TATJANA SCHNEIDMÜLLER

Engaging with Emerging Technologies

Socio-cognitive foundations of incumbent response

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Inspelen op opkomende technologieën:
De socio-cognitieve grondslagen van technologie-adoptie van gevestigde ondernemingen

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Preface

I won't lie, the last four and a half years have been tough; or, as I like to jokingly call it, a confrontational and thorough mental health check. Not just because of the effort and time required to design and execute three independent, yet somehow related studies, that you dedicate so much time and thought to that you can only hope not to lose faith and interest in your research going forward. But rather, because of the things I had to sacrifice and the people I had to let go of, and to some say goodbye forever. After all, nothing changes if nothing changes.

If you know me a little (better), you know I love change. What I tend to forget, however, is that change comes at a cost. Any type of growth is associated with growing pains, such as adjusting to a lower salary, moving, starting from scratch and being a rookie all over again, making new friends while losing old ones, competing for things that seem to make no sense, wasting time, not seeing any progress, facing rejection, and failing a lot before you eventually see a glimpse of success. Hence, it is of paramount importance to surround yourself with encouraging, empowering, and, most importantly, sane and stable people that will help you see the light, enjoy the process and guide you along your journey towards the end of the Ph.D. tunnel.

First and foremost, I wouldn't be here today without the help, support and guidance of my doctoral supervisors. Both excellent and highly successful, yet unconventional academics that have always encouraged me to be nothing else but myself and follow my own path. Not many Ph.D. candidates get the time and chance to explore and do exactly what they want, in their own way, on their own terms while enjoying the full support and backing of their supervisors. A humongous thank you goes to Prof. Henk W. Volberda for far more than just supervision. You have influenced and shaped my life in many ways beyond my work. I will forever be grateful for the opportunity, the trust and confidence in me and my abilities, the praise and encouragement, the counselling, advice, limitless support, all the conversations, and little social chats that you always managed to squeeze in despite your ever-bursting agenda. Knowing that such a strong and uplifting connection with your supervisor is a rare exception, I appreciate and value our bond even more. Similarly, I would like to thank Prof. Shahzad Ansari for his unwavering support and fierce encouragement to embrace my uniqueness. Thank you for making my research visit to Cambridge such a memorable experience, introducing me to the college culture, and opening doors that otherwise would have remained firmly closed.

Next, I would like to express my gratitude to colleagues that eventually have turned into friends and without whose advice, constant feedback and sheer presence in my life the past years would have not only been so much more difficult, but simply not the same. Thank you, Mariano, for your patience and dedication working with me on my first academic project. I sincerely hope that all this time, struggles and effort have not been in vain, and our paper will soon appear in a top journal. Thank you, Murat, for being a trusted confidant and an invaluable advisor. I hold your honesty and directness in high regard; plus, I love a good bad joke. Thank you, Thijs, for checking in on me, for dragging me to all the socials and drinks, and for not giving up and continuing asking me to join for lunch, despite the all too frequent rejections. Thank you, Maura, for sharing our office space, making it a safe harbour and beautiful space to work from, and for co-parenting all our plants and our Nespresso machine. Thank you Somendra for always being so positive and fun to be around. It's a shame we have discovered the pleasures of wine tastings so late in our Ph.D. trajectory. Thank you, Agnieszka, for being such a true and loyal friend, for taking my mind off work and reminding me of what really matters. I regret that we connected so late, even though Henk suggested from the start that we would get along splendidly. But I am happy for whatever stupid comment I made about your tea in the coffee kitchen that got us to talk and click within seconds. Thank you, Lancie — my little brother from another mother and the best conference travel buddy one can wish for — for everything. And last, but certainly not least, a huge thank you to Taghi. Thank you for all the physical tea sessions discussing research ideas, (the purpose of) life, politics, food, events, and so much more. Thank you for lunches in the sun, little walks around campus, and the latest invention — Skype coffees, designed to check in on and motivate each other, and jointly procrastinate whenever applicable. Thank you for being a constant source of inspiration, feedback and criticism (even though we both know I don't like this part), encouragement, and overall support. I don't think that I would have made it without you, especially in those dark times.

This is already getting too long, and I am sure you are all tired of reading by now, but there are a few more people that deserve the credit. Thank you, Sam, Mariya, and Iryna for bringing joy and fun to my life. Thank you for all the wine and champagne, the deep and the silly conversations, our little trips, and countless memorable moments. You have been in my life for over 10 years now; you stood by me in dark times, have immensely supported me, cheered me up and on in changing careers and embarking on this ludicrous journey of a Ph.D. I am so blessed and grateful to have you girls in my life, and I am excited about our future

endeavours. A very special thank you goes to Yannis; your love, care, and strength have helped me heal and mend that what has previously so carelessly and foolishly been broken. You have played such a vital part in this process, and your support deserves so much more credit than you might realize.

Lastly, and most importantly, I would like to thank my family. Thank you, Hasi, aka Inna. You are the best aunt I could have dreamed of. I know we were off to a rocky start when Andreas first introduced you to our family, and I am sure you will remember that thing I said to you for the rest of your life. But oh well, I was young and who knew back then that life will take such a twisted turn. I knew it for a while already, but especially after July 2017, I am so immensely grateful to have you in my life. It has been a huge loss for both of us, and things will never be the same, but I am tremendously thankful to have you and the two little Hasis (Sascha and Nickas) in my life. Finally, thank you to my parents. You both have been through so much in your lives. I admire your strength, positivity, courage, and unbreakable spirit. Thank you, mum, for being so fierce and strong-willed. Thank you for teaching me how to read and write in German, at a moment in time when you yourself had no knowledge of German. This was an invaluable lesson in hard work, perseverance, and the power and importance of continuous learning. You once told me that you always envisioned one child becoming a doctor and the other a teacher; in a sense, I am making both your wishes come true. Thank you, dad, for being my biggest fan and the goal-oriented, free-spirited go-getter that you are. If I had to summarize what I have learned from you, it would be: always turn the other cheek, never give up on people, and know that how people treat you and what they say to you has very little to do with you. Instead, it is testament to their own inner battles, insecurities, and the limits they set to their own existence. Thank you also for your effort and the creativity that goes into making mum and me at least smile, if not laugh daily. But I am sure that after almost 40 years of marriage and practice, this is no longer an effort, but part of your nature. As individuals, you may be maddening opposites of each other, but together, you are incredible parents that would and always have done and given everything for their children. Thank you both for encouraging me from an early age to take independent decisions and cope with the consequences, for being an inexhaustible fountain of (un-)solicited advice, that, much to your frustration, I so rarely follow. Words cannot express my gratitude for the love, time, resources, and effort you have poured into me, my education and upbringing, and how you continue to support me on my life journey.

To those that I have not mentioned by name, know that you are not forgotten. Your actions and words have touched and shaped my Ph.D. experience

in some way or form. It would be such a cliché of me to say that the past years have made me stronger. To be honest, I have never considered myself weak to start with. However, to reference yoga, what I have realized is that with all your help and support, I can create a comfort zone beyond my comfort zone; meaning, I am perfectly comfortable with being uncomfortable.

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Chapter 1: Introduction

How can incumbents navigate technological change? This remains a key question within strategic management literature. Conceptualized as episodic, technological change is considered separate and disjoint from the status quo (Anderson & Tushman, 1990). The initial unfamiliarity with the phenomenon is known to trigger a preconditioned mental process on individual and collective levels (Kaplan & Tripsas, 2008), placing the environment temporarily in a state of flux and upheaval (Bitektine & Haack, 2015; Swanson & Ramiller, 1997). The perceived cognitive distinctiveness of technological change, not only highlights the importance of diverse groups of social actors and their perceptions in technology emergence and change (e.g., Garud & Rappa, 1994; Kaplan & Tripsas, 2008), but is also known to generate an urge for reactivity and action; prompting incumbent firms to 'place their bets' early on the next industry standard, despite considerable uncertainty and a lack of social consensus (Eggers & Park, 2018; Sinha & Noble, 2008).

With the majority of studies attending to later stages of technology emergence and change, research has predominantly considered the interpretations, mental frames, and framing of individuals and different groups of social actors (e.g., Eggers & Kaplan, 2009; Gerstner, König, Enders, & Hambrick, 2013; Kaplan & Tripsas, 2008; Raffaelli, Glynn, & Tushman, 2019; Tripsas & Gavetti, 2000), their interactions in (categorical) meaning making (e.g., Kennedy & Fiss, 2009; Navis & Glynn, 2010; Vergne & Wry, 2014), as well as, the use of language and discursive strategies (e.g., Kahl & Grodal, 2016). Examples peering inside the firm, for instance, have explored how managerial framing can either prevent (Tripsas & Gavetti, 2000) or promote (Raffaelli et al., 2019) incumbent adaptation. Others have studied the evaluative response of stakeholders, such as infomediaries, to incumbent actions (e.g., Benner, 2007; Benner & Ranganathan, 2012).

Advocating a cognitive perspective, an innate assumption in the literature asserts that once top management is aware of technological change, the incumbent firm is generally able to respond (Eggers & Kaplan, 2009; Eggers & Park, 2018; Maula, Keil, & Zahra, 2013). Yet, research addressing the origins and dynamics of attention to technological change and the tensions that may arise due to the initial incongruity of emerging technologies with core and "sticky" field structures and conventions, such as industry regulation is comparably scarce. Overall, the

preparadigmatic stage of technological change has received inadequate attention. Importantly, also, assumptions that may be valid in later stages of technological change may not apply in such early periods of change.

In fact, the very conceptualization of technological change as episodic, and thus, separate from the totality of wider industry events is only illusionary, in the sense that it represents individual and collective temporal, relative and limited perceptions and (over)evaluations of stability of existing structures. Cognition and thinking, more generally, are subjective and emotional (Pollock, Lashley, Rindova, & Han, 2019). Drawing on past conditioning, and thus past emotions, thoughts trigger emotional responses. While emotions are fleeting, they can have lasting consequences (Pollock et al., 2019) by further reinforcing the ongoing thought process and projecting forward, into the future. Trapped in thinking and their cognitive state, social actors overemphasize time by, on the one hand, placing too much value on their past (e.g., their role in the industry, past performance and experiences, industry structures and dynamics), and on the other hand, being too concerned with the outcome (i.e., what and how much they stand to gain or lose), and thus live in constant anticipation of the future. Consequently, audiences, and ergo their engagement with technological change and emerging technologies, are inherently heterogeneous (Dorobantu, Henisz, & Nartey, 2017).

Departing from diverse vantage points (Kaplan & Tripsas, 2008) and with self-serving outcomes in mind (Wooten & Hoffman, 2008), different audiences purposively engage (Romanelli, Powell, & DiMaggio, 1992) in continued negotiations and renegotiations (Garud & Rappa, 1994) around technological change and emerging technologies. Generally, theoretical constructs, such as categories (Grodal, Gotsopoulos, & Suarez, 2015; Zunino, Suarez, & Grodal, 2019) or the "organizing visions" (Swanson & Ramiller, 1997) associated with emerging technologies are the products of an evolutionary, socio-cognitive and socio-political construction process; jointly developed and agreed upon through interaction and negotiations (Rosa, Porac, Runser-Spanjol, & Saxon, 1999). The preceding and unfolding debates, however, are messy and contested due to the varying vantage points (Kaplan & Tripsas, 2008), interests and agendas of social players and the initial instability of evaluations (Kennedy, 2008). This has important implications for how we think about technological change.

New and still emerging technologies are unfamiliar and may even appear dubious at first (Kaplan & Tripsas, 2008; Lee, Hiatt, & Lounsbury, 2017). As the technology emerges and audiences gain experience and exposure, however, the amount of information about the technology significantly increases forcing them to

continuously update and potentially change their evaluations (Dorobantu et al., 2017). Not only do their interpretations vary (Kaplan & Tripsas, 2008), but importantly also, not all audiences may equally contribute to and engage in technology emergence and associated discourse. In fact, some audiences may never engage in the first place. Others may have significant influence beyond their own engagement. Consequently, when and how different audience engage with emerging technologies are important questions to answer to enrich our understanding of technology emergence and technological trajectories, since early foundational developments can have fundamental consequences for the structure and competitive dynamics of the industry and the fate of incumbent players (Moeen & Agarwal, 2017).

Furthermore, the evaluations of different audiences may be significantly at odds with the judgements of others. Extant examinations of cognition in the realm of technological change, however, usually do not consider affect and the polarity of social actors' engagement in the collective meaning making process. While much can and has been learned from cognitive frames and delving deeper into the use of language and words, particularly in category emergence, the exploration of simplified evaluative cues of "good" and "bad" can also yield valuable insights (Rindova, Ferrier, & Wiltbank, 2010). Essentially, all social evaluations display either collective approval or disapproval (Pollock et al., 2019). Especially in the preparadigmatic stage, where lasting consensus and a common vocabulary are still lacking, cues of approval are critical. Consequently, the breadth of discursive interpretations of different audiences, as represented in their audience engagement — their attention and opinions (Gerstner et al., 2013), exposes incumbents to a myriad of potentially conflicting messages about acceptable and expected course of action. How incumbents respond to, by potentially selectively attending to, diverse information cues channelled in audience engagement before a common understanding has evolved remains largely untested.

While it is true that in some industries managers have considerable managerial discretion (Deephouse, 1999), other, more traditional settings, such as banking and healthcare, both currently experiencing an unprecedented wave of technology-enabled innovation, are tightly regulated and thus may significantly limit the strategic actions of incumbents. Such compliance-focused industries are interesting contexts to study not only incumbent adaptation, but also the challenges that existing regulation poses for innovation, more generally. In essence, experimentation with emerging and still controversial technologies may initially be not only illegitimate (Navis & Glynn, 2011), but in fact illegal (Scott, 2008). An

intriguing and important question to ask then is: how do incumbents manage such tensions?

This dissertation consists of three chapters, each addressing one of the previously identified shortcomings in extant literature, namely:

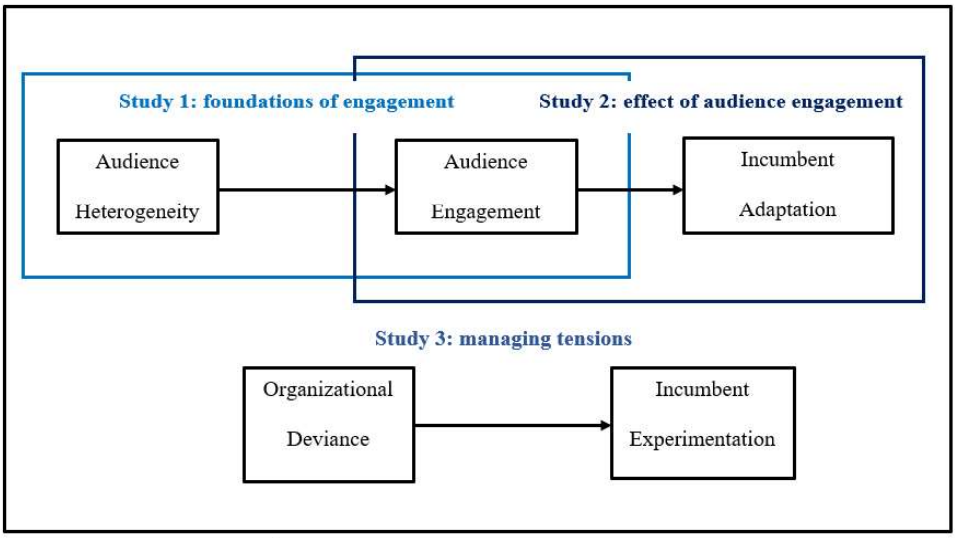
1. The engagement of different audiences with preparadigmatic technological change; particularly, their timing and mode of engagement

2. The effect of differential audience engagement on incumbent response

3. The tensions, and potential incongruence, of existing industry structures with emerging technologies

Figure 1 depicts the overarching framework governing this dissertation.

Figure 1-1: Overarching Framework



The dissertation closes with a general conclusion and future research directions section. But first, a snapshot of each study is presented.

1.1Foundations of audience engagement

Building on work that acknowledges the importance of diverse social communities in technology emergence, I apply the concept of audience engagement to understanding variation in audiences' attention and opinions with emerging

technologies in the preparadigmatic stage. Departing from the notion that not all audiences are created equal, I introduce expertise and field association as sources of audience heterogeneity to hypothesize when and how audiences are likely to differ in their engagement with emerging technologies. Specifically, I attempt to disentangle when and how audiences first learn about the emerging technology, their most likely initial response and how that evolves over time, if and when other audiences join in on the debate.

Ultimately, interactions between social actors and their engagement in discursive debates around emerging technologies are strategic and political in nature. Consequently, contrary to the established notion that incumbents are late to attend to technological shifts, I propose that core expert audiences, such as incumbents, will be first to attend to technological change due to the perceived value or threat of the technology to their business. Additionally, I conjecture that based on issue salience and the cognitive capacity of audiences, the timing of engagement of different audiences is not perfectly aligned; indeed, some audiences may never join certain debates. Moreover, I hypothesize that the engagement of some audiences, often more peripheral and mainstream audiences, will be largely dependent on and shaped by the perceptions and evaluations of others, more core and expert audiences, at least initially. This allows me to conclude that the interconnectedness between audiences goes beyond pure interactions.

1.2The effect of audience engagement on adaptation

Building on the preceding study, we assert that the engagement of different audiences with emerging technologies, such as fintech (short for financial technology), varies over time. Extant studies often handle cognition and discourse in separation, as if unrelated. Particularly in the context of technological change, it is the process of socially contested meaning making that fuels the change. Thinking alone, without outward expression and interaction, can only have limited impact on firm strategy, technology and change.

Consequently, drawing on the concept of audience engagement we hypothesize and test how the relative attention and opinions of four diverse audiences (industry experts, field experts, consumers, and regulators) influence the adaptive response of incumbent players in the preparadigmatic stage of technology emergence within fintech in European commercial banking. We find that incumbents respond predictably to inter-audience consensus, as well as, the engagement from regulators and consumers. Interestingly, our findings regarding the cues perceived from expert audiences (i.e., industry and field experts) are

counter intuitive, as incumbents appear to disregard their engagement. Our findings stress the importance of audience heterogeneity beyond expertise. We suggest that much can be learned from applying an audience-based view, rather than a purely cognitive perspective to incumbent response to technological change; particularly, because not all debates are equally pronounced and emotionally charged.

1.3Managing tensions

A common, often implicit, assumption within incumbent response literature is the idea that incumbents are generally able to adapt, yet often fail to do so. In this study, I question this assumption by accentuating the importance of pre-existing industry structures and agreements, specifically industry regulation. The study is situated within commercial banking in the United Kingdom and explores the impact of regulatory fines on incumbent experimentation with emerging technologies, here fintech. The underlying idea is that pre-existing conventions are sticky and trail behind important industry developments such as new and emerging technologies. Hence, incumbents are bound by existing and lasting regulations and limited in their decision-making regarding experimentation with yet unproven and potentially socially contested technologies. With an industry-wide mandated compliance focus in mind, I hypothesize that organizational deviance relaxes social constraints and allows incumbents to temporarily deviate from industry means by exploring and experimenting with emerging technologies. In fact, I find support for the idea that organizational deviance is positively and significantly associated with subsequent incumbent experimentation with emerging technologies. This finding has important implications not only for theory, but importantly also for policy makers that are increasingly promoting innovation within financial services.

1.4Declaration of contributions

Following the Erasmus Research Institute of Management ‘s doctoral regulations, I hereby

declare the contributions made to each of the chapters that make up my dissertation:

Chapter 1. This chapter was composed by me, the author of this dissertation.

Chapter 2. I am the sole author of this paper. My promotors provided me with feedback at a later stage but did not contribute to writing.

Chapter 3. The paper was written in collaboration with my main supervisor prof. dr. Henk W. Volberda and dr. Mariano L.M. Heyden. I conducted the literature review, gathered the data and supported dr. Heyden in the data analysis. Together we wrote and worked on several versions of this paper, incorporating the feedback provided by prof. Volberda at different stages of the process.

Chapter 4. I am solely responsible for the entire project from idea generation, over literature review, data collection, to analysis and writing. My promotors provided me with feedback at a later stage but did not contribute to writing this version of the paper.

Chapter 5. I am the author of this work.

Chapter 2: Engaging with technology: applying a socio-cognitive lens to technology emergence

2.1Introduction

The role and importance of social audiences in episodes of technological change has been extensively researched across diverse strands of literatures, including institutional change (e.g., Greenwood, Suddaby, & Hinings, 2002; Grodal, 2018; Maguire, Hardy, & Lawrence, 2004), categorization (e.g., Suarez, Grodal, & Gotsopoulos, 2015; Zunino et al., 2019), incumbent response (e.g., Benner, 2007, 2010; Benner & Ranganathan, 2012; Gerstner et al., 2013), and technology evolution (Kahl & Grodal, 2016; Kaplan & Tripsas, 2008). Early and preparadigmatic stages of technological evolution, in particular, are known to be marked by a consensus-challenging (Bitektine & Haack, 2015) socio-cognitive process of contestation and divergence (Garud & Rappa, 1994; Kaplan & Tripsas, 2008), wherein self-interested field communities (Wooten & Hoffman, 2008), or audiences (Bitektine, 2011; Hoefer & Green, 2016), experiment with temporarily competing ideas and interpretations (Abernathy & Utterback, 1978; Anderson & Tushman, 1990). The resulting discursive chaos and confusion, not only place the environment in a temporarily state of flux (Bitektine & Haack, 2015; Swanson & Ramiller, 1997), but also generate an urge for (incumbent) reactivity and action (Eggers & Park, 2018; Sinha & Noble, 2008). Meaning important (investment) decisions with far-reaching and potentially irreversible consequences are often made during these early formative moments of cognitive interaction, while social evaluations are fluid and consensus is still outstanding (Kennedy, 2008; Swanson & Ramiller, 1997).

To highlight this with an example from financial services, consider the rise of digital transformation in banking and its effect on incumbent banks' decision to increasingly retreat from physical services, including the closure of branches and the rapid decrease in bank-owned free to use cash machines. While in line with progressive efforts to transform economies into innovation hubs, this trend is threatening public and free access to cash, discriminating particularly against vulnerable communities, such as the elderly and less well-off. Regulators, including the British government, were initially encouraging this innovative move. However, lobbied by consumer protection groups and concerned with the overall stability of the UK cash infrastructure, their attitude is increasingly changing, with regulators

now considering passing regulation to secure public and free access to cash (Finextra, 2020a).

Our current understanding of audience engagement with emerging technologies, however, does not sufficiently account for the possibility that audiences may update and significantly change their evaluation as the change unfolds, and the effect this has on the industry and incumbent actions. This is particularly the case because most studies focus on later stages of technology evolution and change (Eggers & Park, 2018), where social evaluations are comparably more stable (Kennedy, 2008). Relatedly, because they explore later stages, where generally more information is available and more easily widely accessible, extant explanations and models of audience engagement usually assume that all audiences engage with emerging technologies from the get go (e.g., Kaplan & Tripsas, 2008). However, audiences are undeniably heterogeneous (Dorobantu et al., 2017). Thus, by default their interest in, and therefore engagement with emerging technologies will significantly vary. In fact, as the above example illustrates not all audiences are likely to engage with emerging technologies from the start. Consumers, or at least the average consumers, for instance, for long are largely unaware and uninterested in participating in debates on the digitalization of banking, as these have little to no (negative) consequences for their own interests. In fact, it is only consumer protection groups that are currently speaking up for minorities. Most consumers, on the other hand, may lack the incentive to engage with the debate in the first place.

Hence, in this paper we advocate the need for more attention to audience heterogeneity; not to confirm extant findings that diverse audience matter (Kaplan & Tripsas, 2008), but to further disentangle when, how and why they participate in the discursive and formative socio-cognitive construction of technological trajectories. In so doing, we propose that in preparadigmatic stages of technological change, audiences significantly vary, not only in terms of the timing and mode of their engagement, but also with regard to the roles they play in the wider discursive social debate. We further assert that this heterogeneity in engagement cannot be explained with the prevailing explanation of vantage points alone (Kaplan & Tripsas, 2008; Pfarrer et al., 2019); and thus, calls for considerations of other audience characteristics.

To illustrate, think of the initial hype around Blockchain technology, and crypto currencies, in particular. A trend partially created and sustained due to the extensive efforts of informed experts, such as consultants. On the consumer side, too many (underinformed) private investors have rushed in early and lost their

money or slipped into debt by either underestimating the volatility of digital currencies as highly speculative investments or by falling prey to crypto fraud and scams. At the same time, incumbent banks were initially quite reluctant to invest and explore Blockchain technology. And while most have eventually given in to social pressure and run some experiments, despite the persisting hype, the overall attitude of bankers towards widescale application of Blockchain in banking remains sceptical, at least for the time being. Similarly, most regulators have been postponing action, with crypto regulation varying significantly per country, and most countries lagging behind. At the same time, central banks are currently only cognitively beginning to explore the possibility of central bank backed digital currencies.

Consequently, to shed light on such variation, we draw on the concept of audience engagement — "the degree to which observers view a phenomenon as noteworthy and provocative" (Gerstner et al., 2013: 275), and combine it with work on audience heterogeneity (e.g., Cattani, Ferriani, & Allison, 2014; Dorobantu et al., 2017; Kim & Jensen, 2011). In so doing, we extend extant considerations of heterogeneity in audience engagement based on reference points (i.e., history and prior experiences) (Kaplan & Tripsas, 2008; Pfarrer et al., 2019) by distinguishing between mainstream and expert audiences (Kim & Jensen, 2014), and classifying them as either core or peripheral with regard to their identification with the field (Grodal, 2018). Defining audiences along these two dimensions, we develop propositions about when, how and why heterogeneous audiences engage differently in the preparadigmatic stage, by attending to and forming opinions about the emerging technology.

Combining insight from cognition (Eggers & Kaplan, 2009; Kaplan, 2011; Kaplan & Tripsas, 2008; Raffaelli et al., 2019) with the growing body of literature that explores communication and the discursive dynamics of change (e.g., Clemente & Roulet, 2015; Kahl & Grodal, 2016) we complement extant cognitive explanations of technology evolution by making three main contributions. First, we zoom in on the often overlooked preparadigmatic stage of technological change. In this initial state of confusion and flux (Bitektine & Haack, 2015) audiences' interpretations and attention are still fluid (Kennedy, 2008) and likely to flow and ebb between established rationalizations and emerging ideas (Green Jr, Babb, & Alpaslan, 2008). Nevertheless, as the example on digitalization demonstrates such early deliberations and contestations set the stage for future technology evolution, and importantly shape incumbent and industry trajectories by means of early and consequential commitments.

Second, we make the case for studying audience engagement, hence, audience attention and opinion in tandem, rather than in separation. The notion that not all events are equally attended to (Hoffman & Ocasio, 2001), in particular, has considerable implication for extant considerations of cognitive dynamics within technology evolution (Kaplan & Tripsas, 2008). Particularly, we contradict extant assumptions, and posit that incumbents as core experts, standing to lose most, are likely to keep close tabs on wider industry developments, and are thus most likely to be first to (discursively) engage with emerging technologies, which should not be confused with incumbent action in forms of investments. Similarly, we hypothesize that unless consumers, as peripheral mainstream audiences, are significantly affected or incentivised, they are likely to either abstain from the debate or engage last with emerging technologies. Both our examples of innovation in financial services highlight that audiences in fact do vary in terms of timing and mode of engagement.

Third, with our attention to audience heterogeneity we stress the need to further investigate audience motivation and roles in technology emergence. As we demonstrate, audience heterogeneity initially leads to significant information asymmetry; meaning that mainstream audiences may be importantly dependent and thus biased towards the social evaluations and thus subjective judgements of other, often more informed audiences. This is particularly the case with more complex and abstract technologies, such as Blockchain and crypto currencies. Here, expert opinions carry significant value, yet, as we underscore, are undoubtedly biased towards their own self-interest.

Our findings have important implication for managers faced with emerging technologies.

2.2Audience engagement

Technology emergence, as a process of constantly changing, negotiated, and collectively constructed meaning making, has a strong socio-cognitive foundation (Garud, Jain, & Kumaraswamy, 2002). In this early preparadigmatic stage, different idiosyncratic (Dorobantu et al., 2017) and invariably self-interested (Wooten & Hoffman, 2008) field communities (Grodal, 2018) purposively engage (Romanelli et al., 1992) in continued negotiations and renegotiations (Garud & Rappa, 1994) in order to establish generalized validity verdicts of an emerging technology (Green Jr et al., 2008). They do so departing from varying vantage or reference points, in terms of their understandings of the past and future, based on their unique backgrounds and experiences (Kaplan & Orlikowski, 2012; Kaplan &

Tripsas, 2008). Thus, audiences, here, should be understood as agentic co-creators of the institutional environment (Vergne & Wry, 2014) that exercise direct or indirect control over issues and events (Bitektine, 2011), including technologies and technological trajectories (Garud & Rappa, 1994; Kaplan & Tripsas, 2008).

While technologies and technological frames originate in the minds of social actors (Garud & Rappa, 1994; Kaplan & Tripsas, 2008; Raffaelli et al., 2019), it is the outward expression, exchange and discursive interaction with others that ultimately constructs the (technological) reality (Cornelissen, Durand, Fiss, Lammers, & Vaara, 2015). Consequently, deliberations of technology and its evolution invoke the use of audience engagement, rather than just considerations of cognition. Audience engagement refers to "the degree to which observers view a phenomenon as noteworthy and provocative — which varies over time" (Gerstner et al., 2013: 275). They do so by expressing views that endorse or criticize the new technology, often through communication media (Cornelissen et al., 2015; Lammers & Barbour, 2006). Its crucial difference to cognition lies in the combination of attention and opinion, and the emphasis on their temporal variation (Gerstner et al., 2013).

Attention based theories (Ocasio, 1997; Ocasio, Laamanen, & Vaara, 2018; Webb & Weick, 1979) regard "the environment as a source of constant input and stimulus", where events constantly compete for the limited attention of social actors (Hoffman & Ocasio, 2001). Public attention, in particular, is a scarce resource (Hilgartner & Bosk, 1988). Thus, in order to receive attention issues, need to be perceived as salient. Previous research has established that audiences selectively attend to events and issues (Simon, 1947) that are deemed salient to a social context (Fiske & Taylor, 1991), such as their field, that resonate with their social identity (Ocasio, 1997), align with their self-interests and understandings (Meyer, Jancsary, Höllerer, & Boxenbaum, 2018), are critically novel or incongruent with established beliefs (Hilgartner & Bosk, 1988), surface in interactions with others, or appear in audience specific media as concerns or solutions, in line with their social and cultural structures (Hoffman & Ocasio, 2001). Returning to the earlier example of digitalization of banking, as previously mentioned, consumers are less likely to attend to this issue as it has, at least initially, little direct consequences for them and their own interests. Incumbent banks and banking regulators, on the other hand, are more likely to closely monitor industry developments, and thus dedicate significant attention, due to their perception of salience of such events to their core business.

While attention is necessary (Hoffman & Ocasio, 2001), it is opinion, that has been recognized as a powerful source of social control (Noelle-Neumann, 1993;

Oshagan, 1996). Opinion is based on the quality and quantity of available information, and forms in line with the interest (Oshagan, 1996) and strategic motives of social actors (Dutton & Jackson, 1987). Collective beliefs, in particular, serve as a source of social validity (Bitektine & Haack, 2015; Haack & Sieweke, 2019). Seeking others' approval through compliance with popular beliefs is part of human nature (Clemente & Roulet, 2015) and social approval is necessary for the institutionalization of practices (Maguire & Hardy, 2009). Moreover, recent studies confirm that the collective beliefs of others, or audience opinion, and own interpretations thereof are more powerful in guiding behaviour than private beliefs (Jachimowicz, Hauser, O'Brien, Sherman, & Galinsky, 2018). This becomes particularly clear in the context of hype and hype cycles, such as with Blockchain and crypto currencies. As previously stated, many private investors have suffered significant financial losses due to their overvaluations of the exaggerated expectation of others, not least important field experts and opinion leaders, such as consultants, and trust in valuation of digital currencies.

Capturing both, the engagement of audiences is limited by the cognitive capabilities of social actors (March & Simon, 1958; Simon, 1947) and the carrying capacity of audiences (Hoffman & Ocasio, 2001). It is contingent on their interpretations of issue salience (Bundy, Shropshire, & Buchholtz, 2013), where salience is based on private beliefs and self-interests of audiences (Wooten & Hoffman, 2008), and their access to quality and their quantity of information. As such, audiences are likely to differ in their attention dedicated to and conclusions drawn about the merits of emerging technologies. Additionally, audience attention and opinion are not stagnant, but rather evolve over time (Gerstner et al., 2013). Consequently, this implies that thinking about technology we have to explore other sources of audience variation beyond historical conditioning (Kaplan & Tripsas, 2008). Ultimately, what each deems acceptable and expected reflects a combination of intra- and inter-audience discursive dialogues (Bitektine & Haack, 2015; Lammers & Barbour, 2006; Suddaby & Greenwood, 2005); thus, discursive audience interactions. We suggest that the value that audiences ascribe to outside beliefs and perception significantly vary based on audience expertise and field affiliation.

2.3Audience heterogeneity

Audiences are inevitably heterogeneous (Vinet & Zhedanov, 2010), particularly in terms of their affiliation with the field, which boils down to their identification with field level concerns (Glynn, 2008; Grodal, 2018), and their level

of expertise (Kim & Jensen, 2014), which is essentially dependent on their access to and skill in interpreting information (Dorobantu et al., 2017).

2.3.1 Field association

Audiences are part of and engage in social debates in several fields simultaneously (Glynn, 2008; Grodal, 2018). Being part of multiple fields at the same time, audiences' identification with any one field is relative to their affiliation with other fields (Glynn, 2008). As such, some audiences are peripheral in some fields, and core in others (Grodal, 2018). For instance, consultants operate in financial services, however, only as a peripheral audience. Their main interests align with their own industry, where they represent the core. Since audiences are driven by their individual goals and motives (Wooten & Hoffman, 2008), their level of association with the field determines whether audiences are predominantly concerned only with their own strategic self-interest (i.e., peripheral), which may be at odds with wider field concerns, or primarily act in line with field interests (i.e., core), which strongly aligns with their own concerns (Glynn, 2008; Lawrence & Suddaby, 2006). By selectively and intentionally dedicating their attention and forming (evaluative) opinions in line with their interest, audiences help shape and co-create the institutional settings they participate in (Seo & Creed, 2002).

Yet, their roles and engagement, such as with technology emergence, in each field varies, depending on how they identify, and ultimately, how much they potentially stand to lose or gain (Fiss, Kennedy, & Davis, 2012). When social actors identify strongly with a field, their thoughts and perceptions are significantly shaped by the field and field level concerns, such as in the case of banks and banking. In this process, their thoughts and identity eventually merge. Significant and highly uncertain change, such as technology emergence, may then trigger emotional responses, including aggression and defensiveness. Hence, when social actors engage to defend their perceptions and opinions about technology emergence, they may feel as if they need to defend themselves; meaning, ultimately, they will be fighting for their survival.

Institutional change literature suggests that social contestation outside "ignites" discourse within the field (e.g., Clemente & Roulet, 2015). This, however, strongly conflicts with the idea of field association. Standing to lose/gain the most, we would expect the first debate around emerging technologies to take place at the core of the field, rather than outside of it. In fact, we suggest that when new technological alternatives become available, field insiders, and core audiences that identify strongest with the field, established field practices and rationales, in

particular, are likely to be first to take note of any such change, not field outsiders. With reference to our financial services example, this implies that banks are more likely to be aware of emerging technologies in their field than, for instance, consumers. Due to the scarcity and constant competition for attention (Hoffman & Ocasio, 2001), peripheral audiences are more likely to engage in the field-level debate later as they prioritize other, more salient events (to them). This would imply that outside, or peripheral discourse can further fuel, rather than spark, an already ongoing debate at the core, which thus far may have been invisible to the self-centred eye of peripheral or outside communities. As suggested, banks and bankers are likely to be already aware of industry events. However, interest from (financial) consultants is likely to further accelerate the debate.

A related idea around incumbent inertia (Hill & Rothaermel, 2003) suggests that emerging technologies will be negatively received by field audiences, and core communities in particular (e.g., established industry players). Departing from a field association perspective, however, it is, at least theoretically, just as likely that the change and emerging technology will be embraced; as long as it is appealing and promises a positive outcome that is. The example of digitalization in banking presents such a case. Undeniably, digitalization is a complex task, yet it offers significant advantages, including cost savings which is why most are currently well on their way to becoming increasingly digital (whatever that may mean to them).

In such cases, we can expect the internal debate at the core of the field to be more pronounced. In fact, core audiences may even hype and inflate expectations with regard to the technical and economic viability of emerging technologies to vie for peripheral attention and support in legitimating the change. In similar fashion, we can expect core communities to obstruct information flow, to engage in silencing practices or discourse aimed at discrediting the emerging technology, if the change promises to threaten their existence or otherwise negatively affect them. Blockchain and crypto currencies represent such examples. The inherent promise to both is the disintermediation of financial services, which unarguably, at least theoretically, threatens the very existence of banks.

Taken together, this leads to the conclusion that not all debates are equally pronounced. The degree to which audiences identify with the field, and thus are invested in the outcome of the debate, will determine when and how actively they will engage with emerging technologies.

2.3.2Expertise

Whereas prior research suggests that discursive debates are simultaneously ongoing within and outside of the field (Hauser, 1998), we argue that this understanding oversimplifies the dynamics at play, and, importantly, neglects the crucial roles of expertise and access to information, which are intimately related. From a reference point perspective, social actors will engage with technologies based on their histories and prior experiences (Garud & Rappa, 1994; Kaplan & Tripsas, 2008). Such pre-existing beliefs are known to be stable and to have lingering effects, meaning that new information must be significantly (emotionally) charged (Davis, Morrill, Rao, & Soule, 2008) and ideally stem from more similar audiences, with whom social actors can more easily identify, such as industry peers (Dorobantu et al., 2017) in order to matter. Otherwise, initial beliefs can be further reinforced even if confronted with conflicting information, which then is likely to be discounted (Ditto & Lopez, 1992).

A good example of such irrational behaviour is the current aversion of consumers and retailers towards cash during the COVID-19 pandemic. Recent erroneous accounts referencing the WHO warning against the use of cash have led to more consumers opting for contactless payments and retailers increasingly ceasing to accept cash arguing the necessity of contactless payments for hygiene reasons. Even after scientific evidence has become available stressing that the spread of the virus via banknotes is unlikely, and despite central banks' actions to clean banknotes and communicate the safety of cash, consumers and retailers continue to be wary of using cash.

Consensus-challenging events, such as technology emergence, create a general sense of confusion with regard to the future of the environment (Bitektine & Haack, 2015; Kaplan & Tripsas, 2008) and are generally associated with high levels of uncertainty (Abernathy & Clark, 1985; Tushman & Anderson, 1986). As social actors engage in discursive inter- and intra-audience debates they increasingly expose themselves to other viewpoints and additional information that may potentially challenge their own understanding and possibly add new insights that either conform with, and thus reinforce their opinion (Nickerson, 1998), or challenge existing beliefs.

Importantly, audiences vary in their potential to influence others. Generally, experts tend to be better poised and more influential in shaping others' beliefs (Banerjee, 1992; Loeper, Steiner, & Stewart, 2014). Expert audiences tend to have better and timelier access to relevant high quality information, whereas non-experts, hence mainstream audiences, such as consumers, often have to rely on information-

cascades, and/or have to revert to observing others, including regulators and experts, whom they perceive to have better information or to be more capable in assessing the situation (Dorobantu et al., 2017). Even regulators, who are widely respected and expected to be better informed often launch public and expert consultations to further their understanding of complex matters, including emerging technologies. Due to varying access to information, some audiences may significantly rely on the evaluations of others to form their judgements, and thus may engage later in the field-level debate. Consequently, not all debates are simultaneously ongoing. Audience-level debates may significantly overlap, yet, are unlikely to be perfectly aligned.

Additionally, the purpose of engagement varies. Mainstream audiences, including consumers and the general public, have been found to primarily engage to evaluate the social desirability of and create legitimacy, while expert audiences (e.g., consultants, bankers, analysts) engage to give meaning in an effort to create legitimation (Vergne & Wry, 2014). This implies that the way in which audiences are likely to engage with emerging technologies will differ based on their expertise.

2.4Audience heterogeneity and audience engagement

By design each field is heterogeneous, comprised of different audiences (Grodal, 2018), each with its unique past conditioning (Kaplan & Tripsas, 2008), pursuing its own self-interests (Wooten & Hoffman, 2008). Departing from this notion of filed heterogeneity, we propose that different field audiences will vary in their timing and mode of engagement with emerging technologies. Having established our underlying argumentation of how field association and expertise matter for audience engagement, we now proceed to explain how different audiences are likely to engage with emerging technologies. To illustrate, where applicable, we draw on the previously established examples of digitalization and Blockchain technology and crypto currencies within the emergence of financial technology (fintech) in the financial services industry.

Combining field association with expertise we arrive at four distinct audience groups: core experts, core mainstream, peripheral experts, and peripheral mainstream. Using the example of financial services, key financial institutions, such as banks represent the core experts. Their immediate interests strongest align with field concerns. Auditors, consultants, rating agencies, etc. comprise the peripheral expert community as they offer services and operate in other industries, apart from finance. Financial regulators are a core mainstream audience as they are entrusted with the overall stability of the industry and regulate not just banks, but all financial

transactions and matters also of banking unrelated corporations and individuals. Lastly, consumers, as the general public, represent the largest, most dispersed and unspecialized (on average) audience — peripheral mainstream.

2.4.1Core experts

Core communities, such as commercial banks in banking, identify strongest with the institutional field, the field level arrangements and concerns (Glynn, 2008). Their very existence is based on the wellbeing, stability and continuity of their industry. In other words, they stand to lose the most if their industry were to be disrupted by an emerging technology, such as fintech. Consequently, they need to be attune to their environment; aware and knowledgeable about existential field-level events, such as potential threats, and any early experiments with new technological alternatives, which are characteristic of the preparadigmatic stage of technology evolution (Sosna, Trevinyo-Rodríguez, & Velamuri, 2010; Tushman & Anderson, 1986). Their centrality and connectedness within the field enables them to keep close tabs on such early developments.

Core experts are likely to be first to cognitively and discursively attend to and debate the merits of the emerging technology, such as digital and Blockchain. Prior research suggests that incumbents (i.e., core experts) are either sluggish in their response to or fail to address emerging technological change entirely (Eggers & Park, 2018). However, what these studies refer to is strategic action in terms of technology adoption or adaptation, not audience engagement. In fact, many industry examples highlight that incumbents, including Kodak were first to engage and experiment with, if not even invent, the new technology (Kapoor & Klueter, 2015). Studies on top executives' mental frames confirm that it is neither a lack of cognition, nor engagement, as a function of attention and opinion, which can be blamed (Eggers & Kaplan, 2009; Kaplan, Murray, & Henderson, 2003; Raffaelli et al., 2019).

Being first to cognitively and discursively engage, core experts will be biased towards their subjective and self-interested interpretations of the emerging technology (Kaplan & Tripsas, 2008; Raffaelli et al., 2019). Despite being generally better equipped to carefully assess and make comparably more educated evaluations of the new technology, they will attend to the technology in line with the likely consequences of the technology for their and the field's own good. Uncertainty laden situations, such as technology emergence, create emotional ambivalence (Raffaelli et al., 2019). Meaning, incumbents will either quench the debate early on or intensively engage with the technology trying to influence social perceptions and

debates beyond their audience boundaries. Their mode of engagement will ultimately depend on the evaluation and framing of the technology as either a nice to have opportunity or a potentially existential threat.

Hence, in its very early stages, where little is known with regard to the future economic and technological merits, emerging technologies, are likely to receive very little attention from core expert audiences. Promising a more efficient and effective future for the overall financial system, without any direct and immediate implications for day-to-day business or long-term strategy as of yet, Blockchain, for instance, was assessed mildly positively, and classified as potentially fruitful, yet highly uncertain opportunity, lacking the necessary threat potential to mobilize action. On the other hand, in the event that the technology is initially perceived and framed as a potential threat, the attention dedicated towards it is likely to be substantial. In that case, core communities, such as banks and bankers, will engage to try and discursively fight the looming disruption. Negative media accounts of bankers speaking out against crypto currencies are evidence of this.

Proposition 1: *Core expert audiences will be first to attend to emerging technologies and will form opinions in line with their own self-interest.*

If the initial reaction of core audiences is negative, they are likely to seek allies in other audiences to vindicate their position. Resistance to change will thus further fuel the debate. The strong identification of core experts with the fields and its concerns will ultimately transform this discursive debate into a struggle for survival; however, only if other audiences engage. In case the debate is not further being picked up by other audiences, the technology will be simply dismissed. In such cases the field has collectively decided by means of silent consensus that the proposed technological alternative is not worth further pursuing. Individual social actors might still hold private beliefs that are supportive of the emerging technology, however, fear of being in the minority (Clemente & Roulet, 2015) or fear of social judgement (Haack & Sieweke, 2018) will prevent them from openly voicing their concerns, and thus silence them. Hence, the technology will remain experimental and the extant technological paradigm will prevail.

However, if the debate spreads to other audiences, core experts will dedicate (even) more excessive attention to fight it, especially as the collective debate unfolds over time. The participation of and interaction with other audiences will expose the core expert audience to new information and potentially different mental frames and

evaluations (Kaplan & Tripsas, 2008). Yet, this new input will only be used to update existing core experts' beliefs if the information is sufficiently (emotionally) charged (Dorobantu et al., 2017), meaning it implies immediate or near-term consequences for the core and its concerns. This is the case for instance when other core audiences, such as industry specific regulators openly endorse fintech friendly regulation, or core expert audiences are at risk of losing support from or legitimacy in the eyes of large mainstream audiences, such as consumers. Otherwise, core experts are likely to stick to their own beliefs and evaluations.

Proposition 2: *Core expert audiences will attend more to emerging technologies if other audiences join in the debate but will only update their beliefs if the newly acquired information is sufficiently charged.*

2.4.2Peripheral experts

Peripheral expert audiences, such as consultants or suppliers, operate in multiple industries, have an extensive network of customers and clients which enables them to monitor the developments in multiple fields at the same time. Examples in the fintech context include, but are not limited to, audit or consultancy firms, which have expertise and clients in the financial sector and beyond, including emerging industry challengers, as well as regulators. Their industry experience and expertise expose peripheral experts to high-quality, timely information with regard to important field events, including emerging technologies. In contrast to core experts, peripheral experts only loosely identify with the field and thus their engagement with emerging technologies, such as Blockchain, is associated with comparably little risk. Moreover, they have a vested economic interested in the diffusion of emerging technologies, such as fintech more generally, as they can not only market their expertise to incumbent banks who are trying to make sense of fintech, but can also aid fintech start-ups in getting a foothold in the financial industry. Hence, peripheral expert audiences are likely to dedicate a significant amount of attention to emerging technologies from their early beginnings. With comparably little to lose and a promising upside potential, peripheral expert audiences will act in their own best interest, and are thus, very likely to hype and propagate an overall positive outlook for emerging technologies, as in the case of Blockchain and crypto currencies.

Proposition 3: *Peripheral expert audiences will be early to attend to emerging technologies and will form opinions in line with their own self-interest, which is likely to be in favour of technology emergence.*

Peripheral experts have a financial incentive to spur technology emergence. While core expert audiences may want to conceal and prevent important information from leaking in fear of potential field consequences, peripheral experts, are less attached to the field, and thus potentially more inclined to spread information. Thus, they will create and disseminate expert information to instigate and fuel debates in other audiences. In so doing, peripheral experts may be perceived as (more) impartial and objective by others. Their ties to other communities, and core communities specifically — peripheral experts are often consulted and hired for their expertise by regulators and bankers alike — make them the most engaged audience throughout technology emergence. In fact, peripheral experts, also known as infomediaries (König, Mammen, Luger, Fehn, & Enders, 2018), may help bridge the significant knowledge gap between different audiences in the preparadigmatic stage of technology emergence.

Despite their expert standing and reputation in society, the engagement of peripheral experts with emerging technologies will be mainly driven by opportunism and self-interest. Hence, their main goal is not so much to objectively inform, but to create and stir emotional response in others; as emotion triggers thought and thought triggers action. Consequently, they are most likely to update their beliefs in line with their own preferences and information, and only turn to core mainstream audiences, particularly regulators, for "matter of fact" guidance. The reactions of core expert audiences are likely to be discounted and/or dismissed as biased, defensive and conservative. Insights from peripheral mainstream debates, most notably consumers, are likely to be used to strengthen own arguments.

Proposition 4: *Peripheral expert audiences will attend most to emerging technologies as the debate unfolds and will only update their beliefs if the information is factual.*

2.4.3Core mainstream

Core mainstream audiences, such as industry regulatory bodies, identify strongly with the issues and concerns of the field, yet lack the expert knowledge and information to accurately and timely assess emerging technologies. Positioned at the core, they have a good overall understanding of and have significantly

contributed to the current status quo and history of the industry. However, they have a different focus and agenda with regard to the field. Drawing on the financial services industry as an example, financial regulators represent a core mainstream audience. Entrusted with setting and enforcing the rules and regulations that govern financial interactions and services, they are crucial to the very existence of the financial world. Hence, they identify strongly with the field. At the same time, their focus is too broad, as it extends beyond pure banking and financial services, to be considered field experts. For instance, financial regulators (e.g., Financial Conduct Authority in the UK, which is in charge of the entire financial services sector, not just commercial banking, and thus a mainstream expert audience), also monitor the investment behaviour of individuals and actions of finance-unrelated corporates. Importantly, also, they are primarily concerned with the stability of the industry, in contrast to incumbent banks and consultants (core and peripheral experts, respectively) who are financially incentivized.

Core mainstream audiences are likely to lack the most up-to-date information with regard to emerging technologies and are thus largely dependent on the knowledge creation of and cascades from other engaged audiences, expert audiences in particular. Consequently, they are likely to engage later with the emerging technologies, once experts have already engaged and voiced their opinions. Regulators, in particular, will postpone their engagement and weigh the facts before speaking out. Relatedly, core mainstream audiences are more prone to form opinions in line with expert audiences. Lacking expertise, at least initially, they are more likely to be susceptible to the influence of and receptive to opinions of peripheral expert audiences, not least because they may commission peripheral experts to conduct research and assess the situation or launch public and expert consultations. Judgements of core experts may be dismissed for lack of objectivity.

Proposition 5: *Core mainstream audiences will be cautious to attend to emerging technologies and will form opinions in line with peripheral experts.*

Over time, core mainstream audiences are likely to pay increasingly more attention to emerging technologies to gain experience and build own expertise through further exposure to new information from core audiences and own information search. As the collective debate unfolds, they will continuously update their initial beliefs to arrive at a more balanced and independently informed opinion. They do so based on their own, and interpretation of other similar, thus core expert and peripheral mainstream audiences. However, the engagement of peripheral

mainstream audiences (e.g., consumers) is likely to matters little, if at all, as they represent the least informed and most fragmented audience.

Proposition 6: *Core mainstream audiences will increasingly attend to emerging technologies as the debate unfolds and will continuously update their beliefs as they gain experience and expertise.*

2.4.4Peripheral mainstream

Peripheral mainstream audiences, such as consumers, neither identify closely with the field, nor are they experts in field matters. As such, they do not have access to any relevant first-hand information. Consequently, their engagement will be comparably late and significantly influenced by others who are similar to them, particularly peripheral expert and core mainstream audiences. Since, the latter also largely derive their initial information mostly from peripheral experts, consumers, too, will be initially strongly guided by the evaluation of peripheral experts, such as consultants. While individual enthusiast within the peripheral mainstream audience will join the field-level debate early, most social actors will for long lack the cognitive space to extensively engage with fintech and the like. Not only are audiences limited in terms of their cognitive space and capabilities, but importantly also, not all events are equally attended to (Hoffman & Ocasio, 2001). Lacking the close affiliation with the field paired with only general knowledge of the industry, emerging technologies, such as fintech, are likely to lack the necessary salience for peripheral mainstream audiences to engage.

Proposition 7: *Peripheral mainstream audiences will be last to attend to emerging technologies and will form opinions in line with peripheral experts.*

Comprised of vastly diverse social actors in terms of expertise, and potentially conflicting self-interests, peripheral mainstream audiences loosely relate to the field and thus will only episodically engage with the social debate around emerging technologies. Engagement will mostly be triggered by (provoking) debates in and opinions of other audiences, such as consumer protection groups in the digitalization of banking. Lacking the necessary expertise to accurately assess the situation, peripheral audiences are more likely to fall prey to hype and social fears, including the fear of missing out. The crypto crazy around Bitcoin is exemplar of this. Consequently, as the debate unfolds, peripheral mainstream audiences, such as consumers, subjective to the opinions of others, are likely to follow the most prominent opinion in the field at the time of their engagement.

Proposition 8: *Peripheral mainstream audiences will episodically attend to emerging technologies as the debate unfolds and will update their beliefs to match the prominent opinion in the field.*

2.5 Discussion

In this paper we apply a socio-cognitive lens to explore variation in audience engagement in technology emergence, a period of divergent experimentation with technological alternatives that is accompanied by collective sense-making (Abernathy & Utterback, 1978; Anderson & Tushman, 1990; Kaplan & Tripsas, 2008). Building on work that underscores the crucial role of social actors in the fate of technological designs (Garud & Rappa, 1994; Grodal et al., 2015; Kaplan & Tripsas, 2008), we investigate when and how social audiences cognitively and discursively engage with emerging technologies. In so doing, we draw on audience heterogeneity literature and suggest that audience significantly vary in their attention and opinions not only based on their vantage points (Kaplan & Tripsas, 2008), but also with regard to their expertise (Kim & Jensen, 2014) and field affiliation (Grodal, 2018). Audience engagement, as a socio-cognitive frame, enables us to update our understanding of social actors' engagement in technological change and its evolution and offers ample future research opportunities.

While previous studies have extensively explored the interpretive aspects of technological change (e.g., Eggers & Kaplan, 2013; Raffaelli et al., 2019; Tripsas & Gavetti, 2000) and have repeatedly stressed the importance of interactions between and interconnectedness of multiple social actors, be it collective or individual, the combination of cognition and discourse in explaining the dynamics of technology evolution has not yet received sufficient attention. Ultimately, cognition remains locked in individuals' minds (Garud & Rappa, 1994), and meaningless, unless it is expressed and exchanged. Hence, if we assume that technological change is highly contested and involves interactions (Grodal et al., 2015), we need a deeper understanding of audience engagement, as a function of attention and opinion. Relatedly, it would be useful to further expand our understanding of audience heterogeneity, its effects on audience engagement, and the interconnectedness between the engagements of different audiences; especially, their roles and motives for and in engagement with technological change. Past studies have devoted significant attention to study the cognition of incumbents and top managers, in particular. As our paper clearly highlights, other audiences, such as peripheral experts and peripheral mainstream audiences, the timings, modes and

motives behind their engagement in technology emergence also matter, but possibly in other ways than we have previously assumed. This implies that a reconsideration of extant assumptions may be in order to move the field and our understanding forward.

2.5.1Audience engagement matters

The first goal of our paper was to argue a case for audience engagement in studying technology evolution, and technology emergence, in particular. Drawing on the concept of audience engagement (Gerstner et al., 2013), we advocated the view that audience opinion and attention need to be considered in tandem, rather than in separation. The contested nature of technology evolution makes deliberations of cognition alone inadequate to capture the full dynamics of technology emergence. While beliefs and mental frames are inarguably important, they are irrelevant without considerations of attention and outward expression and exchange. In fact, not all debates are equally contested and pronounced. Consequently, a focus on audience opinion alone can be misleading. Similarly, Meyer, Jancsary, Höllerer, & Boxenbaum (2018) contend that while exposure or attention is a necessary criterion in the pre-institutionalization stage, it is insufficient. Furthermore, the iterative nature of technological and categorical evolution suggests that social actors repeatedly update their beliefs and opinions (Dorobantu et al., 2017), and only with sustained attention gain necessary exposure and experience to negotiate and arrive at a common understanding (Grodal et al., 2015). Consequently, both attention and opinion matter, and, importantly, are likely to vary over time.

In this study, we have hypothesized how audiences may initially engage with and update their beliefs in early technology emergence. Future studies could further explore the interactive dynamics of audience engagement not only in the preparadigmatic stage, but also throughout the entire technology evolution cycle. An important implication of our study is the rejection of the idea that discursive fights are simultaneously ongoing (Baum & Oliver, 1992; Hauser, 1998). Instead, we propose that discursive debates on audience and potentially other levels significantly overlap yet are rarely perfectly aligned. We explain this misalignment or sequencing of engagement based on audience heterogeneity, and field association and expertise.

2.5.2Audience heterogeneity matters

Thinking about technology requires deeper thinking about social audiences, their motives, timing and roles in engagement with technological change, and thus, audience heterogeneity. Differentiating between distinct audiences, we depart from studies that conceptualize the field as homogenous and connect with work that considers the actions of core and peripheral communities in institutional fields (Grodal, 2018). Building on work on audience heterogeneity (e.g., Cattani et al., 2014; Dorobantu et al., 2017; Kim & Jensen, 2014), we propose that the way different audiences engage in social contestation of emerging technological change is significantly influenced by their idiosyncrasies. Assuming that individual and collective audience-level perceptions, labels and mental frames of technological change are heterogeneous, subjective, and ultimately self-interested (Wooten & Hoffman, 2008), implies that they are also deceptive and limited perspectives of reality, relative to the perspectives of others. Furthermore, the evolutionary and interactive process of technological change implies that these perceptions are temporal and fleeting, subject to re-evaluations and change.

Past studies contend that multiple actors matter (Kaplan & Tripsas, 2008), yet fail to account for the fact that not all audiences are created equal, are equally alert and equipped to engage with emerging technologies. In this paper we explored variation in audience engagement based on heterogeneity in field association and expertise. We have argued that field association is intimately related with issue salience (Grodal, 2018), and will thus influence the attention audiences are willing to dedicate (Hoffman & Ocasio, 2001) to emerging technologies. Expertise, on the other hand, concerns the quality and quantity of information and the necessary skills to assess a situation (Dorobantu et al., 2017; Kim & Jensen, 2014), which we link to opinion. We propose that due to information asymmetry and issue salience, different audiences will engage with emerging technologies differently. Departing from the notion that audiences vary with regard to their influence on others' opinions (Banerjee, 1992), we have theorized that some audiences largely rely on others as information providers and guideposts in forming their opinions (Dorobantu et al., 2017), and thus suggested a temporal sequencing in audience engagement of different social communities.

Especially with regard to timing of engagement, our current understanding of technology evolution oversimplifies the dynamics at play. Contrary to the common misconception that incumbents, for long, tend to ignore technological change (Bower & Christensen, 1996; Christensen, 1997), we propose that incumbents will be first to, at least discursively, engage and attend to emerging

technologies. Using the case of core experts, or incumbents, we have linked framing to discursive action by showing how negative or positive interpretations of fintech will pan out in terms of audience engagement. Additionally, we postulate that audiences that are less informed, less attached, and more diverse, such as consumers will significantly differ in their timing and mode of engagement with emerging technologies compared to other audiences.

While we have explored only two dimensions on which audiences differ, we believe there is far more to be learned on when, why and how different audiences participate, steer or even (temporarily) dominate the social contestation for technology trajectories. It would be interesting to know whether all audiences eventually participate in, or under what conditions certain audiences may abstain from engagement with technological change. Similarly, the roles different audiences assume and whether and how those may change throughout technology evolution present intriguing research avenues. Additionally, future research could explore other audiences, such as new industry experts (communities that have expertise in the new technology, such as fintech, yet are not widely recognized and accepted as 'real' experts). We believe that studies in this area could significantly contribute to and advance our current understanding of the formative process of technological evolution.

2.5.3Interactions matters

While it is tempting to believe that social actors' behaviour and actions will be mainly guided by their peer group, and audiences that are more similar to them (Dorobantu et al., 2017), our paper clearly shows that the interconnectedness and interactions of diverse audiences warrants more scholarly attention. In line with previous studies we have argued that some audiences, also known as infomediaries (e.g., König et al., 2018), serve as information suppliers to other less informed and less equipped communities. We add to this line of research that by creating and disseminating information these audiences also intentionally influence the timing of engagement of other audiences and their initial beliefs in line with their own interest. Consequently, we further stress the need to study audiences' motives in their engagement. Additionally, contrary to extant assumptions, we propose that the majority of consumers due to constant competition for attention and issue salience (Hoffman & Ocasio, 2001) will play a much lesser (direct) role in technology emergence than previously assumed (e.g., Kahl & Grodal, 2016; Kaplan & Tripsas, 2008).

Summing up, grounded in audience heterogeneity we extend the idea that audience interactions necessitate further investigation, particularly with regard to audience motives and roles. We believe that future studies can significantly contribute to our current understanding of how technological frames and trajectories come about by paying closer attention to the roles audiences assume in social contestation of technological change and the motives that drive their engagement.

2.5.4Managerial implications

As we have shown, the initial incumbent, or core experts', cognitive and discursive response is likely to be either to disregard and dismiss the emerging technology as a nice to have potential, but distant future opportunity, or try to fight and quench the eminent threat in its very beginnings. Driven by their conditioned thinking, incumbents will passively or actively resist the change. And thus, eventually embark on the previously so often documented path towards disruption (see Eggers & Park, 2018 for a review of studies on incumbent response). Throughout this process, they may attempt to influence the perceptions and actions of other audiences, such as consumers (Kahl & Grodal, 2016) and regulators. However, as we have shown, these audiences often rely on information cascades (Dorobantu et al., 2017) from other, often peripheral expert, audiences. Additionally, due to (lack of) issue salience (Hoffman & Ocasio, 2001) consumers, in particular, are likely to partake in the social discussion on technological change at a much later stage, and possibly only occasionally, when significantly triggered by others and the overall unfolding debate. Hence, our study suggests, that incumbents wanting to influence the debate around technology emergence, would be best advised to direct their discursive strategies (Kahl & Grodal, 2016) at expert and core audiences, rather than consumers (peripheral mainstream). This idea resonates with recent studies that explore the importance and impact of social media and social media influences (e.g., Etter, Ravasi, & Colleoni, 2019; Seidel, Hannigan, & Phillips, 2020), as potential "new experts".

Most of past work concerns incumbents' ability to respond to technological change (Eggers & Park, 2018), implying a reactive, rather than a proactive stance of incumbents towards technology emergence; hence, the emphasis on cognition and mental frames in technological change literature (Raffaelli et al., 2019). What if instead of resisting, and ultimately responding to change, incumbents were to choose the path of least resistance? Instead of prematurely labelling and framing emerging technologies as either bad or good, incumbents could accept the change for what it is, stay alert, and explore, potentially on a small scale, whether they can

somehow make use of or even exploit it to their own advantage. Doing so, incumbents could be on top of and the driving force behind, rather than merely responding to the change as it unfolds. In fact, past work (Adner, 2012; e.g., Christensen, 1997; O'Reilly & Tushman, 2013) has already alluded to this possibility. To some extend we do see examples of this in practice already. Most incumbent banks, for instance, are or have been experimenting with Blockchain technology despite widespread scepticism. However, even these attempts are mostly driven by social pressure, and are thus reactive in nature.

Regardless whether the experimentation is internally integrated or externally contained, it is important that such early investments in emerging technologies remains label free. Labels or cognitive frames, are inarguably subjective (Garud & Rappa, 1994), historically conditioned (Kaplan & Tripsas, 2008) and limited by the cognitive capacity and capability of social actors (Raffaelli et al., 2019). As such they represent limited, illusionary perspectives that can either create exaggerated expectation, such as the hype around crypto currencies and Blockchain, or trigger organizational resistance (Lavie, 2006), such as inertia, and keep the organization trapped in its past (Sull, 1999). While recent work highlights the importance of frame flexibility (Raffaelli et al., 2019), we call for dis-identification and distancing from any conditioned thinking towards awareness and alertness. Early technology emergence creates a general sense of confusion (Bitektine & Haack, 2015) and any labelling or framing in this formative stage can have significant implications not only for technological trajectories (Kaplan & Tripsas, 2008), but also for organizational survival (Eggers & Park, 2018). Examples such as Kodak clearly demonstrate that it is not a lack of cognitive action, but rather cognition and framing stand in incumbents' way when dealing with technological change (Kapoor & Klueter, 2015; Raffaelli et al., 2019). Similarly, as our example of digitalization of banking illustrates, conditioned thinking, early labelling and exaggerated expectations can also have far-reaching societal implications, especially when key audiences such as regulators are involved. While the UK example of access to cash demonstrates that some early decision making may be reversable, it clearly draws attention to the importance of audience engagement and its fluctuation throughout the early, preparadigmatic stage of technology emergence.

Chapter 5: Overall conclusion

This dissertation concerns the broad, yet important question: How can incumbents navigate the preparadigmatic stage of technological change? Attributed with heightened levels of environmental uncertainty (Gerstner et al., 2013; Tushman & Anderson, 1986), divergent technological (Sosna et al., 2010) and categorical experimentation (Grodal et al., 2015), as well as, ambiguity with regard to the winning technology (Kaplan & Tripsas, 2008), and an inability to predict the wider industry outcome ex ante (Eggers & Park, 2018), technological change and the associated emerging technologies have been found to pose significant threats to the very existence of incumbent firms (Christensen, 1997), triggering a socio-cognitive process (Kaplan & Tripsas, 2008; Kennedy, 2008) and creating an urge for reactivity and action (Eggers & Park, 2018).

Despite considerable research effort, our current understanding remains incomplete. Rooted in cognition literature, extant explanations have already established the importance of social actors (e.g., Garud & Rappa, 1994) and explored how individual, as well as, collective mental frames and cognitive processes influence technology emergence (e.g., Kaplan & Tripsas, 2008) and incumbent response (e.g., Gerstner et al., 2013). However, most studies focus on later stages of technological change and are grounded in assumptions that may not necessarily apply to the preparadigmatic stage of technological change. To address these shortcomings, in this dissertation, I delve deeper into and explore the socio-cognitive dynamics of early technology emergence, by addressing the following three questions:

1. *When and how do audiences engage with emerging technologies and technological change?*
2. *What is the effect of audience engagement on incumbent response?*
3. *What is the effect of existing industry regulation on early incumbent experimentation with emerging technologies?*

Specifically, in Study 1 I explore and theorize when and how different social communities, or audiences engage with emerging technologies. Subsequently, in Study 2 I test the effect of differential audience engagement on incumbent response. Finally, in Study 3, acknowledging that extant industry structures may restrict incumbent action, I examine the effect of organizational deviance on incumbent experimentation with emerging technologies.

5.1Main findings and contributions

This section highlights the key findings of each study.

5.1.1Study 1

Building on work that underscores the crucial role of social actors in the fate of technological designs (Garud & Rappa, 1994; Grodal et al., 2015; Kaplan & Tripsas, 2008), in this paper, I investigate when and how social audiences cognitively and discursively engage with emerging technologies in the preparadigmatic stage, a period of divergent experimentation with technological alternatives that is accompanied by collective sense-making (Abernathy & Utterback, 1978; Anderson & Tushman, 1990; Kaplan & Tripsas, 2008).

By drawing on audience heterogeneity literature, I highlight that audience engagement is strategic and driven by self-interest (Wooten & Hoffman, 2008). This implies that audiences significantly vary in their attention and opinions not only based on their (historical) vantage points (Kaplan & Tripsas, 2008), but also with regard to how closely affected they are by the change, and ultimately, how much they stand to gain or lose. Stressing the importance of audience heterogeneity, I contrast audiences along two dimensions, expertise (Kim & Jensen, 2014) and field affiliation (Grodal, 2018), and thus distinguish between expert and mainstream, as well as, core and peripheral audiences, respectively.

I propose that based on their affiliation and self-interest (Wooten & Hoffman, 2008), audiences will engage differently and at different times with emerging technologies. Further, I assert that their level of expertise determines not only the quality and quantity of information available for decision making, but also, and importantly, significantly affects the independence of their evaluations and decisions. This implies that mainstream audiences, such as regulators and the public, largely rely on information cascades from more informed and skilled expert audiences (Dorobantu et al., 2017), at least initially. Lastly, I assert that audiences need not engage with emerging technologies at the same time, in a similar manner or intensity, or at all. My theorizing alludes to the conclusion that the engagement of audiences may be staged or may follow a certain pattern, which in turn may vary based on salience and nature of the change.

With Study 1, I contribute to literature by further dissecting the origins of audience engagement and highlighting the need to pay closer attention to audience heterogeneity, not only for mode and timing of engagement, but also with regard to the different roles audiences assume in technology emergence and change. The

latter, in turn, has implications for how we think about audience interactions. An important contribution of my study is the idea of time of engagement and potential for change in mode of engagement, if and when different audiences join in on the debate. Too often extant literature assumes that all audiences are equally engaged and have lasting, and seemingly irreversible attitudes towards emerging technologies. However, particularly early on, social evaluations are flexible and fluid (Kennedy, 2008). Meaning, social actors can and do update their beliefs and perceptions (Dorobantu et al., 2017). Consequently, I propose that we need to update and expand our understanding of how, when and whether at all audiences engage in technology emergence and change.

5.1.2Study 2

Building on Study 1, and specifically the notion that audiences are invariably heterogeneous (Dorobantu et al., 2017) and self-interested (Wooten & Hoffman, 2008), in this study we empirically test the effect of audience engagement of four diverse audiences (industry experts, field experts, the public, and regulators) on early incumbent response. In Study 1, I introduced the idea that audience engagement by core (industry experts, hence banks and bankers) and peripheral experts (field experts, including auditors, consultants, rating agencies, etc.) will be essentially biased with regard to their expectations of potential benefits from fintech for their own good. Our empirical results seem to confirm this, as we find that incumbents respond counterintuitively to the engagement of experts, both at field and industry levels. It appears that incumbents distrust the initial (over)evaluations of experts. In view of mainstream audiences, our predictions are confirmed, meaning incumbents seem to "obey" regulators and consumers. This is not further surprising, since these two audiences have the highest sanctioning powers (Suddaby et al., 2017), either by imposing regulatory sanctions or withholding business, and thus profits.

We add to existing literature by showing that the early engagement of different audiences carries different weights. Some audiences seem to matter more than others. Previous research has already established that social consensus matters (Kennedy, 2008). But little is known about whose opinion influences incumbent response when social evaluations are still in flux and the technology is still being contested and developed. Hence, we draw attention to audience heterogeneity, and show that the importance of traditional experts and expertise may be overvalued.

5.1.3Study 3

Adaptation literature has already extensively explored the barriers to incumbent response to technological change by particularly peering inside the firm (Eggers & Park, 2018). External, industry-level factors, on the other hand, have received comparably little attention. Industry regulation, in particular, has been largely neglected in this stream of research. Consequently, departing from the notion that emerging technologies are not only at odds with extant knowledge (Eggers & Park, 2018), but also existing industry structures, I hypothesize and test the idea that previous deviant behaviour is positively associated with experimentation with emerging technologies. My statistical findings confirm the idea that organizational deviance is positively associated with incumbent experimentation.

In so doing, I contribute to research that concerns incumbents' ability to address technological change (Eggers & Park, 2018) by highlighting that existing regulation may hold incumbents hostage to the extant technological paradigm. Consequently, I put forward the idea that regulation and regulatory compliance, otherwise desirable and widely socially accepted, may be crucial, but often overlooked, sources of organizational inertia (Hill & Rothaermel, 2003). Particularly in highly regulated settings, regulation may significantly restrict essential experimentation in preparadigmatic stage of technological change; and thus, might jeopardize successful adaptation.

Furthermore, since experimentation with emerging technologies may not only be at odds with ex post evaluations of key stakeholders (e.g., Benner, 2010; Benner & Ranganathan, 2012), but importantly also may violate ex ante (industry) conventions and the established social order (Scott, 2008), I introduce the idea that organizational deviance may provide the necessary window of opportunity to (temporarily) relax social constraints and allow for deviation from acceptable norms of expected behaviour. This, in turn, may have important implications for theory and practice.

5.2Implication for theory

The aim of this dissertation was to enhance our understanding of how incumbents can navigate the preparadigmatic stage of technological change, a period of early technology emergence, where little is known for certain, the social meaning-making process is still ongoing, and everything appears to be in flux. To do so, I focused on two main topics: audience heterogeneity and audience engagement. In Study 1, I explored how audience heterogeneity motivates

audiences to engage with emerging technologies. Subsequently, in Study 2, I addressed how differential audience engagement influences incumbent response to technological change. Finally, in Study 3, I highlight heterogeneity in audience power and differences in stability and "stickiness" of social evaluations and demonstrate the effect of such rigidity on incumbent experimentation. I make several contributions to extant literature.

5.2.1Audience heterogeneity

While past studies contend that multiple actors matter (Kaplan & Tripsas, 2008), they fail to sufficiently account for the fact that not all audiences are equally alert and equipped to engage with emerging technologies. Driven by subjective, and ultimately self-interested (Wooten & Hoffman, 2008) motives, audiences are significantly invested in and trapped by their own temporal and fleeting, yet inarguably deceptive and limited perceptions of reality, and thus will engage in line with their own self-interests and past conditioning. Hence, discursive debates across audiences are unlikely to be perfectly temporarily aligned. This is an important contribution, since most extant work implicitly or explicitly assumes simultaneity of engagement (e.g., Kaplan & Tripsas, 2008). As I demonstrate in Study 1, however, it is more likely that audience engagement is a staged process, based on audience heterogeneity.

Furthermore, due to information asymmetry (Dorobantu et al., 2017; Kim & Jensen, 2014) and issue salience (Hoffman & Ocasio, 2001), audiences will not only vary in their engagement, but also, with regard to their influence on others' opinions (Banerjee, 1992). In fact, initially, some, often less equipped, audiences may significantly depend on others as information providers and guideposts in forming their opinions (Dorobantu et al., 2017). I briefly touch upon this in Study 3 when discussing that regulators, driven by popularity of fintech, are increasingly urging incumbents to innovate. The iterative nature of technological evolution further implies that social actors can and repeatedly do update their beliefs and opinions (Dorobantu et al., 2017). Hence, the roles and levels of dependency may vary over time. Referencing the empirical context of Study 3 and combining this with the insights from Study 1, I postulate that regulators, as mainstream audiences will be initially hesitant to engage with emerging technologies and are likely to significantly influenced by experts, but ultimately will regain their independence by creating own knowledge and gaining first-hand experience.

A related topic concerns the role and importance of traditional experts, particularly infomediaries (König et al., 2018). New technologies bring about

important change in industry dynamics, beyond competition for market share and customers. The existing knowledge structures are replaced or at least updated (Moeen & Agarwal, 2017). This in turn, has important implications for experts and expertise. Compared to tech savvy influencers, established and more traditional experts, such as analysist may find themselves (initially) out of their depth and potentially with more limited access to quality and quantity of information. This, in combination, with comparably less exposure and thus less knowhow and skill with regard to new technology threatens not only the existence and relevance of established, old-technology experts, but may have also important implications for other audiences and society more generally. As presented in Study 1, expert audiences inform mainstream audiences through information cascades. Hence, when trusted experts lack knowledge or struggle with making sense of technological developments, this can have significant implications for technological trajectories and the pressures incumbents are exposed to. Intriguingly, our findings seem to confirm the waning power of extant expertise, suggesting that the role and importance of established experts in technology emergence might be overvalued.

In fact, seeking expert guidance, incumbents may be better advised to turn to field novices as these may have more influence on the future of competitive dynamics and industry structures(Köster & Pelster, 2017). As market boundaries are being stretched and expanded, it is likely that other audiences alongside with incumbents will be motivated to take action to renegotiate field dynamics. Hence, the strategic motivations and actions of field communities warrant more attention (Grodal, 2018). Of particular importance are the actions of regulators. As the findings in Studies 2 and 3 confirm, regulators have considerable power and influence over incumbent decision making.

Consequently, I advocate the view that to advance our current understanding of the socio-cognitive dynamics of technological change, particularly early on, we need to think deeper and consider social audiences, their motives, timing and roles in engagement; hence, audience heterogeneity (e.g., Cattani et al., 2014; Dorobantu et al., 2017; Kim & Jensen, 2014).

5.2.2Audience engagement

Another important aim of this dissertation was to argue a case for audience engagement (Gerstner et al., 2013) in studying technology evolution, and technology emergence in particular.

In line with recent efforts that draw attention to the actions of different field communities (e.g., Grodal, 2018), in Study 2 we advocate an audience-based view

on incumbent adaptation by exploring social discourse as validity signals in early technological change. Focusing on audience engagement as early cues or signals, we compliment extant studies that emphasize the intra-organizational determinants of incumbent adaptation (Eggers & Kaplan, 2009; Jansen et al., 2005; Maula et al., 2013; Tripsas, 2009) and traditionally only consider incumbent response after social consensus has been reached. In so doing, we follow calls for more attention to the preparadigmatic stage of technology emergence (Eggers & Park, 2018).

Our 'outside-in' approach, adds to the literature the idea that the degree to which external audiences legitimize technological change (in our case fintech) matters; particularly in regulated industries (Study 3). While most existing studies, implicitly or explicitly, assume that technological change is generally understood and widely accepted, we, empirically demonstrate that when everything from the validity of the technology to the acceptable course of action is still up for negotiations, incumbents do not adapt to technologies per se, but rather to ongoing and evolving debates. In so doing, we add to the comparatively underdeveloped stream of literature that concerns incumbents' motivation, rather than ability, to address technological change (Eggers & Park, 2018).

Specifically, I make a plea for considering audience opinion and attention in tandem, rather than in separation. I argue that a focus on cognition alone is inadequate to capture the full dynamics of technology emergence. Considerations of attention and outward expression and exchange are important, as not all debates are equally contested and pronounced. Consequently, a focus on audience opinion alone can be misleading. Similarly, attention, while necessary, is in itself insufficient (Meyer et al., 2018). Ultimately, both attention and opinion matter, and are likely to vary over time.

Similarly, in Study 2 we advance the idea that more attention needs to be paid to discursive variation within audiences over time. The idea that audiences host equally relevant opinions at the same time, and that the relative favouritism or criticism of audiences can change over time has rarely been empirically tested. Audiences are not static, but rather reflect an ongoing dialogue between proponents and detractors (Lefsrud & Meyer, 2012); and are thus, large enough to host multiple, potentially conflicting beliefs at the same time. With our audience engagement measure, we do not presuppose a dominant view, but instead allow and account for the possibility of simultaneously legitimizing and delegitimizing beliefs. Doing so, we are able to map the breadth and polarity of social discourse that increasingly place the environment in flux in the preparadigmatic stage.

Ultimately, all social evaluations display signs of approval or disapproval (Pollock et al., 2019). Studies 2 and 3, in their own way, underscore the importance of positive and negative audience engagement. Positive engagement signals social approval and validity (Bitektine & Haack, 2015), greenlighting incumbent adaptation, whereas negative engagement, implies societal disapproval and scepticism. It is important to recognize that positive and negative audience engagement may carry different weight for incumbent action. Specifically, external negative engagement may be perceived as a more imminent signal by and threat to incumbents (Studies 2 and 3). At the same time, negative engagement by some audiences may trigger the engagement of others, who otherwise would have remained dormant (Study 1).

Essentially, the polarity of audience engagement is grounded in audience heterogeneity, audience reference points (Nason et al., 2019) and self-interests (Wooten & Hoffman, 2008). Eventually, with sustained attention, and having obtained the necessary exposure and experience, social actors will jointly arrive at a common understanding (Grodal et al., 2015). However, the journey towards consensus, as documented in audience engagement over time, and its impact on incumbent response warrant more attention to detail.

5.3Implications for management

5.3.1Study 1

Here, I conclude that incumbents are likely to either disregard and dismiss or try to fight and quench the emerging technology from the get-go. Either way, incumbents are likely to passively or actively resist the change, and thus, set in motion a self-fulfilling prophecy towards disruption (see Eggers & Park, 2018 for a review of studies on incumbent response). In so doing, they are likely to vie for support from other, mostly non-expert audiences, such as consumers (Kahl & Grodal, 2016) and regulators. However, these audiences are known to rely on information cascades (Dorobantu et al., 2017) from expert audiences. Hence, spending millions on marketing campaigns, devising communication strategies targeting consumers (Kahl & Grodal, 2016), particularly now, in times of social media and new media experts (Castelló, Etter, & Årup Nielsen, 2016; Etter et al., 2019; Seidel et al., 2020) may not be the best strategy to pursue.

Additionally, extant studies often focus on incumbents' ability to respond (Eggers & Park, 2018), implying incumbent reactivity towards technological change. Reactivity is rooted in conditioned thinking (Garud & Rappa, 1994; Kaplan

& Tripsas, 2008), laden with emotions and expectations. Instead of falling prey to their own cognitive trap (Lavie, 2006), incumbents could explore whether they can experiment with emerging technologies without prematurely labelling them. Extant research has already insinuated this possibility (Adner, 2012; e.g., Christensen, 1997; O'Reilly & Tushman, 2013).

Overall, this study makes a plea for dis-identification and distancing from any conditioned thinking, as labelling and framing in this formative stage can have significant implications for organizational survival (Kapoor & Klueter, 2015; Raffaelli et al., 2019).

5.3.2Study 2

In line with previous research (e.g., Kaplan & Tripsas, 2008), Study 1 asserts that technological change triggers biased and subjective socio-cognitive processes, exposing incumbents to potentially mixed and contradicting messages, and creating an urge for incumbent reactivity. Yet, early adaptation may require a degree of external approval (Clemente & Roulet, 2015). Consequently, incumbents must sift through and weigh the engagement and therein communicated cues of differently engaged and heterogeneous audiences. Particularly in highly regulated settings, incumbents' responses to technological change are not solely based on the technological and economic merits of the technology (Kennedy & Fiss, 2009), but instead are sensitive to the ongoing social debates.

Therefore, we argue that the preparadigmatic stage of technological change should be perceived as a window of opportunity, rather than a period of chaos and confusion. Specifically, we posit that incumbents can steer the social debate in their desired direction, for instance by strategically influencing expert audiences, as proposed in Study 1.

5.3.3Study 3

As indicated in Studies 1 and 2, reactivity to technological change may place the firm in a disadvantageous and inert position. However, our results in Study 3 seem to suggest that most proactive experimentation with emerging technologies, such as fintech, primarily stems from deviant incumbents. Hence, it appears as if laws and regulations, put into effect to preserve trust and social stability, may, in fact, stand in the way of innovation.

This finding is alarming and has important implications for regulators and regulation. On the one hand, regulators across the globe are increasingly trying to profile their countries as innovation hubs, urging incumbents across industries to

innovate. Yet, as this study suggests there may be significant and potentially disastrous societal costs associated with incumbent proactive experimentation with still emerging and illegitimate, and initially potentially illegal technologies.

Consequently, regulators may have to rethink not only their discursive engagement with still emerging technologies, particularly when encouraging incumbent experimentation and adaptation, but also, become increasingly aware of the existing boundaries of extant regulations. As technology emergence creates space for social re-evaluations, the famous notion of striking a balance between innovation and stability may also apply to regulators and regulation.

5.4Future research directions

In this dissertation, I have presented three studies that explore the socio-cognitive dynamics in the preparadigmatic stage of technological change and have explored how incumbents can navigate and ride the waves of such turbulent waters. Despite their individual contributions, all research is prone to limitations. This, however, is exciting news, as limitations pave the way for future research opportunities.

In my first study, I put forward the idea that audience engagement is staged, and possibly follows a pattern. This runs counter to the baseline assumption in extant literature that seems to suggest that all audiences engage and interact from the start and simultaneously (e.g., Kaplan & Tripsas, 2008). However, this may not be the case at all. It may be that different audiences matter at different stages of technology emergence and thus fulfil different roles. Some audiences may abstain from engaging in certain debates but may be the main driving force behind others. We still know comparably little about how, when, and why audiences become activated or remain dormant.

My propositions are limited, in the sense that I have explored only two dimensions on which audiences differ. Without doubt, there are plenty other important audience characteristics to be considered. Additionally, I do not address heterogeneity of technological change, that may serve as an additional source of variation. In fact, in Studies 1 and 2 I looked at fintech more broadly, more as an emerging "organizing vision" (Swanson & Ramiller, 1997), rather than considering individual applications, such as Blockchain or AI. Future studies, however, can explore how these processes may differ depending on the characteristics of individual technology applications. It may be, for instance, that more comprehensible and more readily adaptable technologies do not attract much audience engagement, and despite their advantages do not receive much incumbent

attention and acceptance due to hype and overexaggerated expectations of less accessible technologies, such as Blockchain. Such research efforts could for instance further our understanding of managerial fads and fashion (Abrahamson, 1991).

Furthermore, more can be learned from delving deeper into the content of audience engagement. What I have presented here is a crude first measure to capture how much attention audiences dedicate to and what opinions they form with regard to emerging technologies. This was an intentional choice because fintech, as an umbrella-term, is so diverse. And primarily because the main goal of my research was to study audience engagement and its effect on incumbent action absent a common vocabulary and understanding. A next step could be to dive deeper into the content of messages exchanged, the emerging themes and associated mental frames account for potential differences in topics, and the use of language. Relatedly, more work needs to be done to disentangle how different messages spread from one audience to others and the importance and salience of some messages and audiences versus the rest.

Similarly, the roles different audiences assume and whether and how those may change throughout technology evolution present intriguing research avenues. In line with previous studies I have pointed towards expert audiences, such as infomediaries (e.g., König et al., 2018), and their role as information suppliers to other less informed and less equipped communities (Dorobantu et al., 2017). By creating and disseminating information, these audiences intentionally influence the timing of and engagement of other audiences. Consequently, what motivates audience engagement, the interconnectedness of audiences and the different roles they play in technology emergence all deserve future research attention. Recent studies concerning rumour communities (Seidel et al., 2020) and social media (Etter et al., 2019), in particular, are great examples of how to advance our current understanding on the inter and intra-audience dynamics withing early technology emergence.

In line with recent effort, future research could also explore other audiences, such as new industry experts (communities that have expertise in the new technology, such as fintech, yet are not widely recognized and accepted as 'real' experts). The rise of social media has important implications for how we think about media and the assumptions we make with regard to reach, influence, and engagement (Roulet & Clemente, 2018; Seidel et al., 2020). Such efforts could significantly advance our current understanding of the formative process of technological change.

Moreover, regulation and its effect on incumbent action warrant considerably more attention in technology change literature. Particularly considerations of extant vs new regulation, aimed to promote innovation, and the resulting tensions present fruitful research opportunities. For instance, while it is true that regulatory compliance is and has been a hot topic in financial services for a while now, the passing of new regulations, such as PSD2 and Open Banking introduces important changes to industry dynamics. Such regulation make adaptation no longer a choice, but a dire necessity. The experimentation with fintech captured in Study 3 may be part of impression management and other strategic, yet purely symbolic actions (Busenbark, Lange, & Certo, 2017). Therefore, as a next step, it is important on the one hand to further explore whether we can establish causality between prior organizational deviance and incumbent action and delve deeper into the subject matter by paying closer attention to the internal changes those investments introduce. On the other hand, the advent of such fintech friendly regulation is meant to level the competitive ground and further accelerate innovation in financial services. It would be interesting to see if these kinds of initiatives actually deliver on their promise and spur innovation. Here, the focus can also include new entrants, both start-ups and diversifying tech giants alike.

Summing up, I believe there is far more to be learned about when, why and how different audiences participate, steer or even (temporarily) dominate the social contestation for technology trajectories and how incumbents can resolve tensions between more stable and fluid social evaluation. For instance, it would be interesting to know whether all audiences eventually participate in all debates, or under what conditions, faced with what technologies certain audiences may abstain from engagement with technological change in the first place, and how theie roles and engagement evolves over time.

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Summary

Managing technological change is existential for incumbent firms. The early episodes of technological change, in particular, when little is known for certain and the social debate is still unfolding are critical. In these early stages of technological change, different social communities engage in social debates and negotiations around emerging technology, thereby creating an urge for organizational action. Hence, it is of paramount importance to further our understanding of the socio-cognitive dynamics within early technological change.

To do so, in three studies, I explore when and how different social communities engage with emerging technologies based on their expertise and field affiliation, study the effect of their engagement on incumbent response, and highlight the importance of established and sticky conventions, such as regulation, for incumbent experimentation with emerging technologies.

I find that not only do audiences engage at different times and modes with early technological change, but also that some audiences wield significant power over the engagement of others. While expertise appears important for influencing the engagement of other audiences, the effect of expert engagement on incumbent response is surprising. In fact, the results indicate that positive signals from peers and consultants, as industry and field experts, respectively, are likely to lead to non-adaptation by incumbents. Hence, it appears that incumbents are likely to distrust the engagement of experts, such as competitors and analysist or consultants. Lastly, I find support for the idea that stable industry structures, such as regulation, may significantly restrict incumbent experimentation with new technologies. Since technological change may initially not only be considered illegitimate, but potentially also illegal, it appears as if incumbents may have to break the law to experiment with emerging technologies.

Overall, in line with previous studies, I find strong support for the idea that social communities and their engagement with technological change have important implications for incumbent players and industries. However, my findings demonstrate that our current understanding of the socio-cognitive dynamics afoot during technological change is incomplete.

Samenvatting (summary in Dutch)

Het managen van technologische veranderingen is existentieel voor gevestigde bedrijven. Vooral de beginperiodes van technologische verandering (de zogenaamde pre-paradimatische fase), wanneer er veel onzekerheid is en het maatschappelijk debat zich nog steeds ontvouwt, zijn bepalend voor de adoptie van deze technologieën van gevestigde spelers. In deze initiële stadia van technologische verandering nemen verschillende sociale gemeenschappen (zoals concurrenten, analisten, klanten en regulerende overheidsinstanties) deel aan de sociale debatten en onderhandelingen over de rol van opkomende technologieën. De uitkomsten van deze sociale debatten bepalen in grote mate of gevestigde spelers deze nieuwe technolgieën zullen adopteren. Hierdoor is het van het grootste belang om ons begrip van de sociaal-cognitieve dynamiek met nieuwe opkomende technologische veranderingen te vergroten.

Om dit te realiseren, zijn drie onderzoeken uitgevoerd. Allereerst is onderzocht wanneer en hoe verschillende sociale gemeenschappen omgaan met opkomende technologieën op basis van hun expertise en affiliatie met het werkveld. Ten tweede is bestudeerd wat het effect is van hun betrokkenheid op de reactie van gevestigde bedrijven. Tot slot wordt het belang van gevestigde en bestaande conventies besproken, zoals regelgeving, voor het experimenteren van gevestigde bedrijven met opkomende technologieën.

De bevindingen van dit onderzoek tonen aan dat doelgroepen niet alleen bij nieuwe opkomendetechnologische veranderingen betrokken zijn op verschillende tijden en via verschillende modi, maar ook dat bepaalde doelgroepen aanzienlijke macht uitoefenen over de betrokkenheid van anderen. Hoewel expertise belangrijk lijkt om de betrokkenheid van andere doelgroepen te beïnvloeden, is het effect van deskundige betrokkenheid op de response van gevestigde ondernemingen verrassend. Het onderzoek laat zien dat positieve oordelen van concurrenten (interne experts) over opkomende technologieën juist leidt tot het niet adopteren van deze technologieën door gevestigde ondernemingen. Uit het onderzoek blijkt verder dat gevestigde bedrijven de betrokkenheid van industrie experts (analisten, consultants) waarschijnlijk zullen wantrouwen. Ten slotte toon ik aan dat stabiele industriële structuren, zoals regelgeving, het experimenteren met nieuwe technologieën door gevestigde bedrijven aanzienlijk kunnen beperken. Aangezien technologische veranderingen zich niet verhouden met bestaande reguleringen van toezichthoudende instanties, lijkt het erop dat gevestigde bedrijven zich

disconformeren met bestaande conventies (in de vorm van boets) om te experimenteren met opkomende technologieën.

In lijn met eerdere studies, blijkt uit dit onderzoek dat sociale gemeenschappen en hun betrokkenheid bij technologische verandering belangrijke implicaties hebben voor de gevestigde spelers en industrieën. Mijn bevindingen tonen echter aan dat ons huidige begrip van de sociaal-cognitieve factoren tijdens technologische verandering onvolledig is.

About the author

Tatjana Schneidmüller (1987) has obtained her Bachelor of Science in International Business Administration degree in 2011 from the University of Groningen. She then continued her studies at the Rotterdam School of Management, Erasmus University, Rotterdam where she obtained two Master of Science degrees in Finance and Investments and Strategic Management in 2013. Having completed her studies, she took a two-year break from academia to work as an investment fund auditor at KPMG Luxembourg. In December 2015 Tatjana returned to the Rotterdam School of Management once again. This time, to pursue her PhD at the department of Strategy & Entrepreneurship, under the supervision of Professor Henk W. Volberda and Professor Shahzad Ansari.

Tatjana's research focuses on how established organizations can navigate discontinuous technological change; and focuses specifically on the case of fintech (financial technology) in financial services. Her research has received several awards, including the runner-up Best Paper at Fintech Toronto 2017, Best Paper EURAM 2018, Best Paper AOM, TIM Division, 2018, is currently nominated for the SMS PhD Paper Prize 2020, and has been published in the Sloan Management Review. Furthermore, she has presented her work at various international conferences, including the Academy of Management, the Asian Academy of Management, the European Academy of Management, the European Group of Organizational Studies, the European Theory Development Workshop, Fintech Toronto, and the Strategic Management Society. Tatjana will be continuing her academic career as an assistant professor at LUISS Business School in Rome.

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About Tatjana

Tatjana Schneidmüller (1987) has obtained her Bachelor of Science in International Business Administration degree in 2011 from the University of Groningen. She then continued her studies at the Rotterdam School of Management, Erasmus University, Rotterdam where she obtained two Master of Science degrees in Finance and Investments and Strategic Management in 2013. Having completed her studies, she took a two-year break from academia to work as an investment fund auditor at KPMG Luxembourg. In December 2015 Tatjana returned to the Rotterdam School of Management once again. This time, to pursue her PhD at the department of Strategy & Entrepreneurship, under the supervision of Professor Henk W. Volberda and Professor Shahzad Ansari.

Tatjana's research focuses on how established organizations can navigate discontinuous technological change; and focuses specifically on the case of fintech (financial technology) in financial services. Her research has received several awards, including the runner-up Best Paper at Fintech Toronto 2017, Best Paper EURAM 2018, Best Paper AOM, TIM Division, 2018, is currently nominated for the SMS PhD Paper Prize 2020, and has been published in the Sloan Management Review. Furthermore, she has presented her work at various international conferences, including the Academy of Management, the Asian Academy of Management, the European Academy of Management, the European Group of Organizational Studies, the European Theory Development Workshop, Fintech Toronto, and the Strategic Management Society. Tatjana will be continuing her academic career as an assistant professor at LUISS Business School in Rome.

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