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articles

Communication Tools in New Product Development: Startup Companies' Preferences Over Time

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Purpose

Communication is essential for successful new product development. Startup companies, in particular, need to meet market expectations to gain ground and become economically viable, and heavily rely on integrated platforms for communication and collaboration.

Approach

Two studies cover both the ideation and development phases of a three-step Stage-Gate process. Single-product choice-based conjoint analysis is used to investigate preferences for a communication software application on the feature level over startups' life cycle to shed light on the adaptation of application use. Study 1 draws on a sample of 102, study 2 on a sample of 103 startup employees.

Findings

Collaboration application requirements widely differ across new product development stages, although text channel is the most important attribute for both, contrasting traditional media richness theory. Users favor automation that increases their control over communication mode choice, and prefer auto-transcription and speech-to-text. A simulation based on the results further reveals functionality gaps between user demands and market supply.

Originality

The study at hand provides initial empirical insights into adaptive system use of collaboration platforms using a conjoint approach. The feasibility of single-product choice-based conjoint analysis is established, providing a pathway for future research in a monadic context.

Introduction

Companies need successful product launches in order to survive in the market. This is particularly important for young players that are prone to a downfall when their product turns out as a failure. To ensure economic viability, new product development (NPD) needs to be carefully managed. Consequently, many companies employ standardized frameworks for their development process, providing guidelines for any specific point in time. One prominent reference scheme is the Stage-Gate process (Cooper, 1990), which has experienced a series of modifications and extensions over the years, leading to the integration of agile methods in the latest iteration (Paluch et al., 2019; Vedsmand et al., 2016). However, any framework is just that – a frame that needs to be filled. Modern work requires communication, coordination, and collaboration, frequently across a variety of fields and sectors (see, e.g., Herbsleb & Mockus, 2003). Due to technological advancements, the work environment itself has become technology-mediated (Dixon & Panteli, 2010; Wajcman & Rose, 2011). Hence, the notion of virtual teams has gained importance, and their communication is described as being "characterized by extensive media use" (Handke et al., 2019). The concept of virtuality, in consequence, has changed from depicting dispersed teams' communication style to a general workplace phenomenon that encompasses almost any team and organization (Dixon & Panteli, 2010). A novel class of software applications called Workstream Collaboration tools (WCT, sometimes also termed team communication platforms, Anders, 2016) has been identified as a highly integrated successor of previous developments (Gartner, 2018) to care for these de-

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mands.

As the name suggests, WCT are not limited to specialist applications for a particular process step, but rather fulfill an all-around role alongside the workstream. These characteristics match demands identified for superior information technology (IT) capabilities: providing a "firm-wide integrated and flexible platform that aims to standardize and integrate processes and data [...] [that] enables all NPD team members to draw on the same tools and information in a reliable, convenient, and useful manner – from anywhere at anytime" (Mauerhoefer et al., 2017). They offer solutions to reduce the "hodgepodge combination of independent tools and technologies" (Montoya et al., 2009) identified in the literature on IT-dependent NPD teams. However, these solutions are large bundles with a myriad of features that can be complemented with increasing numbers of third-party integrations; hence, the 'hodgepodge' has rather been relocated from being scattered across many applications into one platform (Anders, 2016; Gartner, 2018). This property renders WCT hard to grasp and effectively utilize, with the exception of features such as instant messaging that were adopted from the private context (Harris et al., 2012; Tan et al., 2014), and as such raises the potential for feelings of overload, uncertainty, and due to increasing multi-platform compatibility, invasion, which have been identified as technostress creators (Ragu-Nathan et al., 2008; Tarafdar et al., 2007, 2010). Still, studies on IT use mostly focus on general measures such as usage frequency (Burton-Jones & Straub, 2006; Sun, 2012), which fall short of providing a detailed picture of actual user behavior. Hence, research lacks insights on feature-level use and users' behavioral alterations over time (Sun, 2012). Users have been found to assess the perceived fit of their tasks and available technologies, and teams display adaptation behavior to achieve a better match over time (Fuller & Dennis, 2009; Goodhue & Thompson, 1995). In the case of startup companies, teams need to successfully create a functional product by the end of their NPD in order to survive in the market, which is a demand that typically comes with high requirements concerning task interdependence and coordination (Dingsøyr et al., 2017; Lee et al., 2013).

The study at hand seeks to contribute to the literature on post-adoption behavior by utilizing the perspective of preference research in the form of choice-based conjoint analysis (CBC). In order to link both fields of IT acceptance and use and preference measurement, a novel variant of CBC termed single-product choice-based conjoint analysis (SP-CBC) is used. In order to cater for possible usage adaption, two studies covering the first two stages of a three-step Stage-Gate Xpress (Cooper, 1990) are carried out. These stages comprise Scope and Business Case (abbreviated as 'ideation' in this paper, covered in study 1), and Development and Testing (abbreviated as 'development', study 2).

The remainder of the paper is organized as follows. Section 2 presents related work. The research design is described in Section 3, and findings are displayed in section 4. The paper concludes with a discussion and limitations.

Related work and hypotheses

Actual system use

The majority of research frameworks for technology use in organizational contexts take a rather abstract perspective of general system use, such as the technology acceptance model TAM (Davis, 1989), the unified theory of acceptance and use of technology UTAUT (Venkatesh et al., 2003), and the expectation-confirmation model examining information systems continuance (Bhattacherjee, 2001). As these models draw on the Theory of Reasoned Action (Fishbein, 1979) and its successor, the Theory of Planned Behavior (Ajzen, 1985, 1991), they utilize an individual's intention to conduct a particular behavior to describe actual behavior. While naturally, this gap has been criticized for a long time, for the study at hand, it is more important to note that this view organically leads to a very broad and general perspective on IT usage. Actual behavior is formally part of the models (TAM and UTAUT); however, many studies omit this measure (in many cases due to measurement problems, e.g., when a technology is not available yet, Davis, 1989), and the ones that do measure actual usage do so often using frequencies such as 'I use the technology on a daily basis' (Venkatesh et al., 2012, however, note that the research was conducted in a consumer context where usage is voluntary). These conceptualizations "have been considered to be simplistic and unable to capture the richness of systems use" (Sun, 2012). Consideration of the construct has been characterized as typically escaping scrutiny (Burton-Jones & Straub, 2006), and indeed, calls have been raised for closer examination (Delone & McLean, 2003). In organizational contexts, usage of a particular technology may be mandatory; hence both intention to use it and a rather general answer on usage frequency do not provide much information. Even more, it has been found that users commonly alter their use behavior due to a variety of factors, such as demands by management or novel tasks (Barki et al., 2007). Alterations may also be the result of stress experienced through usage (i.e., 'technostress', Tarafdar et al., 2007) as part of an individual's coping strategy (Beaudry & Pinsonneault, 2005). Consequently, moving from a system-level to a feature-level perspective is necessary to derive meaningful insights and implications.

Sun (2012) proposed the notions of adaptive system use and features in use as potential advancement, viewing revisions of system use as regular and organic, and thus focusing on drivers and patterns. Consistent with this approach and addressing task-media fit, Handke et al. (2019) demand to view communication media use as a dynamic process. Features in use are described as "the basket of system features that are ready to be used by a particular user to accomplish tasks" (Sun, 2012). As such, they comprise functionalities an individual is aware of and assessed as being adequate for his or her work. Examining the feature level is critical, as it may provide insight into drivers and barriers of satisfaction, performance, and technostress creators. Consistent with these considerations, user acceptance of technology has been proposed to be viewed as an ongoing process rather than a phenomenon ending after the adoption of the particular technology, and different aspects such as "learning, adaptation, and optimization" (Schwarz &

Chin, 2007) as core elements emerging over time should be emphasized. The second concept, adaptive system use, describes alterations in utilize features over time and comprises (1) testing new features that have not been used before, (2) substituting features, (3) combining, and (4) repurposing them. In line with propositions by Burton-Jones & Straub (2006), the study at hand seeks to employ actual system use as consisting of the user, the system, and the task. For the user element, the startup context was selected. The system is provided by the SP-CBC's morphological box, allowing insights into favored and neglected features. Finally, for the task element, different segments of the stage-gate NPD process were chosen to provide a natural setting for WCT.

Communication behavior in NPD

To create a sustainable competitive advantage, ideas and knowledge need to be located, aggregated, and exploited (Teece et al., 1997). In essence, innovative companies are knowledge creators (Nonaka & Takeuchi, 1995), and their NPD is a knowledge management process (Madhavan & Grover, 1998). Knowledge can be obtained from different sources such as internal (e.g., R&D) and external (e.g., through open innovation approaches) and is available in different forms such as market data, patents, and research databases (Stephan et al., 2019). As many of these sources are available to competitors, the key to competitive advantage is making sense of this data and leveraging efficient allocation within the organization. Especially for cross-functional teams, these tasks are highly non-trivial. Knowledge may be embodied in hard data such as fact sheets that are easy to disseminate, but also in tacit forms such as employee experience. Research on NPD and innovation has been focusing on hard data but is broadening its focus and explicitly addresses different forms of knowledge (see, e.g., Tang et al., 2015). Consequently, both researchers' and practitioners' issues shift towards the coordination of knowledge resources, predominantly expressed in asking 'who knows what' (Jarvenpaa & Majchrzak, 2008; Tang et al., 2015). An emerging literature stream examines the impact of IT on NPD (e.g., Kawakami et al., 2015; Mauerhoefer et al., 2017; Reid et al., 2016), underscoring the importance of viewing both fields in combination. Previous research has investigated the frequency of IT tool use (Kawakami et al., 2015) and factors making IT a necessity, such as distributed NPD teams (Barczak et al., 2008). However, many gaps remain. One major topic is how organizations leverage their IT systems to manifest advantages (Mauerhoefer et al., 2017). As IT does not carry value until it is exploited through meaningful business processes, it is crucial to study IT understanding and requirements during NPD phases. NPD process formalization has been identified as an essential steering mechanism for IT tool usage (Barczak et al., 2008; see also meta-analysis on success factors by Henard & Szymanski, 2001), and further, project phases have been proposed as most relevant causal factors for changes in tasks and requirements which in turn shapes demands regarding communication (Handke et al., 2019). Hence the study at hand employs Stage-Gate phases as a guideline for research, as depicted in Figure 1.

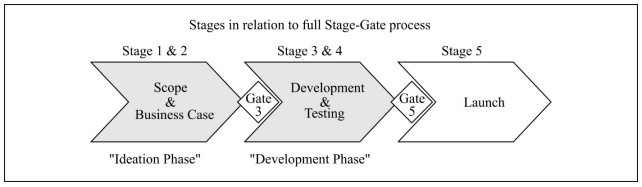

Figure 1: Three-step NPD process used in the study, based on Cooper (2009).

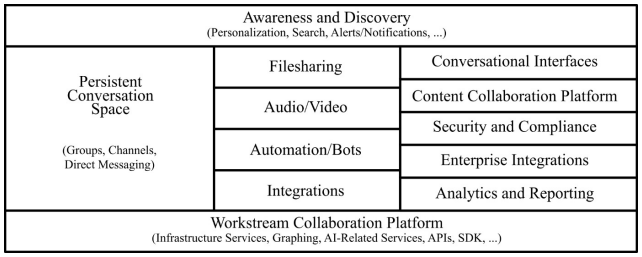

Figure 2. WCT scheme, based on Gartner (2018).

Traditionally, many companies have been following a standardized NPD process consisting of delimited operation phases and periodic control gates such as Stage-Gate (Cooper, 1990). A new generation of NPD seeks to integrate agile methods while maintaining the framework of a stage-gate process (Paluch et al., 2019; Vedsmand et al., 2016), which profoundly alters flows and timeliness of communication. All-round applications such as Microsoft Teams and Slack have created WCT as a novel market segment (Gartner, 2018; Reynolds, 2018) to satisfy these demands. Although Slack is common among renowned names and has more than 600,000 companies across 150 countries in its customer portfolio that account for 10m users (Slack, 2019), Microsoft Teams has taken the lead in terms of users with 13m (Microsoft, 2019; Novet, 2019). WCT quickly gained traction after global player Microsoft entered the market 2017 (Unify Square, 2019) and are described as combining "messaging, notifications, files, bots, tools and people [.] to create a private, persistent and searchable digital workspace" (Reynolds, 2018, n. pag.). Several of these aspects can be transferred to third-party integrations, which are central elements of WCT (Anders, 2016; Gartner, 2018). Their customizability and focus on drawing on top-notch technology has them predestined for automating routine tasks and tackling non-routine challenges while being centered around users' demands and needs (Reynolds, 2018). From the perspective of NPD, many WCT come with presets for agile development (e.g., Slack lists 20 Scrum-related integrations in its app directory). These applications can serve both as tools for carrying out specific tasks and establishing holistic NPD infrastructures. Independent of specific periods during development, they support communication and, subsequently, collaboration persistently. This covers the range from early 'homework' to ensure a viable business case (Cooper, 2019) until the final deployment. Figure 2 displays a general scheme for a WCT.

Along the process chain, most critical success factors re-

quire regular and in-depth communication (both at fixed appointments and on the fly), such as a sharp product definition, subsequent iterative development and feedback, and planning and resourcing launch: cross-functional teamwork has been identified as a major influence on project outcomes (Cooper, 2019; Nakata & Im, 2010; Valle & Avella, 2003). However, previous research has found that communication and coordination efforts may lead to a "substantial loss of development speed" (Herbsleb & Mockus, 2003). Hence, the role of communication needs further examination. Research on success factors revealed the importance of communication within all involved parties of NPD (see, e.g., Cooper, 2019; Rese & Baier, 2011. In fact, communication is considered "a fundamental part of almost all organizational activities" (El-Shinnawy & Markus, 1997). While virtuality (i.e., usage of digital technology for communication) has been studied for geographically dispersed teams and colocated teams have been viewed as relying on face-to-face interaction for a long time (Powell et al., 2006), modern work environments offer a multiplicity of technologies that may also be used for communication among users working at the same site. They may also make use of e-mails and instant messaging because of the properties these technologies offer in contrast to purely analog interaction, such as saving commuting effort, providing documentation, and allowing users to respond in an asynchronous manner, which has been described as facilitating structures (Handke et al., 2019). Communication is required to reduce the degree of uncertainty, which is defined as the absence of information (Shannon & Weaver, 1964), and clarify equivocality, which is a message's possible ambiguity (Daft et al., 1987). Media such as face-to-face communication delivering many cues such as inflection and tone and feedback options are viewed as rich, while written communication lacks these properties and is thus defined as not very rich (El-Shinnawy & Markus, 1997). To provide adequate resolution of equivocality, a medium's richness needs to match the message's degree of ambiguity (Daft et al., 1987). In early NPD stages that circle discussion of ideas, scope, and business case, it appears plausible that the degree of ambiguity is quite high, and thus rich channels mimicking face-to-face communication should be favored as is the case for the audio channel (D. A. Adams et al., 1993). In contrast, text channel, which is lean, should be rather unfavored (Markus, 1994). However, research found that aspect of media richness theory misleading, and participants favored less rich channels due to "the lengthy, ongoing, prolonged and ambiguous communication typical of equivocal situations" (El-Shinnawy & Markus, 1997). Regarding uncertainty reduction, capabilities to "facilitate both the processing of large amounts of data and the exchange of accurate, objective and quantitative data" are critical for a medium's evaluation, while richness is less important (El-Shinnawy & Markus, 1997). As startups need to focus on their product or service, calculate business cases, and process a lot of information, it appears likely that reduction of uncertainty is more perceived as being more critical by startup employees than resolving ambiguity. In addition, when a startup is founded, members commonly already know which product or service to provide; hence highly fuzzy tasks such as generating new ideas have been carried out previously. Further, graphically displaying information on the screen (rather than providing it auditory) has been found to facilitate processing on the receiving and, and increases memorability (Levy et al., 1996), while in the case of audio channels, transcriptions need to be made first (El-Shinnawy & Markus, 1997). This leads to the following hypotheses:

H1. During the ideation phase, the text channel will be the more relevant communication medium.

H2. During the ideation phase, the audio channel will be a less relevant communication medium.

From H2, it is further derived:

H2a. During the ideation phase, video calls will be the most favored audio feature.

H2b. During the ideation phase, voice messages will be the least favored audio feature.

For the development phase, several adaptations are expected. Drawing on the notion of equivocality, rich media are helpful for equivocal messages such as negotiations, while lean (i.e., not rich) media are suited for unequivocal messages such as routine reports (Suh, 1999). Transitioning from the ideation to the development phase, startup companies need to reach an agreement about their product or service to begin actual development. Hence, many communication tasks are likely to change from equivocal, such as debating the new product's features, to rather unequivocal, such as regularly reporting on the current prototyping status. However, regarding uncertainty, documenting the development's progress becomes vital for steering the NPD. Altogether, while for resolving ambiguity, text channel may slightly decrease in relevance, its role for reducing uncertainty is expected to compensate that loss, if not overcompensate. Hence, the following hypotheses are derived:

H3. The text channel will remain prominent during the development phase.

H4. The audio channel will decrease in importance during the development phase.

A last set of hypotheses is proposed for automation functionality. WCT commonly offer built-in features such as bots managing personal schedules and provide an interface for simple integration of a variety of third-party integrations (Anders, 2016; Gartner, 2018; Reynolds, 2018). Once more, a feature's capability of supporting information processing is employed as a criterion to hypothesize user behavior. In general, concerning communication, automation can happen at either the sending or the receiving end. This distinction naturally exhibits a power gradient: when the sender opts for an automation feature that best matches his or her preference, he or she imposes the selected format upon the receiver. For example, one user might favor written text and but does not like typing, and hence uses a speech-to-text option to create a written document from natural speech, which the receiving party then needs to process. Another user may only focus on how he or she generates the message, and again favoring natural language sends an audio file. In any case, the sender can choose which format to employ and whether to convert the original file or not, while the receiver has to deal with whatever arrives. On the receiving side, features such as auto-transcription provide freedom of choice, allowing the receiver to decide whether to handle an incoming audio file as is or to convert it. Altogether, automation features on the receiving

side yield the advantage of letting both sender and receiver pick their favorite mode of communication, while features on the sending side only benefit the sender. For the context of WCT, which has team members play the roles of senders and receivers simultaneously, it is expected that this difference is anticipated and incorporated in decision-making. Hence, the following hypotheses are tested:

H5a. Automation on the receiving side will be more relevant than automation on the sending side during the ideation phase.

Moreover, due to the expected decrease in audio channel usage during the development phase:

H5b. Automation on the receiving side will decrease in relevance during the development phase.

NPD in startup companies

For this study, startup companies in Germany were targeted. Nascent companies are an important field of study for two significant reasons: their need to reach a state of ongoing economic viability, and their impact on general innovation trajectories and economy (Cantamessa et al., 2018). The startup population is subject to fluctuations, as many companies leave the market after a short time (see, e.g., Baum et al., 2000), and organizational structures are variable. This paper aims to conceptualize a communication tool that is useful for a variety of companies, assuming that startups with their flexible structures may quickly adopt workstyles and technologies, while tools' use will rather be prolonged in incumbents. Thus, startup behavior is taken as an indicator of forward-looking preferences and demands.

In recent years, founders and nascent companies have been provided with the lean startup philosophy, which emphasizes early customer integration to fit the product to the targeted market segment and shorten development time (York & Danes, 2014). This notion is quite similar, if not the same, to modern Stage-Gate processes, which allow voice-of-the-customer (VOC) consideration from the very beginning of an NPD undertaking. Hybrid Stage-Gate, which takes advantage of agile methods during stages while providing a stable reference scheme for the overall process (Vedsmand et al., 2016), makes short feedback loops and data-driven ideation more feasible. Altogether, whichever approach a founding team is willing to take, the upcoming amount of complexity and coordination requires reliable and abundant software support. Research on successful and failed product launches identified the very early phases before formal design as key determinants of success (Edgett, 2011). These are "often disorganized, unpredictable, and unstructured" (York & Danes, 2014) At the heart of this phase is effective communication (Brentani & Reid, 2012), which extends over the NPD process in total as NPD, in essence, is information processing (Leenders et al., 2003). Quality and speed are seen as main components to ensure this effectiveness (Brentani & Reid, 2012; Kim & Wilemon, 2002; Millson et al., 1992). This indicates the need for assistance and guidelines for integrating all data sources by default, such as VOC, earlier product concepts, and market data, which may be sustained by adequate software-based applications. As software tools require specific patterns and inputs for operation, they can provide rough process guidance out of the box and constitute a vital intersection of product development, organizational processes, and customer-centricity.

In order to succeed, startups need to define and validate their business concepts and enter the phase of scalability. During this phase, nascent companies need to establish disciplined structures required for subsequent rapid scaling (Picken, 2017), leading to a dramatic increase in scope and complexity (Hambrick & Crozier, 1985). This transition stage is "the most critical period" in a startup company's life span before it reaches a state of maturity (Picken, 2017). Statistics reporting only about 50 % of startups surviving the first five years display the impact of these challenges (Bureau of Labor Statistics, 2016). Software support may provide valuable support to keep track, which is essential as many nascent companies are solely focused on the product and customer development while losing the rest out of sight (Picken, 2017). During transition, both growth and segmentation of organizational functions demand adequate infrastructures for project development, customer relationship management, operations, and finance (Flamholtz & Randle, 2012). In addition, as choices increase and supply alternatives become more transparent, customer-centricity rapidly grows in importance (Teece, 2010), which can hardly be fulfilled without adequate sophisticated software solutions. The competition among startup companies consequently does not focus on products or services alone, but on their capabilities in delivering and supporting them (Picken, 2017).

Research Design

Conjoint design

WCT are complex applications with a variety of features and use cases. In order to structure these for scientific investigation, this study breaks them down to their core functionalities. The scheme provided by Gartner (2018), which characterizes WCT as a bundle of communication, collaboration, networks, and security, was used as a guideline. An extensive review of software solutions was conducted and compared to user experiences elicited in blogs, forums, and online magazines for identification of attributes and levels. Findings were complemented drawing on the body of NPD literature, such as the tools used in the study by Montoya et al. (2009), which, among others, comprise e-mail, voicemail, and instant messaging. This list was viewed as preliminary specific for WCT and critically evaluated by contrasting previous communication instruments, such as instant messaging or voice chat software, but also hardware-focused tools such as fax machines and telephones. This lead to a reduction from 18 to 14 levels, while all attributes were kept. Table 1 displays the employed attributes and their respective levels. For technical implementation, Sawtooth Software was used.

Text channel refers to communication by writing; however, the channels may differ from sender to receiver as in the case of fax. The sender may type his text into a message box within the application, whereas the receiver will obtain a printed version as known from fax machines. This rather outdated level is included as printed documents may still be helpful for documentation purposes, handouts, and pro-

Table 1. Conjoint attributes and levels.

Attribute	Levels
Text channel	Instant messaging, e-mail, fax
Audio channel	Voice call, voice message, video call, video message
Implementation	Software, augmented reality, virtual reality
Automation	Auto-translation, text modules, speech-to-text, auto-transcription

posals, and are present in many office environments such as public administration settings. Previous research also suggests that documentation capabilities play an essential role in user choice of media (El-Shinnawy & Markus, 1997). In general, usual cases will have both sender and receiver within the same mode of communication, e.g., an instant message will appear within a chat window where the receiver may directly answer. E-mail is still the standard format for a lot of daily communication and may be viewed as more reputable than instant messages, as it is merely a digital version of a letter. Instant messaging, however, is the predominant mode in WCT and has become a natural part of daily communication due to its wide-spread distribution in applications such as text messengers or social networks. The audio channel comprises regular phone calls as well as video calls for direct, synchronous exchange. The two "message" levels, i.e., voice message and video message, refer to asynchronous communication and function similar to an answering machine, where the receiver is flexible to address the message when he or she has the time to do so. In general, a trend of bringing communication modes into the workplace that are already known from private contexts can be observed (Harris et al., 2012; Tan et al., 2014). Primarily, this affects instant messaging as known from apps such as WhatsApp and Instagram, as stated by Gartner's research vice president Craig Roth: "Digital workers turn to tools that are common in their personal lives to get work done" (Costello, 2019, n. pag.).

Implementation and automation relate to practical technical realization. The implementation may occur as a regular software application operated on a desktop computer, laptop, or mobile device. In this case, interaction is limited to a user interface displayed on a screen, which is usually manipulated by mouse and keyboard or touch. Handling the software comprises opening and closing windows, clicking through menus, and scrolling through conversation spaces. Alternatively, technological advancements allow realization as augmented reality or virtual reality applications. Augmented reality is a mixture of physical and digital realms and is usually implemented by a combination of camera technology and software content. For example, a hardcopy on its own only displays what has been printed, yet by using an augmented reality application, a user may be shown additional information on his or her screen. For more practical handling, augmented reality applications may also be realized as glasses that project additional information within the visual field. Augmented reality thus allows a smooth transition between physical and digital content. More secluded from reality, virtual reality is commonly realized through a head-mounted device that features a combination of a processing unit, a screen, and goggles that hold the screen. This allows navigating a fully embracing virtual world, e.g., by moving one's head or ranging around; however, it leaves the user quite undocked from his or her physical environment. Ultimately, automation is one of WCT's core characteristics, which is realized by top-notch technological means such as chatbots and digital voice assistants. Catering for modern globalized business environments, features such as auto-translation (for international contexts), and auto-transcription (for documenting calls) are employed. More directly impactful on communication are text modules, i.e., when the software guesses what a user wishes to write and shows suggestions that can be added with one click, and speech-to-text, which allows dictation of messages as known from Apple's Siri, Google Assistant, or Microsoft's Cortana.

Sampling strategy

To align the research goal with sampling strategy, federal databases of listed startups were used as a data source. Hence, the targeted population is startups that feature a certain amount of professional structures, as required and reinforced by many startup federations. These companies are suitable to indicate future demands to a greater extent than the overall startup population, which also encompasses shortcomings in their business models, organizational structure, and overall commercial knowledge. Consequently, these startups have already defined and validated their business concepts and are on the brink of scalability, also referred to as the transition stage (Picken, 2017). A list of 1,000 German startup companies was compiled, all of which are members of the German Startups Association. This association acts on the federal level for the representation of founders' and startups' concerns and demands and is the predominant federation of its kind in Germany. To some extent, this ensures that the startups' business model is viable and ready to enter (and has already entered, respectively) the transition phase, where software applications presumably play a significant role. Cluster sampling was conducted to select a startup company in the first step, and then survey individuals within the company that fit the respective NPD stage of the survey (i.e., ideation for study 1, and development for study 2).

Results

Descriptive statistics

Both studies were run simultaneously from August to September 2019 over four weeks. 175 startup companies

Table 2. Descriptive statistics. ICT = Information and communications technology. Ideation phase n = 102, development phase n = 103

Highest educational achievement	Ideation phase	Development phase
PhD	2.9 %	1.9 %
Master's degree	37.9 %	20.4 %
Bachelor's degree	41.7 %	36.3 %
Matriculation standard	8.7 %	19.6 %
Other	1.0 %	21.8 %
Branch		
Arts and entertainment	6.8 %	2.0 %
Commerce	21.4 %	7.8 %
Finance and insurance	13.6 %	16.7 %
Health and welfare	4.9 %	2.0 %
ICT	26.2 %	27.5 %
Logistics and transportation	4.9 %	3.9 %
Public administration	1.0 %	9.8 %
Service	13.6 %	19.6 %
Other	7.6 %	10.7 %

Table 3. Advantages and disadvantages of displayed concepts as indicated by respondents T-test: ** p < 0.01, *** p < 0.001. Dev. Phase = development phase.

Amplitude	Response option	Ideation phase Mean (SD)	Relative values	Dev. phase Mean (SD)	Relative values
Advantage	Saving time	2.50 (2.20)	0.55 (0.32)	***4.01 (2.09)	0.69 (0.28)
	Avoiding misconceptions	1.26 (1.71)	0.27 (0.28)	***2.39 (2.29)	0.43 (0.32)
	No positive impact	0.26 (0.54)	0.07 (0.16)	**0.60 (1.10)	0.11 (0.22)
Disadvantage	Increasing stress	2.20 (2.34)	0.47 (0.33)	1.80 (1.76)	0.30 (0.25)
	Isolating from colleagues	0.44 (1.41)	0.08 (0.17)	***1.34 (1.42)	0.20 (0.19)
	No negative impact	0.91 (1.02)	0.23 (0.25)	***2.76 (1.76)	0.48 (0.26)

were contacted via telephone and sent an e-mail with a link to the survey each. The survey itself was realized by using Sawtooth Software. For study 1, 102 questionnaires were completed and used for analysis. 35 participants were female. Age ranged from 20 to 66 years (mean = 30.45, SD = 9.67, median = 28). Professional experience displayed a right-skewed distribution, with a median of 5 years and an SD of 7.90 years.

For study 2, 103 questionnaires were completed and used for analysis. 36 participants were female. Age ranged from 19 to 60 years (mean = 33.69, SD = 6.73, median = 33). Professional experience had a median of 7 years and an SD of 7.04 years. Table 2 summarizes educational and branch statistics, indicating a rather high standard among startup employees and a tendency towards ICT-related business models.

Descriptive statistics fit the general startup landscape quite well. Most startup employees feature a high level of education, with a majority holding a Bachelor's or Master's degree, and business models are heavily dependent on IT and digitalization, primarily being located in the field of ICT (Bundesverband Deutsche Startups & KPMG, 2018)(. Furthermore, employing and using standardized business processes and frameworks is viewed as a critical goal by more than 80 % of nascent companies (Bundesverband Deutsche Startups & KPMG, 2018).

Each choice task was connected to a skip logic, either showing two follow-up questions if the concept was chosen, or skipping to the next decision round. Table 3 summarizes follow-up data. Descriptive statistics for absolute values are provided; however, these are not unambiguous, as a low value, for example, may either result from only none-options being chosen (i.e., no follow-up questions were displayed) or most concepts being perceived as not leading to this respective result. In order to get a more insightful overview, relative values are used, which were calculated as the absolute numbers an amplitude was selected by a participant divided by the number of concepts a respondent checked. On average, 6 concepts were selected per participant (mean = 5.60, SD = 2.63, median = 6, upper quartile = 7).

For the ideation phase, saving time was the most fre-

Table 4. Results of HB estimation. SD = standard deviation.

Attribute	Level	Ideation phase Part-worth utility (SD)	Development phase Part-worth utility (SD)
Text channel	Instant messaging	48.60 (28.40)	68.77 (35.52)
	E-Mail	68.17 (19.44)	42.10 (28.81)
	Fax	-116.77 (36.11)	-110.87 (54.02)
Audio channel	Voice call	38.84 (44.96)	-3.02 (22.95)
	Voice message	-21.21 (19.83)	12.06 (18.35)
	Video call	38.89 (19.69)	3.43 (14.29)
	Video message	-56.52 (41.61)	-12.47 (20.35)
Implementation	Software application	18.54 (20.42)	33.53 (37.67)
	Augmented reality	2.72 (14.25)	12.22 (30.78)
	Virtual reality	-21.26 (19.75)	-45.76 (49.19)
Automation	Auto-translation	-1.42 (12.53)	11.81 (19.34)
	Text modules	-7.01 (13.94)	-13.03 (20.70)
	Speech-to-text	1.28 (14.59)	10.13 (23.79)
	Auto-transcription	7.15 (13.38)	-8.92 (16.87)
None		57.66 (67.85)	51.44 (73.09)

quently mentioned advantage, followed by avoidance of misconceptions. A lack of positive effects was only stated in a minority of cases. On the negative side, increased stress was the primary concern, consistent with the emerging literature stream on technostress (e.g., Ragu-Nathan et al., 2008, Tarafdar et al., 2007). Isolation does not seem to be a strong consideration, however. Strikingly, the option 'no negative impact' was rarely selected, indicating that at least some kind of unfavorable consequences is expected.

For the development phase, advantages were stated more often than disadvantages. In particular, 'no positive impact' has a relative frequency of 0.11, indicating this option was barely checked. Saving time, one major characteristic of software in general, and one particular goal of WCT has the highest overall number of mentions. The most often response on the negative side was "no negative impact", followed by concerns about increased stress. A free-text form for additional comments on both the positive and the negative side was provided; however, no such responses were given. In total, positive impacts were stated frequently, while negative impacts appear rather small.

Utility estimation

Hierarchical Bayes estimation with 20,000 estimations was used for both studies (Allenby & Ginter, 1995; Lenk et al., 1996). RLH was 0.82 for study 1 and 0.83 for study 2, respectively, exhibiting supremacy over a naïve benchmark (i.e., 0.50 for SP-CBC). For study 1 main effects, within-attribute χ^2 displays *P*-values smaller than 0.01 for text channel (χ^2 = 146.38, df = 2) and implementation (χ^2 = 37.86, df = 2). For the text channel, a strong negative utility for fax compatibility can be observed. For implementation, virtual reality displays large negative utility compared to the other two levels. For study 2 main effects, within-attribute χ^2 displays *P*-values smaller than 0.01 for text channel (χ^2 = 139.01, df = 2), voice channel (χ^2 = 95.27, df = 2), and implementation (χ^2 = 11.03, df = 2). No interaction effects among attributes were found. Results from part-worth calculations are displayed in Table 4 for both studies.

As Table 4 indicates, video call is the preferred audio feature during the ideation phase. Hence, H1a is corroborated. Ranking of the remaining audio channel levels, in descending order, is voice call, voice message, and video message. H1b is thus rejected, as video messages are least favored in contrast to voice messages. Regarding the automation attribute, evaluation of auto-transcription and speech-to-text as two most favored levels in the ideation phase fit reports by Grudin (1988) and El-Shinnawy & Markus (1997), indicating that when on the sending end, a user gains full advantage of voice-based communication, such as high speed and simple transfer of nuances and inflection, while when on the receiving end, text-based communication is preferred. Automation allows to match demands on the sending and the receiving end, e.g., in the case of speech-to-text, the sender can make full use of voice-based communication's advantages, while the receiver gains the benefits of written information (i.e., conversion into text is located at the sending end). Vice versa, auto-transcription enables the receiver to convert an incoming audio file to written documentation and ensures freedom of deciding whether to deal with the message in an audio or text format (i.e., conversion into text is located at the receiving end). The higher utility derived from auto-transcription compared to speech-to-text may be explained due to difference in leverage on the receiver's side: while for speech-to-text, the sender can opt for transmitting audio or converting it to text and the receiver has to make use of whatever format he or she is provided, in the case of auto-transcription, decision-making authority is on the receiving end.

Table 5 provides an overview of the average attribute im-

Table 5. Average attribute importance ratings. Ideation phase n = 102, development phase n = 103.

Attribute	Ideation phase Average importance (SD)	Development phase Average importance (SD)
Text channel	47.93 (9.32)	48.47 (13.70)
Audio channel	31.84 (7.93)	10.99 (8.50)
Implementation	13.54 (4.95)	28.02 (10.13)
Automation	6.69 (6.37)	12.52 (8.10)

Table 6. Hypotheses testing.

Hypothesis		Evaluation	Evaluation based on
H1	During the ideation phase, the text channel will be the more relevant communication medium.	Supported	Average importance
H2a	During the ideation phase, video calls will be the most favored audio feature.	Supported	Part-worth utility
H2b	During the ideation phase, voice messages will be the least favored audio feature.	Not supported	Part-worth utility
H2	During the ideation phase, the audio channel will be a less relevant communication medium.	Supported	Average importance
H3	The text channel will remain prominent during the development phase.	Supported	Average importance
H4	The audio channel will decrease in importance during the development phase.	Supported	Average importance
H5a	Automation on the receiving side will be more relevant than automation on the sending side during the ideation phase.	Supported	Part-worth utility
H5b	Automation on the receiving side will decrease in relevance during the development phase.	Supported	Part-worth utility

portance ratings. For the ideation phase, the text channel is accountable for about half of the total utility, followed by the audio channel with about a third. H1 could not be supported. Implementation follows with about half the weight of the audio channel, yet exhibits still twice the influence of automation, which follows in fourth place. Automation, although often highlighted by software vendors, accounts for about 7 percent utility. The development phase exhibits a similar pattern for text channel; however, implementation ranks second with about a quarter, and automation ranks third with much higher importance than in the ideation sample. The audio channel, as opposed to the ideation phase, accounts only for a minor part of total utility. Table 6 summarizes the results of hypotheses testing.

Must-have features

Following choice tasks, participants were given a full list of attribute levels and had the option to indicate their must-have features. Part-worth utilities allow examination of preferences among attribute levels; however, there is no specific cut-off point where an individual would view a level as a must-have. Explicit investigation of an absolute threshold is derived from adaptive CBC, which features self-explication of importance (Johnson, 1987). Self-explicated tasks have been proven reliable (Netzer & Srinivasan, 2011). Table 7 displays the findings.

Both studies' participants agree on the importance of e-mail and instant messaging as written forms of communication, and voice calls as major audio channel. However, e-mail appears to be more critical during the early phases, while instant messaging dominates during development. When it comes to video calls, a rather substantial difference can be observed: about twice as many respondents from the development phase indicated the feature as must-have compared to the ideation phase. Technical implementation is dominated by regular software; however, in the ideation phase study, about half of the participants indicated implementation as augmented reality as must-have, whereas only a small portion of the development phase agreed. Virtual reality, then, is evaluated rather equally, and constitutes a niche demand. For automation, auto-translation was the most frequently stated must-have functionality for the ideation phase, while speech-to-text dominated during the development phase. All together for this attribute, two large discrepancies can be observed in terms of auto-translation, and text modules, respectively. Findings suggest that changing task requirements throughout NPD significantly influence user perception of a feature's adequacy and advantageousness, which fits the notion of adaptive system use as described by Sun (2012).

Table 7. Critical WCT features. Study 1 n = 102, study 2 n = 103.

Feature	Ideation phase must-haves	Development phase must-haves
Text channel		
Fax	1.9 %	3.4 %
E-mail	93.2 %	72.4 %
Instant messaging	69.9 %	86.3 %
Audio channel		
Video call	59.2 %	31.0 %
Voice call	94.2 %	75.9 %
Voice message	30.1 %	44.8 %
Video message	5.8 %	17.2 %
Technical implementation		
Implementation as regular software	92.2 %	65.5 %
Implementation as augmented reality	49.5 %	3.4 %
Implementation as virtual reality	14.6 %	17.2 %
Automation		
Auto-transcription	21.4 %	27.6 %
Auto-translation	68.0 %	27.6 %
Speech-to-text	40.8 %	44.8 %
Text modules	12.6 %	37.9 %

Table 8. Product concepts used for market simulation.

Conceptional idea	Text channel	Voice channel	Technical implementation	Automation
Conventional	Instant messaging	Video calls	Software	Speech-to-text
Formal	E-mail	Voice calls	Software	Text modules
Innovative	Instant messaging	Voice calls	Augmented reality	Speech-to-text
Documentation	Fax	Voice message	Software	Auto-transcription
Asynchronous	E-mail	Video message	Software	Auto-translation

Market simulation

In order to understand adaption, a market simulation using randomized first choice was conducted in the last step. Table 8 displays the tested concepts for both NPD phases. Five different conceptional ideas were used to depict differentiation in supply, which is about to happen as the WCT market grows to maturity. The 'conventional' concept represents a standard application that combines instant messaging and video calls (e.g., Slack, Microsoft Teams). 'Formal' refers to contexts that rely on traditional forms of communication and social interaction, employing e-mail as a modern variant of letters, preferring direct and synchronous contact via voice calls, and making use of text modules for uniform and reliable appearance. The 'innovative' concept blends state-of-the-art functionality such as instant messaging and voice calls with implementation as AR application and allows dictation of messages like the accelerating market of voice assistants. The last two concepts are rather similar, with 'documentation' emphasizing persistent availability of conversations, and 'asynchronous' focusing on individual response patterns as no synchronous mode of communication is embedded.

Market simulation is conducted using Sawtooth Software's Choice Simulator module. The none-option (interpreted as own choice in this study) is included. Randomized first choice is applied as a selection method, and 2450 iterations per respondent are conducted. Table 9 displays the results.

The 'formal' concept exceeds all other shares by far, followed by the 'innovative' application during the ideation phase. Interestingly, the concept built to depict current basic tools ('conventional') gains only 2.0 % of shares, about as much as the 'documentation' tool, which features fax as textual communication. For the development phase, the conventional tool gains the largest share, while the innovative concept also ranks second. Here, the formal concept is far off, even behind the none-option. Shares of preference for the none-option reveal that regarding the ideation phase, participants are rather satisfied with market supply, and hence rarely opt for own-choice. However, for the development phase, shares doubled, indicating that needs and

Table 9. Market simulation results. CI = confidence interval.

Ideation phase				
Conceptional idea	Shares of preference	Std. error	Lower 95 % CI	Upper 95 % CI
Conventional	2.0 %	0.7 %	0.7 %	3.4 %
Formal	62.2 %	2.8 %	56.6 %	67.7 %
Innovative	21.6 %	1.9 %	18.0 %	25.3 %
Documentation	2.1 %	0.8 %	0.6 %	3.6 %
Asynchronous	6.9 %	1.6 %	3.7 %	10.0 %
None	5.2 %	1.0 %	3.3 %	7.1 %
Development phase				
Conceptional idea	Shares of preference	Std. error	Lower 95 % CI	Upper 95 % CI
Conventional	47.8 %	3.0 %	42.0 %	53.6 %
Formal	4.3 %	0.7 %	2.9 %	5.7 %
Innovative	21.8 %	2.2 %	17.4 %	26.2 %
Documentation	2.8 %	1.0 %	0.7 %	4.8 %
Asynchronous	11.6 %	1.5 %	8.7 %	14.4 %
None	11.8 %	1.9 %	8.0 %	15.6 %

demands change over time, and market supply is not fully able to care for this alteration. In consequence, evidence for rather significant adaptions in system use was found.

Discussion

SP-CBC findings indicate that text channel is a WCT's most crucial mode of communication. While many WCT heavily rely on (and are based on, respectively) instant messaging such as Microsoft Teams and Slack, e-mail is perceived as essential for written communication. This result holds for both the ideation and the development phase; however, instant messaging is rated higher during development. Nevertheless, the rather neglected functionalities of e-mail appear to be still vital for communication. Ranking second considering importance is the audio channel. Participants favored real-time communication in the form of voice and video calls in the ideation phase and rather disliked asynchronous modes. As the early phases of NPD are often regarded as the fuzzy front-end (Kim & Wilemon, 2002), the possibility of quickly receiving feedback provided by real-time communication may be essential to collect and assess ideas, particularly in agile environments. During development, when many decisions have already been made, getting the work done becomes essential, which may explain the preference for voice messages that allow the receiver to get the information whenever he or she finds the time. Although a rich medium offering both imagery and audio, video messages are evaluated as rather unfavorable in both studies. Although surprising initially, this result is consistent with studies drawing on media richness theory, finding that richness alone is rarely sufficient to explain actual communication medium choice in organizations (El-Shinnawy & Markus, 1997). This shortcoming is regularly traced back to the conception of channel equivalence (Reder and Schwab, 1988), describing that a particular channel can perfectly substitute an ideal benchmark, which in many cases is implicitly assumed to be face-to-face communication (Bair, 1989). Instead, individuals may choose applications and features that best fit the nature of their tasks (Dishaw & Strong, 1999; Goodhue & Thompson, 1995).

The study at hand contributes to the literature in several ways. First, the research on organizational IT leverage is extended by integrating dynamic requirements throughout NPD processes. Second, the plains of firm-level IT capabilities and individual-level qualities, such as technology-induced stress, are connected, promising a fruitful starting point for future investigations. Third, WCT are introduced as robust platform solutions that provide a variety of specifications necessary for achieving superior IT capabilities.

In general, it could be shown that WCT are perceived as valuable addenda for NPD communication. Two studies were conducted, covering the first phases of a three-step Stage-Gate process. Regarding average importance, the text channel appears to be the dominating attribute. This fits vendor practice (e.g., Slack, Microsoft Teams), which emphasizes communicating in organized chatroom structures. These employ so-called workspaces on the superordinate level, which are subdivided into different channels, i.e., persistent chatrooms. This may be the result of virtual work practices (i.e., individuals are potentially connected at any time), where text messages can be read whenever the user finds time, whereas audio calls are highly invasive. Fax, unsurprisingly, was preferred the least. In part, this result may root in the low dissemination of fax machines in modern workspaces.

Within implementation, realization as a traditional software application was the most favored option. This may be due to the scarce dispersion of AR and VR, which leads to a lack of boundary points and practical experience. However, as both variants require additional equipment and alter interaction with the physical environment to some extent, operating experience alone may not suffice for actual acceptance and usage. Findings suggest that for the first phase of

the Stage-Gate process, where creativity and idea generation need to be carried out to gain fuel for NPD, AR seems to be imaginable. Concerning automation functionality (e.g., speech-to-text), many users appear to be rather reserved. This might be due to a skeptic distance due to error-proneness in early implementations, such as voice assistants misunderstanding a user's commands, or the technology behind sophisticated applications being quite unknown to the average consumer. This brings up opportunities for research on acceptance of specific attributes and possible embodiments, as well as for in-depth interview studies examining attitudes and use cases. Regarding importance, automation nearly doubled from 6.69 % during ideation to 12.52 % during development. Considering the attribute's levels, automation in the context of the study at hand provided auto-transcription, auto-translation, speech-to-text, and text modules. Except for auto-translation, these features facilitate switching from one communication mode to another. Auto-transcription supports the receiver, who has the option to manage an incoming audio-based message as an audio file, or can simply convert it to a text document, which provides a better graphical representation and can easily be forwarded and stored for documentation purposes. This feature proved helpful during ideation but decreased in relevance during development. Speech-to-text can be viewed as a complementary feature on the sender's side, who can choose to send an audio message or dictate a text document. This flexibility gained relevance during the development phase, as it may not only be used to communicate with team members but might help to take quick notes while carrying out development tasks such as documenting a bug or another challenge. Surprisingly, however, the most favored automation feature during development was found to be auto-translation. Auto-translation allows one to convert text documents from one language to another via a single mouse-click but is also implemented for video calls where it provides transcripts that can be translated into arbitrary languages. This feature provides several benefits, such as facilitating documentation (even across different levels of language expertise among team members) and supports mutual understanding of technical terms and jargon. It appears intuitive that these benefits play a more prominent role during development, where technical terms widely differ across fields of expertise such as business administration and software engineering, as opposed to ideation, where members need to ensure mutual understanding and may express their thoughts in everyday language.

Participants mentioned a predominance of positive impacts such as saving time and preventing misunderstandings. A complete lack of beneficial effects may be viewed as rather absent. However, as communication occurs on many channels employing a variety of modes simultaneously, stress will be an essential variable to track. It also became clear that demands and impact perceptions change as the NPD progresses, indicating the need for a dedicated software administration and guidelines for all stakeholders.

Conclusion and practical implications

Adaptions in startup employees' usage behavior could be verified in terms of altering preferences. The market simulation revealed that while for the early stage of ideation, feature bundles commonly offered by WCT suffice, requirements change over time and cannot be satisfied by these features. The complex nature of WCT was assessed as yielding both advantages and disadvantages, which fits the notion of a 'dual nature' of IT systems as proposed by Tarafdar et al. (2007). While the set of different communication channels may reduce friction and misunderstandings, participants were well aware that the 'hodgepodge nature' of highly integrated platforms is a manifest source of stress. Hence, formal training and communication guidelines that are updated in accordance with NPD progress may be a fruitful approach. Concerning functionality, the high number of respondents indicating e-mail as must-have provides first evidence that the wide-spread application of instant messaging has its limitations, although, for most WCT, it is the primary mode of communication (Anders, 2016; Gartner, 2018). This fits earlier findings on the importance of graphical display and clear message structure for understanding, memorizing, and documentation, suggesting that instant messaging's role in daily business might actively be challenged. Further, while automation was not the primary concern in terms of average importance, an increase in relevance was found during the development phase. However, automation may be confusing as common WCTs provide hundreds to thousands of integrations (Slack, 2020), and benefits in many cases may only be derived when most or all team members make use of a particular feature. Initialization and administration of WCT workspaces thus should be anchored in organizational structures, and dedicated roles of workspaces administrators might be assigned. In addition, mandatory guidelines describing personalization may help avoid the emergence of shadow IT-like WCT configurations with different team members employing different features for the same tasks, which may be incompatible in the worst case. In essence, communication taking place on such digital platforms must not be considered a means to an end by decision-makers, but needs to be regarded as a self-contained organizational structure and carefully managed. Finally, as users' requirements change throughout NPD, a dedicated feature bundle blueprint may be provided to care for alterations in demand for each phase.

Future research and limitations

The study at hand considered variation in time by examining two consecutive NPD phases. However, as nascent companies grow and mature, their organizational structure and layout will likely result in a change in communication tool requirements. Large organizations need to form separate functional areas, each of which typically follows idiosyncratic objectives (M. E. Adams et al., 1998) and is delimited by formal and informal norms and boundaries (De Long & Fahey, 2000). Further investigation may investigate startups over their development and use longitudinal studies for analysis. Thus, fine-grained insights into users' demands and the organization's respective changes and modifications to the software portfolio may be investigated in detail, allowing the detection and dedicated examination of critical events that may have led to an alteration. Such

an assessment is critical as an organization's resources are limited, and the implementation and maintenance of underused or even unused technological features narrows the potential investment in a beneficial field. From a methodological point of view, qualitative approaches such as the critical incident technique may be helpful to gather rich information about causes and effects of such shift phenomena.

Also, small organizations are rather forced to form cross-functional and multidisciplinary teams, which may be altered as functional divisions grow in size, and additional layers of hierarchy are implemented for better manageability. The question arises whether preferences remain stable under these conditions or differ between rather homogeneous and rather heterogeneous teams, as heterogeneity implies knowledge asymmetries, differences in workstyles and jargon, and maybe also diverging performance measures and objectives. Another promising direction might be the notion of virtual teams and their specific IT-dependent communication needs (Montoya et al., 2009): functionality preferences likely differ depending on location and language of team members, e.g., automated translation may be interesting for dispersed teams that do not share common language skills, but less attractive for team members from the same city.

The study at hand sought to shed light on actual system use of startup employees on a feature level, following suggestions by Sun (2012). While alterations could be detected by means of sampling strategy, the study did not employ a longitudinal perspective (i.e., intra-individual changes), and the drivers of alterations could not be addressed due to the study's methodology. The cross-sectional layout was chosen to hold technology advancements constant so that the same IS state-of-the-art is available to all participants. Hence, omitting a longitudinal setting was deemed adequate for the research at hand. Future studies, however, may tackle this layout and provide insights into drivers for usage revision.

As for all scientific studies, a number of shortcomings need to be addressed. Sampling was conducted among members of federal startup organizations; hence nascent companies outside these structures did not appear in the sample. Although federations require and foster organizational structures that were deemed a requirement for the study at hand, organizations opting against membership due to their numbers might be an interesting object of research as well. Also, SP-CBC requires preference elicitation through concept selection, limiting the amount of information that can be provided for each alternative. Although the design yields insightful advantages through its monadic orientation, real-world decision-makers may exhibit different information processing when choosing an application for their organization, e.g., they may suffer from information overload due to the sheer amount of alternatives and subsequently rely on heuristics for selection, such as overstating familiar brand names.

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