1 Introduction

The following sections provide an overview of the ongoing academic and practitioner discussions about the consumerization of IT. It will introduce the term consumerization of IT, and present the course of investigations including the core research questions of this work. Afterwards, related research will be discussed. Finally, the anticipated contributions of the underlying dissertation will be introduced.

1.1 Motivation

Computing has drastically changed since its emergence in the 1940s. While information technology had already leapt into private households in the early 1980s in the form of personal computers and all kinds of electronic home entertainment, the subsequent drastic reduction in size, increased connectivity, and development of tangible user interfaces have changed our perceptions of computing forever. The last decade showed an especially unprecedented speed of converging technologies and networks, melting down former borders between technologies (such as landline phones, cell phones, computers, computer networks, gaming consoles, hifi technology, and cameras), media (e.g., newspapers, radio, and TV broadcasting stations), and business models (from "brick and mortar" stores to services such as food delivery and taxi driving), which are now all more or less interconnected.

Though "computing" was once a field of special knowledge for a privileged few academics fascinated by coding instructions and understanding the architecture of their technology, using digital media today is common even for performing transactions in some of the poorest and most underdeveloped regions of the world. In areas without any electrical, banking, or ATM infrastructure, it is already common practice, even for the poorest and almost illiterate nomad stock breeders, to perform payment transactions using cell phones and payment systems like M-Pesa (Morawczynski & Miscione 2008; Subramanian 2014). In the Western world there is no way to escape advanced information technology in one's daily routine. However, the beige boxes that we once used to perceive as our "personal" computers, even in corporate settings, have almost completely disappeared.

It is a second IT revolution we are now witnessing. While there was a first revolution, bringing integrated planning systems designed to increase business process efficiency,

nowadays we cannot grasp all the expectation towards information systems by defining them as "implemented within an organization for the purpose of improving the effectiveness and efficiency of that organization" alone (Hevner, A., March, S., Park, J., and Ram 2004). What we are observing right now is a process commonly referred to as "consumerization." Although the term consumerization is mainly associated with IT today, it has quite a bit of history, appearing as early as in 1915 in the United States (Eriksson & Vogt 2012). It is derived from the term "consumerism," which describes the theory that an increasing consumption of goods is economically desirable, possibly implying a preoccupation with and an inclination towards buying consumer goods (Merriam-Webster.com 2016). In 1955, John Bugas, vice president of the Ford Motor Company, even favored consumerism as a more accurate tag for the American economy than capitalism: "The term consumerism would pin the tag where it actually belongson Mr. Consumer, the real boss and beneficiary of the American system. It would pull the rug right out from under our unfriendly critics who have blasted away so long and loud at capitalism. Somehow, I just can't picture them shouting: 'Down with the consumers!' " (Eriksson & Vogt 2012).

In social theory, the concept of consumerism is associated with social individualization, the expansion of the service sector, and the individual person as the "master identity" of modern society, handing the individual more responsibility for his or her own choices and their consequences (ibid). Consumerization is thus, as the suffix "-ization" suggests, the act, process, or result of the noun "consumerism." Random House Dictionary defines the process as "to make (goods or a product) suitable or available for mass consumption: to consumerize computers by making them cheaper (Random House Dictionary 2016)."

Applying this terminology to IT, Gartner (2005) defines consumerization as "the specific impact that consumer-originated technologies can have on enterprises. It reflects how enterprises will be affected by, and can take advantage of, new technologies and models that originate and develop in the consumer space, rather than in the enterprise IT sector."



Figure 1 - Hype Cycle 2012 (simplified version based on Gartner 2012)

While the Gartner Hype Cycle predicted it would take five to ten years for consumerization to mainstream adoption as of July 2011, it quickly advanced to the "slope of enlightenment," signifying "focused experimentation and solid hard work by an increasingly diverse range of organizations lead[ing] to a true understanding of the technology's applicability, risks and benefits" and a prediction of maturity in two to five years in 2012 (see Figure 1). In 2013 Gartner considered consumerization to be "an established, broad-based trend" (LeHong & Fenn 2013), splitting it up into several subcategories, and no longer a hype.

1.2 Course of Investigation and Research Questions

While the impact of information technology on organizations is at the very core of information systems research, the appearance of consumer technologies in organizational or business contexts is relatively new.

The research on consumerization of IT (CoIT) originally started as a project on information security with business practitioners in the context of networked financial ser-

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vices organizations. During the course of this project, the subject of mobile security, i.e., the impact of mobile devices such as smartphones and tablet computers on information security, recurred frequently. While members of some organizations focused on technical security measures, others were more interested in social measures, such as information security policy communication. In joint discussions between the scholars and the practitioners it became more and more clear that the issues emerging in the practitioner's business routine could not be treated effectively by a one-sided approach. However, the interplay between technical developments in the consumer space, the organization, as well as the employee-directed communication and their responses were not clearly understood in a holistic manner.

Overall Research Question

What is the impact of the consumerization of IT on organizations and how can they react?

To approach this research question, the problem is divided into several subproblems. As will be discussed in further detail in the Research Design section, the research process did not follow a predefined path to verify a priori defined hypotheses; instead, it was primarily led by the surfacing of emerging concepts during the research process. Never-theless, a profound examination of the current body of knowledge was undertaken at the beginning of the research process to gain an understanding about the research gaps related to the subject.

The term "consumerization" has only recently found its way into scientific publications. It is examined in the first publication of this cumulative work: "Consumerization of IT – Where Is the Theory?" Although consumerization has been widely discussed among practitioners in the last few years, there have only been a few scientific publications and no meta-analysis of the definitions applied. The first research question of this publication is therefore to determine how consumerization of IT has been defined to date. Most of the existing scientific literature on the phenomenon is relatively descriptive and focuses on consequences of private devices and technologies entering organizations. To be able to theorize the phenomenon at hand, the paper suggests various theoretical lenses for gaining deeper and more abstract insights.

Research Question 1

1.1: What is consumerization of IT?

1.2: How has consumerization of IT been defined in prior literature? What are the commonalities and differences?

1.3: Which theories have been applied and could be applied to grasp the phenomenon of consumerization of IT?

Comparing existing publications about the subject, it becomes clear that most definitions tackle consumerization of IT as a technology-adoption issue, positing that consumer IT devices are just one more corporate IT option from which the end user can choose. This perspective has some restrictions, as it suggests that the user decision follows the same pattern it did in the past. Known countermeasures to related phenomena such as shadow IT seem to be less efficient regarding disallowed consumer IT inside companies.

Genuine information systems theories like technology adoption models can quantitatively confirm or refute that certain specifics influence behavior. However, they always assume that an autonomous human agent determines the relation between the user and the (choice of an) IT artifact. In contrast to this view, structuration theory posits that IT artifacts and their users are a socio-technical activity system with inseparable, intertwined, and interdependent elements. Analyzing these structures, consisting of rules and resources, organized as properties of social systems, may not deliver easily quantifiable effect sizes and directions but does allow for a more in-depth and holistic stance for determining the novel aspects of consumerization (Research Question 1.2).

After gaining access to a major German financial services enterprise, 29 in-depth open interviews were conducted with business and IT employees to gain a deeper understanding of what triggers this consumerization behavior. The aim was to determine whether the practices in use with consumer IT devices differ significantly from those with established corporate solutions and, if so, why.

Research Question 2

What are the emergent practices enacted by business practitioners as they use consumer IT for organizational purposes?

Applying the grounded theory methodology, three different practices emerged from the data: users drawing upon unbounded consumer IT resources, developing a consumer IT mindset, and leveraging consumer IT to create value for the organization. The increasing blending of private lives with information technology creates a vector of expectations about what technology is supposed to offer and how fast these expectations must be fulfilled. Corporate IT departments have a hard time meeting these increased demands resulting from the processes of digitalization, individualization, and changing role relations between IT professionals in their respective organizational units and organizational IT users.

One of the results of the first interviews was that the utilization of consumer devices is – amongst other aspects – a security issue for the corporations. Regarding the role relations, the strict banning of all consumer technology use is common practice but seldom successful. The third and fourth publications elaborate upon whether perceived information security concerns are relevant to the adoption of information systems and which social and technical information security measures can be applied to keep up with regulations in times of IT consumerization.

In a quantitative study, a structured questionnaire was developed and sent to 1953 project managers in German industry networks to determine whether and to what extent perceived information security and interpersonal trust would influence the intention to use collaborative information systems.

Research Question 3.1

Does the user's perceived information security play a role in the adoption of consumer IT in organizations?

Given that security has been considered from a technical standpoint, the findings suggest that communication of security to users is a worthwhile investment, as sheer perception has a significant effect on the intention to use. To efficiently communicate appropriate behavior, it is worthwhile to be aware of the various security threats that consumerization of IT brings along. The fourth paper analyzes different forms of security threats, broadly categorized in technological and social attack vectors, and suggests potential countermeasures:

Research Question 3.2

How can organizations react operationally to information security threats from consumerization of IT?

However, these measures are only a response to emerging threats and thus of reactive nature; they do not get to the core of why the discovered usage patterns differ so significantly from before. Adding more interviews to the case study allowed a theory to be developed about what changed in the relationship among the IT users, the organizational IT department, and the technology artifacts themselves – and not only in the enacted user practices, focusing solely on the user side of the phenomenon.

Applying the theory of psychological ownership, which describes why and when individuals establish a mental connection of possessiveness and control to artifacts, a theory of digital ownership is developed. It explains why users may become personally attached to "their" IT solutions. Even further, as explained in study 1, it might no longer be possible to clearly distinguish between the IT users and the tools they use, so that user behavior is part of an identity construction in the workplace.

Three patterns of digital ownership emerged from the data, each representing a configuration of different subjects (who in an organization has ownership attitudes towards technology), the route of ownership (how these are attitudes developed and enacted), and the target of the ownership (ownership feelings towards means, such as systems, applications, or ends, e.g., capabilities to perform certain tasks).

Research Question 4

4.1: What is digital ownership?

4.2: How do different patterns of digital ownership emerge and how do they affect organizations?

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Finally, in the last section of this dissertation, the different studies are related to one another to develop a stage model by which organizations shape their responses to IT consumerization. The process of consumerization impacting the organization can be divided into three stages: the tactical reaction to consumer IT demands, developing an understanding of the consumer IT mindset, and the consumer-centric redesign of the corporate IT function. Each of these stages shows distinct patterns of IT user attitudes, practices, and reactions from the IT department, and digital ownership configurations.

The nature of IT in organizations is changing from a separated IT department (with a clear separation between business and IT) to a cross-functional resource upon which almost everyone within an organization draws equally.

In total, this dissertation contains five studies, as well as an integration section in which the results of the individual studies are combined into a process model. The following table connects the research questions presented to the different studies of this cumulative thesis (see Table 1).

Study#	RQ	Outlet	Rank ing	Status	Core Research Question	Contribution
#1	1.1 1.2	Proceedings of the Pacific Asia Confer- ence on In- formation Systems (PACIS) 2014	С	Published	Which theoretical lens should be cho- sen when conducting CoIT research?	Structured analysis of different ap- proaches to consumerization and presentation of dif- ferent theoretical angles
#2	2	Academy of Management Proceedings 2014	N/A	Published	What are emergent practices that lead to CoIT?	Identification of behavioral patterns challenging current assumptions of IT management and the IT function
#3	3.1	Proceedings of the Hawaii International Conference on System Sci- ences (HICSS) 2014	С	Published	Do the users' per- ceived information security concerns play a role for IS adoption in and between organiza- tions?	Influence of per- ceived security on use of collaboration systems
#4	3.2	HMD – Praxis der Wirt- schafts- informatik	D	Published	How can organiza- tions react to infor- mation security concerns of CoIT on an operative level?	Practical recommen- dations about how to address technical as well as social CoIT- related information security issues inside organizations
#5	4.1 4.2	Management Information Systems Quar- terly (MISQ)	(A+)	Passed 1 st round of review Revised version submitted for 2 nd round of review	What are generaliza- ble patterns of CoIT behavior and how can organizations respond strategical- ly?	Development of a theory of evolving digital ownership in three different pat- terns – IT owner- ship, digital technol- ogy ownership, and digital business ownership – and strategic options for organizations to respond

Table 1 - Studies in this dissertation; rankings correspond to VHBJQ3 2015



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1.3 Related Research

Consumerization of IT is a comparatively young topic. With its first appearance in practitioner literature in 2004 (Moschella et al. 2004) and in peer-reviewed scientific publications in 2009 (Cummings et al. 2009), it still lacks a clear definition. Study 1 will elaborate upon similarities and differences among the existing definitions; however, it might be useful to first explain the perspective of this dissertation as well as closely related research streams and topics.

It is not a trivial task to delimit the term "consumerization of IT." It inherently signals a relation to either the consumer market or consumer IT. However, a clear separation between the areas of corporate and private IT is lacking in most of these approaches to delimit the phenomenon. Ortbach et al. (2013) conceptualize consumerization as individual information systems penetrating a business context and present examples that are clear to allocate as either consumer or corporate IT, such as video games as opposed to CRM systems. For them, consumerization is the fact that consumer technologies cross the boundaries to business technologies at the macro level, as depicted in Figure 2.



Figure 2 - Consumer technologies vs. business technologies (based on Ortbach, Köffer, et al. 2013)

Baskerville (2011) differentiates between personal activity systems and professional activity systems and considers the interplay of all systems in use by a person as his individual information system, in which all different systems have bindpoints as depicted in Figure 3. He does not refer to consumerization per se, but he notes that IS researchers "might begin with the recognition that we are fairly benighted about the phenomena" (Baskerville 2011) of private and organizational information systems intermingling. Unlike in the model by Ortbach (Ortbach, Köffer, et al. 2013) presented previously, Baskerville sees no clear separation between the professional and personal activity systems, as shown by the overlapping vertical arrows in Figure 3:



Figure 3 - Individual information system architecture (Baskerville 2011)

Another possible stance to interpret consumerization is viewing it as a separate historical era in computing. Gannon (2013) divides the IS history in four epochs, pioneering from 1950-1965, growth 1965-1980, distribution 1980-1995 and consumerization 1995-2010. In his categories the phase of consumerization impacts in all dimensions concerning the corporate IT function, whether the technology itself, themes dominating the discussion about the technology, the functional organization of IT in corporations (and therefore, as will be discussed in the following, governance), or the refinement of processes applied.

Also taking a chronological perspective in their paper, Hirschheim and Klein (2012) focus on the predominant topics of the scientific field of information systems. While their structuring differs slightly from Gannon (2013), they acknowledge that although management and governance have been widely addressed by IS researchers since the

1960s, there have been some changes to the research themes and methodologies that have gained focus in what they refer to as the Internet Age, where "myriad forms of IT have become pervasive within organizations," (Hirschheim & Klein 2012) fueled by continued developments in technologies such as new forms of wireless communication protocols, search engines, and social media. Table 2 shows an integration of the relevant aspects of both classifications.

	Pioneering 1955-1970	Growth 1970-1985	Distribution 1985-2000	Consumerization 2000-2015
Organi- zation and Skills	• Small (<50) in-house data processing departments	 Large (>100) data processing departments IT director Software "engineers" 	 Central IT CIO Outsourcing / Offshoring Professional Services 	 Small, centralized IT for infrastructure Head of Digital User-led development IT-business hy- brids
Man- agement and Govern- ance	 Centralization IS reporting Relationship under control of Accounting 	 Steering committees User-led IS development projects 	 Departmental computing Decentralization Emergence of the CIO 	• Management of widely distribut- ed technologies and personnel (including off- shore vendor staffs)
Tech- nology	 Custom main- frame (e.g., IBM 360)/ basic pe- ripherals / assembler / early languages Languages: Machine code Assembler Fortran COBOL Database Ethernet 	 Microprocessors Minicomputers Mid-range computers PCs Fifth Generation Computer project Relational Databases High-level languages CASE tools 	 PCs / MS-DOS MS Windows Office productivity SQL Distributed computing Networks leading to the emergence of the Internet 	 Internet Age Ubiquitous computing (laptops, netbooks, tablets, smartphones Search Engines Social Media Mobile Virtualization Search / Data mining / Business Intelligence Social Media Cloud / Software as a Service

Process- es	 Hardware engineering Resource- constrained pro- gramming disci- plines 	 Software engineering con- cepts Development methodologies 	 Internet / HTML- Development ITIL CMM 	 Agile App development Systems integration
General Topics	 Pioneering, exciting and game- changing Skeptics Grosch's law 	 Age of the corporate computer New Frameworks Moore's law 	 Power to the User Metcalfe's law	 Anytime, anyplace, anywhere Big Data Bring Your Own Technology (BYOT)
Research Themes	 Decision Support Systems Human- Computer Inter- action Early Frame- works Stages of growth of IS What is the real value of IS 	 Defining the research field of IS Impact of IS success IT / Organization change IS in the public sector Participative design 	 IT productivity / economic performance IT Value Technology acceptance GDSS Process-based view of IT implementation Outsourcing Aligning IT strategy with business 	 Adoption of Internet / e- Commerce Globalization and cross- cultural studies Virtual teams Business Intelli- gence Design Science IS journal prac- tices and ratings Discipline cri- tiques: relevance vs. rigor
Repre- sentative Projects	 LEO Bakery Valuations GE Payroll	SabreAIB Core Bank- ing	 Economost Glaxo Information Superhighway 	 First Direct Banking UK Government Data Services (GDS)

 Table 2 - Four historic stages in corporate IS (based on Gannon 2013; Hirschheim & Klein 2012)

In opposition to their view is a stream of publications that considers consumerization to be a behavior of individuals, actively deciding to take private IT into the business sphere. In this case, there are several models that measure the influence of external factors related to such a decision. One example of this kind of model is the structural model by Dernbecher et al. (2013), where the behavior is regarded as an outcome variable that is determined by the willingness to try out and adopt IT innovations, the individual perception of the capability to use technology to perform a task and resulting habits in technology use:

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Figure 4 - Structural model of consumerization (Dernbecher et al. 2013)

Consumerization of IT is often mistaken to be yet another buzzword for shadow IT or rogue IT. Shadow IT, though a term frequently used, has rarely been defined. There are few scholarly publications about shadow, rogue, or grey IT (Györy et al. 2012). The published, peer-reviewed scientific definitions, such as

- "systems which replicate in full or in part data and/or functionality of the legitimate systems of the organization" (Behrens & Sedera 2004),
- "the supplement of 'official' IT by several, autonomous developed IT systems, processes and organizational units, which are located in the business departments" (Rentrop & Zimmermann 2012), or
- "software applications or extensions to existing software (1.) neither developed nor (2.) controlled by an organization's central IT department" (Fürstenau & Rothe 2014)

are missing important aspects of consumerization, as they focus solely on the system itself and do not address the process behind the emergence of the system or justify it with the simple insight that there might be a gap between the information systems offered and the affordances needed by the user. While Rentrop and Zimmermann (2012) state that a theoretic framework to conceptualize shadow IT is still missing, Fürstenau and Rothe (2014) concentrate merely on how to govern shadow IT systems that cannot be avoided. However, there is no serious attempt to justify the emergence of shadow IT - it is only mentioned that it arises from a somehow missing functionality of corporate IT.

This work takes a different stance. Consumerization is not seen solely as the decision of an individual to take a device or technology from one clearly separated context of his or her life (private) to another (business); instead, it is considered to be a socio-technical development, where technical progress influences the social habits of not only individuals but also society at large. This social development does not stop at the (arguable) border between private and professional life but is omnipresent in all areas of the daily routine.

This work therefore follows the calls for research expressed by Baskerville (2011) and Sambamurthy and Zmud (2000), which will be briefly introduced in the subsequent section.

1.4 **Related Calls for Research**

While the IS research community had already started to explore the private use of postdot-com information technology outside of organizations in the 2000s (Hong & Tam 2006; Venkatesh & Brown 2001), taking a technology adoption perspective, the consequence of the vast adoption of everyday life technology in organizations has not yet been studied in depth. The notion, that adopting a certain kind of technology might not be extensive enough for the reality that modern-day organizations face has been recognized by Lamb and Kling (2003), who argue that users are part of a much more complex socio-technical environment. Instead of modeling a user, they propose researching social actors in a network of relationships that exchange information via information systems. Digitalization and social networks have radically changed aspects that were formerly part of an offline world. Today, even dating has become a major online business, and social networks are common not only to browse stranger's profiles but are part of the every-day communication channels among family and friends. Using digital technologies is no longer perceived as adopting an information system. Their use is rather a self-evident part of life, not something that can be evaluated separately. This impact cannot but influence organizational work practices and structures (Hevner, A., March, S., Park, J., and Ram 2004; Orlikowski 1993; Robey & Sahay 1996; Sambamurthy & Zmud 2000; Straub & Watson 2001). There have been a number of calls for research

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