as it holds the promise to create competitive advantage and support customer-oriented innovation (e.g., Kitchens et al. 2018; Lehrer et al. 2018). However, personalization can not only be achieved by automatically adapting a product or service according to the user's personal preferences, but also by being customizable directly through the user (Vodanovich et al. 2010). As the study by Blom and Monk (2003) shows, including personalization features in products or services can provide significant added value to the user, for example a feeling of control and ownership of the product/service or a feeling of emotional attachment to it. Furthermore, the highly personalized nature of digital technologies in general and connected objects such as smartphones has the consequence that users can pursue a variety of goals with them; thus, they decide what a smartphone (or another, similar product or service) is for themselves, instead of just using and adopting a given product (Jung 2014).

Although extant research indicates the overall importance of personalization in the digital age, prior studies mostly focused on personalizing customer interactions, for example related to online brand advertising (e.g., Zhang et al. 2016). However, the influence of personalizing connected objects according to the user's preferences while they are using them has not received much attention so far. Furthermore, advances in the field of big data analytics enable organizations to gain deeper insights into their customers' needs and behaviors, allowing them to automatically personalize their offerings to a greater extant, in real-time, and based on previous direct interactions between the user and the product. This might significantly improve the acceptance and attractiveness of respective offerings. However, as previous studies have shown (e.g., Xu et al. 2014), attending to the customer's personal preferences may run counter to an organization's overall goal of a high efficiency. Hence, it is crucial for organizations to balance the personalization of their offerings according to the customers' preferences on the one side and efforts regarding overall goals such as efficiency on the other side. Altogether, this leads to the final research question of this dissertation:

RQ 4. How can we design connected objects that attend to personal preferences while simultaneously operating in the most efficient way and how does it influence user perceptions of such connected objects?

Figure A:1 illustrates the research questions of this dissertation. To answer these questions, four studies were performed which I will briefly describe in the following paragraphs (along with their respective research designs and contexts) after presenting the overall structure of this dissertation.

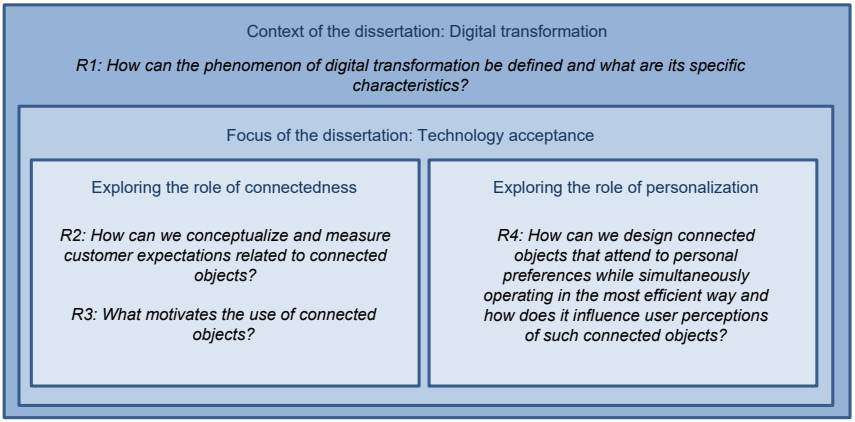

Figure A:1. Overview of the research questions.

I.3 Structure of the Dissertation

This dissertation is cumulative in nature and divided into three parts. Part A lays the foundation for this work. In Chapter A.I, I describe the motivation for my research (A.I.1) and highlight research gaps from which I derive four research questions (A.I.2). Afterwards, I

outline the structure of the dissertation (A.I.3) as well as its research context and design (A.I.4). Finally, I present the anticipated contributions for research and practice (A.I.5). Chapter A.II provides the theoretical background of this dissertation. In this regard, I will first describe insights from extant research on the widespread diffusion of digital, connected objects (A.II.1). Afterwards, I present implications of integrating these objects into everyday life in Section A.II.2. Finally, traditional theories for the study of technology acceptance as well as alternative approaches that have been applied in recent years are described in Section A.II.3.

Part B constitutes the main part of this dissertation and comprises four studies. While Study 1 deals with the phenomenon of DT, Studies 2, 3, and 4 examine individual behavior in the digital age. Thereby, the studies address the formulated research questions and research gaps as illustrated in Section A.I.2. An overview of the studies included in the dissertation along with their title, outlet, current status, the ranking of the outlet according to the VHB, the section in which the study is presented, and the RQs that are addressed is provided in Table A:1.

Table A:1. Overview of the studies included in the dissertation.

A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change					
No	**Outlet**	**Status**	**Ranking (VHB)**	**Section**	**RQ**
1	Journal of Management Studies	Published	A	B.I	1
Digital Connectedness Expectancy: Construct Development and Scale Validation					
No	**Outlet**	**Status**	**Ranking (VHB)**	**Section**	**RQ**
2	Information and Organization	Submitted	B	B.II	2, 3
A Needs-Affordances-Satisfaction Perspective on the Use of Connected Objects					
No	**Outlet**	**Status**	**Ranking (VHB)**	**Section**	**RQ**
3	Information Systems Frontiers	Submitted	B	B.II	2, 3
Handling the Efficiency-Personalization Trade-Off in Service Robotics: A Machine-Learning Approach					
No	**Outlet**	**Status**	**Ranking (VHB)**	**Section**	**RQ**
4	Journal of Management Information Systems	Submitted (third revision)	A	B.II	4

Finally, in Part C, I summarize and synthesize the findings of Part B into a framework for the study of connected objects (C.I.1 and C.I.2). Afterwards, I discuss their implications for

research (C.II.1) and practice (C.II.2) related to DT, digital life, and technology acceptance. Furthermore, I describe the limitations of this dissertation (C.II.3). Based on the implications and limitations, opportunities for further research are presented (C.II.4). Finally, I conclude this thesis in section C.III. The structure of the dissertation is visualized in Figure A:2.

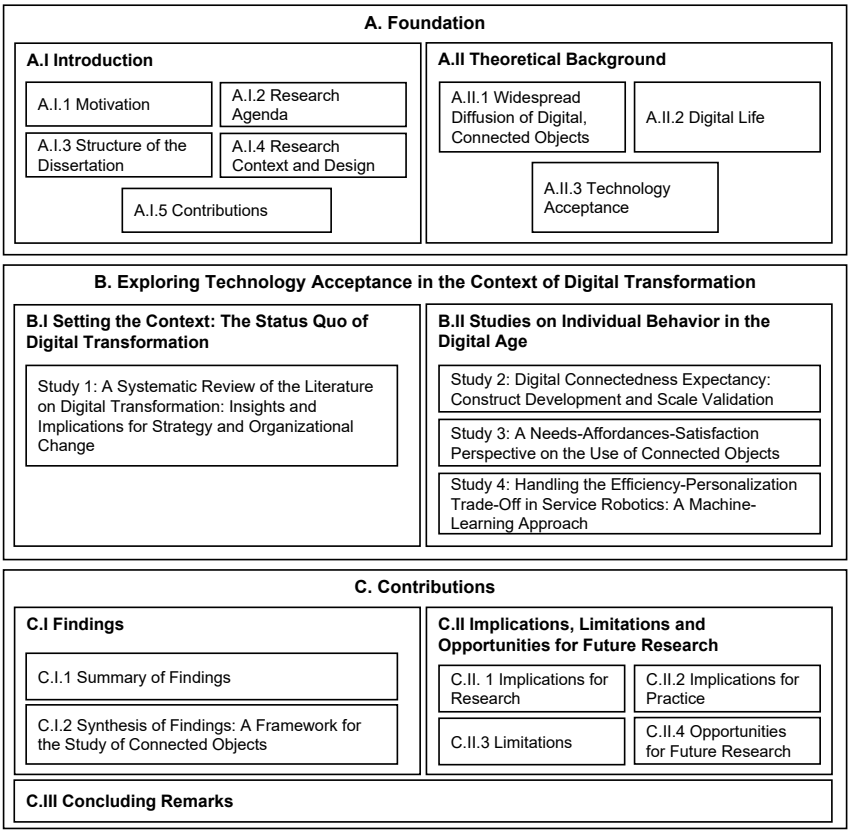

Figure A:2. Structure of the disstertation.

I.4 Research Context and Design

The studies of this dissertation are carried out in different settings (see Table A:2 for an overview). Study 1 is a systematic literature review (Tranfield et al. 2003; Webster and Watson 2002) on DT. Following role models such as Crossan and Apaydin (2010), 279 articles dealing with the phenomenon were identified and analyzed according to the structuring content analysis approach of Mayring (2000; 2014). Based on the analysis of extant research, a multi-dimensional framework synthesizing what is known about DT is provided. Furthermore, two important thematic patterns (i.e., a move towards malleable

organizational designs and a move towards digital business ecosystems) of DT are discerned. Finally, based on these patterns, four perspectives on the phenomenon of DT are derived and presented in a two-by-two typology.

In Study 2, the new construct of digital connectedness expectancy is conceptualized and operationalized using an established and rigorous construct development approach (MacKenzie et al. 2011). After introducing the concept of personal digital ecosystems (i.e., assemblages of heterogeneous digital technologies, products, and services), the influence of connectedness to them on decisions related to technology adoption and use is examined by validating the construct of digital connectedness expectancy drawing on a sample of 470 U.S. consumers. Therefore, a survey about the use of connected cars was developed and conducted. To perform the statistical tests, the partial least squares technique of structural equation modeling (PLS-SEM) was applied, using the SmartPLS software (v 3.2.7).

Study 3 also addresses the notion and relevance of connectedness. However, in this study the focus lies on the motivation and drivers of individuals to use connected objects and the role of connectedness in this regard. Therefore, a needs-affordances-satisfaction perspective is developed, assuming that psychological needs motivate individuals' use of connected objects to the extent that these objects provide affordances to satisfy such needs. The respective predictions are empirically tested through a survey about the use of smartphones and connected cars with 405 German consumers. As in Study 2, the PLS-SEM and the SmartPLS software (v. 3.2.8) were applied to perform the statistical tests.

Finally, Study 4 develops a level-1 design science artifact (Gregor and Hevner 2013) that is capable of handling trade-offs between system-level and individual-level goals based on real-time data. More specifically, a machine learning system is developed to resolve the efficiency-personalization trade-off in service robots using the example of autonomous vehicles which are seen as an instance of connected objects in the context of this work. Furthermore, additional empirical analyses are performed that 1) illustrate the efficiency-personalization trade-off from a user perspective and 2) indicate that customers would opt for and substantially value personalized products and services as they exhibit a higher willingness to pay for an offering that would make use of the proposed approach and thereby, attends to the user's personal preferences.