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Coming Apart While Scaling Up – Adoption of Logics and the Fragmentation of Organizational Identity in Science-Based Ventures

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ABSTRACT When trying to commercialize, science-based ventures often face contradicting institutional logics. While stakeholders appreciate scientific ability, they also increasingly demand concessions to a commercial logic focusing on efficiency and profit. To satisfy stakeholders, science-based ventures must adapt their organizational identity to include the commercial logic. The study investigates this challenge, relying on a 24-month in-depth study of a venture in the photonics industry. Based on the findings, I developed a process model that outlines how the logics shift from compatibility to incompatibility during the adoption process, thereby causing the organizational identity to fragment. The paper contributes to research streams on organizational identity processes, dynamics of institutional logics in organizations, and scaling of science-based ventures.

Keywords: institutional logics, scaling of ventures, organizational identity, science-based ventures, science commercialization, qualitative case study

> 'Can I school them in that it is okay to make the same thing twice? That it is okay to make money? To make a lot of money? You would think that that is normal procedure for a business, but not for these guys. You are up against religion'. (Original CEO of 'Supertech')

INTRODUCTION

Science-based ventures serve an important role in commercializing new technology and scientific breakthroughs. When doing so, science-based ventures cross boundaries from a scientific field and into a commercial field (Fini et al., 2019; Mason et al., 2019; Maurer

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and Ebers, 2006). Here, ventures may often find themselves in a 'chasm'[1] between two fields: the scientific field and the commercial field (Fisher et al., 2016; Moore, 1991; Murray, 2010). To bridge this chasm, science-based ventures must prove that they can play according to the rules of the commercial market, which scholars often refer to as a 'commercial logic' (Perkmann et al., 2019). Therefore, ventures adopt the commercial logic into their organization through changing practices, norms, values and, crucially, their organizational identity (Fisher et al., 2016). Yet, as the new commercial stakeholders also desire consistency, and invest in science-based ventures due to their status in science, the ventures must also retain the science logic. This paradox is evidenced in Wry et al.'s (2014) study, where they find that science-based ventures that mix the science and commercial logic into a new organizational identity, attract investors and thereby are more likely to commercialize and scale up.

However, little is known about the organizational identity dynamics that unfold when ventures try to form new identities by combining different logics (Cornelissen et al., 2021; Fisher et al., 2016; Perkmann and Spicer, 2014). While organizational identities can contain tensions and be somewhat elastic (Kreiner et al., 2015), trying to combine logics into a new identity is difficult because logics contain conflicting notions about what the purpose of the organization is (Cornelissen et al., 2021). For example, to the science logic the purpose is science and progress for all, while for the commercial logic the purpose is profits and the market position of the firm (Perkmann et al., 2019; Thornton et al., 2012). Science-based ventures may therefore face challenges when adopting the commercial logic and trying to reform their organizational identity (Fisher et al., 2016). Yet, with only scarce knowledge on what goes on inside the ventures transitioning from 'lab to market' (Fini et al., 2019), researchers are in the dark with respect to the nature of the challenges that ventures face during this process (Desantola and Gulati, 2017; Fisher et al., 2016). Therefore, this study seeks to shed light on the question: *How is the organizational identity of science-based ventures affected by the adoption of a commercial logic over time?*

To answer this, the paper relies on a two-year study of a science-based venture in the photonics industry, which was commercializing its technology and scaling its operations. The venture, Supertech (pseudonym), started as a university spin-out with most of its employees being researchers. The organization was set up as a research lab with all product sales going to researchers at leading universities. As the market matured, Supertech increasingly faced demands to commercialize its technology and increase profits. This forced them to additionally take on and adopt a commercial logic in the form of new practices, goals, and employees. Using longitudinal data, I portray how the new, commercial logic was first accepted and entered the organization, how it subsequently evolved and challenged the status quo and, finally, how incumbents mounted a pushback that caused the organizational identity to fragment. Based on the findings, I construct a process model that outlines how and why the science and commercial logic fluctuate in power and compatibility, and how this causes the organizational identity in science-based ventures to fragment beyond immediate repair.

The paper contributes to research in three ways. *First*, I extend current work on organizational identity processes in ventures (Cornelissen et al., 2021; Fisher et al., 2016; Grimes et al., 2019; Snihur and Clarysse, 2022). In particular, I unpack why the adoption of a new logic leads to organizational identity fragmentation over time, a fact

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caused by the fluctuations in logics triggering confusion, mistrust, and conflict. *Second*, through unpacking why logics fluctuate in power, I then add to the conjoined literature on the dynamics of logics and identities in organizations (Cappellaro et al., 2020; Gioia et al., 2013b; Smith and Besharov, 2019). *Third*, my study makes an overall contribution to the knowledge on scaling of science-based ventures, through highlighting how imprinted identities, such as the science logic in this case, cause conflict and hinder scaling over time.

Institutional Logics and Scaling of Science-Based Ventures

When trying to grow and commercialize their technology, ventures often face critical moments where they must change to successfully scale up (Vohora et al., 2004). Scaling here refers to how organizations expand and adapt their internal organization to sustain market growth (Desantola and Gulati, 2017, p. 641). For example, ventures may have reached the threshold of their current capabilities and thus must develop new ones to continue their growth journey (Zahra and Filatotchev, 2004). In this regard, many scholars argue that ventures adapt because they are facing new external demands for how they should organize (Fisher et al., 2016; Zimmerman and Zeitz, 2002). Here, scholars often rely on the institutional logics perspective (Fisher, 2020; Fisher et al., 2016; Zimmerman and Zeitz, 2002). Institutional logics are socially constructed norms, beliefs, values, and practices that shape interactions, guide behaviour, and provide actors with a specific lens on reality (Thornton et al., 2012). Thereby, they serve as organizing principles for organizations. In order to achieve legitimacy, and thus resources, from their stakeholders, organizations must adapt to the institutional logics of their stakeholders (Fisher, 2020; Fisher et al., 2016).

For science-based ventures, that is ventures aiming to commercialize scientific research[2] (Colombo et al., 2010), this can pose a problem over time. When first founded, science-based ventures survive by leveraging academic research and obtaining grants (Fisher et al., 2016). As such, their first stakeholders are professors, scientists, and grant administrators who represent a science logic, valuing scientific novelty, personal autonomy in choosing projects, and producing value for public good (Perkmann et al., 2019, p. 5). Science-based ventures are, therefore, often deeply embedded into the scientific community through their social ties (Maurer and Ebers, 2006). This connection to a science logic usually informs their understanding of their organizational identity, the 'who they are as an organization' (Fisher et al., 2016, p. 389). For example, Maurer and Ebers (2006) find that the cohesive and closed networks in the scientific field cause ventures to internalize the science logic.

However, as science-based ventures seek to scale, they face commercially-oriented stakeholders, such as venture capitalists (Fini et al., 2019). In contrast to scientists and grant administrators, such stakeholders hold a commercial logic, focusing on profits, organizational efficiency, and market growth (Pahnke et al., 2015). To obtain legitimacy in the eyes of the commercially-oriented stakeholders, science-based ventures must adopt the commercial logic of their stakeholders. This entails demonstrating commercial viability of their technology (Wry et al., 2014), changing their management team from scientists to financial-oriented managers (Hellmann and Puri, 2002),

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and changing their capabilities towards marketing and mass production (Ambos and Birkinshaw, 2010). However, research also shows that science-based ventures that maintain their scientific ties are more successful than the ones that cut their ties (Maurer and Ebers, 2006, p. 285). Furthermore, Wry et al. (2014) find science-based ventures that adopt a commercial logic to be much more successful than both purely scientific ventures and purely commercial high-tech ventures. Accordingly, Fisher et al. (2016, pp. 396–97) argue that science-based ventures should adopt the commercial logic and 'layer it' on top of the established science logic to form a new organizational identity, which allows them to please the commercial audience. This adoption of a new logic is more fundamental than organizational identity change because it requires more than just changing labels or meaning of labels (Gioia et al., 2013b, p. 144). It requires a drastic overhaul where new practices, beliefs, norms, and values are included. This is known as organizational identity formation (Cornelissen et al., 2021; Gioia et al., 2010).

While there is a growing literature on how ventures adapt to new demands and change their organization when crossing over to a commercial field (e.g., Ambos and Birkinshaw, 2010; Kaehr Serra and Thiel, 2019; Vohora et al., 2004), this literature focus more on 'hard elements', such as capabilities or organizational design (Alexy et al., 2021; Zahra and Filatotchev, 2004), and rarely accounts for how ventures change or form new identities (Cornelissen et al., 2021; Desantola and Gulati, 2017; Snihur and Clarysse, 2022). However, trying to form a new identity could lead to the organization experiencing 'mission drift' where it loses sight of its purpose (Grimes et al., 2019, p. 823). Therefore, recent work calls for more attention to the internal processes occurring when ventures try to form new organizational identities (Cornelissen et al., 2021; Fisher et al., 2016). According to this recent work, organizational identities are not enduring characteristics of organizations, but malleable entities that must be adapted to the institutional environment. Therefore, organizational identities often reflect the institutional logics around an organization (Gioia et al., 2010; Perkmann and Spicer, 2014).

Forming a New Organizational Identity out of Dynamic Institutional Logics

While work on scaling and ventures has not considered organizational identity change or formation to a large degree, there is a growing stream of work on how organizations form new identities by combing different institutional logics (Battilana et al., 2017; Cornelissen et al., 2021; Smith and Besharov, 2019). This literature seeks to combine insights from institutional theory and organizational identity theory to understand how organizations construct identities when facing contradicting institutional logics. From institutional theory, scholars draw on the notion that organizations must create identities that are legitimate, while from organizational identity, they focus on that organizational actors try to make sense of who they are (Gioia et al., 2010). In this perspective, institutional logics are externally provided building blocks that organizations use to construct their identity (Perkmann and Spicer, 2014). As a result, scholars propose an agentic view of organizations, where actors use institutional logics to construct legitimate and meaningful identities (Kraatz et al., 2016).

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Cornelissen et al. (2021) provided a recent example of work in their stream. They study how a social venture was forced to adopt a commercial logic but then formed a functioning hybrid identity that contained social and commercial logics. However, Cornelissen et al. (2021, p. 1323) also note that the literature is underdeveloped. Similarly, Gioia et al. (2013b) note that more work is needed to tie together insights from institutional and organizational identity theory.

In particular, scholars note that there is very little knowledge on the *how the interaction between logics unfolds over time* (Cornelissen et al., 2021; Fisher et al., 2016; Smith and Besharov, 2019). Scholars have increasingly argued for conceptualizing institutional logics as dynamic and potent identity elements that can cause rifts in organizations (Besharov and Smith, 2014; Smith and Besharov, 2019). Besharov and Smith (2014) pose that logics can shift in compatibility – that is, how well logics function together – and centrality: that is, how important they are to an organization. Depending on these dimensions, logics may work in harmony or be in conflict. For example, organizations may be in harmony when logics are compatible or when one logic strongly dominates the other (Besharov and Smith, 2014). Yet, knowledge of when, how, or why logics may switch in these dimensions is limited. For example, Cappellaro et al. (2020, p. 417) argue that most previous studies have downplayed the political tensions that might arise over time. Hence, prior work may have downplayed the challenges that organizations face in forming new identities from multiple logics.

Overall, there is little knowledge about the challenges for ventures in adopting a new logic and forming a new organizational identity. Therefore, I study how the organizational identity of science-based ventures is affected by the adoption of the commercial logic over time.

Research Context

To study how the science and commercial logic interact in science-based ventures as they transition from a scientific field to a commercial field, I followed a science-based venture in the photonics industry that was commercializing its technology and scaling during the research period (see Figure 1). The venture in question, Supertech (pseudonym), originally consisted of a set of R&D centres funded by the conglomerate BIG (pseudonym), in alliance with a large technical university, in 2000. The background for this collaboration was mutual interests. Because photonics research was very costly, especially the 'drawing tower' used to produce fibres for lasers was expensive, the technical university needed funding to finance the research. On its side, BIG was interested in photonics research because it believed that this technology could disrupt its core industries. BIG had also collaborated with the university for a long time and trust was high between them. BIG therefore decided to fund a set of R&D centres and it successfully convinced PhD students and early career researchers to join them and work with their superior facilities. In its early years, Supertech served as an R&D company for the conglomerate, applying for research grants and patents, training PhD students, and developing new cutting-edge technology for the conglomerate's core business.

Then in 2009, Supertech was incorporated as its own entity. Until this incorporation, Supertech worked as a research company where profit was not the main focus. In fact, the annual reports focused much more on how many patents Supertech applied for. This started changing in 2009, as now it became a science-based venture seeking to commercialize academic research in its own right. This meant that Supertech had to eventually

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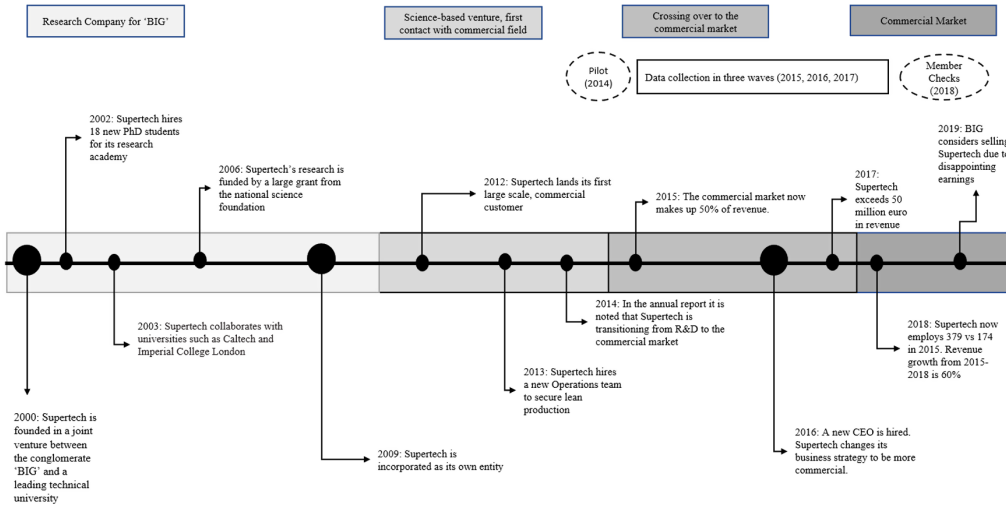

Figure 1. Timeline

consider commercial demands. But in 2009, its technology was still too immature for this to be top of mind. Supertech, at this point, sold its fibres and lasers to scientists at top universities, with the hope that the universities would find commercial use for them in the future.

Then between 2012 and 2013, the laser technology started to become commercially viable outside of the initially-targeted, scientific niche market. Now, Supertech started selling to large corporations, called 'OEMs' by informants, which bought the product in larger quantities, thus enabling Supertech to start growing and standardizing its processes. It was then that, according to the original CEO, Supertech was about to 'cross the chasm' from its early scientific market to a commercial market. The CEO described it as a complex situation where, on one hand, the science logic had been ingrained into the company, but on the other hand, the OEMs, and increasingly BIG, demanded that Supertech became more commercial: 'The research world is our market, that's our mindset. But being owned by an industrial conglomerate that is not *comme il faut*, there it is the OEMs [large corporations] that are *comme il faut*' (interview, CEO 1, 2014).

This transition from scientific field to commercial field is described by scholars as a unique challenge for ventures because they have to cross over to a world with different norms, values, rules, and ways of working (Fisher et al., 2016; Mason et al., 2019). Yet, as little is known about this process where science-based ventures grow and cross over from the scientific to commercial field (Mason et al., 2019), Supertech represents an interesting case. Supertech is also interesting because it had unique scientific and technological capabilities, which rivalled elite universities, and because it was in a high-growth industry.[3]

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METHODOLOGY

I used an explorative, single case study design to build theory using a grounded theory approach (Glaser and Strauss, 1967). I relied on multiple data sources from observations, informal interviews, in-depth interviews, and rich archival data. The goal was to investigate a complex phenomenon where both the organization and its environment mattered. I chose to anonymize the company because the study showed conflict and problems, which could reflect negatively on the informants involved.

Observations

I conducted a total of 200 hours of observation, primarily during the first research phase, when I had my own desk and visited the company weekly. During the first six months, working from my desk, I got to know most of the 120 employees at the R&D department, and I toured facilities, observed meetings, and had lunch and coffee with employees. These casual meetings with employees served as very good sources of data, as I acquired a detailed understanding of what was going on, what individual employees worked on, and what bothered them in their daily work. I also participated in the team-building day with the firm's entire R&D group; here I conducted active participant observations in which I worked with members of R&D to discuss and solve issues that related to collaborations between R&D and Operations.

I also secured visual documentation by photographing the Kanban boards and other types of tools that employees used for organizing their work. Comparing the different boards and their elements provided useful clues about practices and motives. I noted when the boards changed, whether deadlines were rigid or flexible, and whether this was consistent across units. However, this study was not truly ethnographic, as I could not observe some of the crucial work involved in producing the lasers themselves, which took place in closed labs where participant observations were unwelcome and dangerous due to laser radiation. I particularly relied on observations early in my study to gain an in-depth understanding of the daily activities at Supertech. These observations were detailed in field notes.

Interviews

While working at my desk and touring the facilities, I would do short 'on-the-spot' interviews focusing on the problems I saw and issues bothering the informants. I made notes of these interactions immediately afterwards. Although these short interviews were useful in gaining an understanding of the everyday life of informants, they lacked depth.

Therefore, I conducted in-depth interviews with two CEOs, managers, heads of departments, project managers, engineers, and research scientists. These informants were chosen based on theoretical sampling and by using observations and the short, informal interviews to identify key informants. To secure a process perspective, informants were interviewed over the various periods covered in the study (see Table I). Moreover, I chose to re-interview some informants to analyse how their views developed and changed over time. These in-depth interviews (37 in total) were focused on

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Table I. Data overview

Source of data	*Type of data*
Formal Interviews	*January 2014 – July 2014*: 3 in-depth pilot interviews
	June 2015 – December 2015: 11 in-depth interviews (excl. 'kick-off' interview with COO).
	January 2016 – May 2016: 12 interviews (excl. 1 'kick-off' interview with CTO)
	March 2017 – June 2017: 12 interviews
	In total: 37 in-depth interviews with CEOs, managers, heads of departments, project managers, and research scientists.
Field Observations	*2015*: approx. 160 hours of observations
	2016: approx. 30 hours of observations
	2017: approx. 10 hours of observations
	Multiple informal 'on the spot' interviews during the research phase with CFO, accounting, marketing, Operations engineers, scientists in R&D.
Photographs	Tracking development projects and project management over time.
Project Documents	Full file over development project of compact ultra-fast laser from 2012–16, 2650 files, including presentations, resumes from meetings, internal memos, and budget changes.
Internal Employee Surveys	Employee surveys from 2014 and 2015, including 40–50 variables with a 68–76% response rate.
Internal documents	Internal strategy documents from 2014–17, including documents and PowerPoints from internal presentations and meetings during this period.
External Documents	Annual reports from 2002–17, 1441 pages.
	Job postings with descriptions from 2016–17.
	Social media profiles on employees on sites such as LinkedIn and Google Scholar.
	Firm news 2015–17: 128 articles.
	Industry reports from:
	German Federal Ministry of Education and Research 2013;
	SPIE Report 2015

the informants' perspectives and interpretations of events and their personal history. The in-depth interviews generally revolved around the informants' personal history and their unit's history – which was used later to identify their logics – as well as around their interpretation of how events unfolded. For example, I would ask questions pertaining to high-profile projects, problems in their daily work, and how informants dealt with organizational change.

Archival Data

To complement the interviews, I also gathered internal documents on company strategy and on projects. This helped me triangulate the data (Lincoln and Guba, 1985).

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The internal documents were particularly rich as they included extensive project data within more than 2500 files, including presentations and notes from stage-gate meetings. Finally, I compiled a set of archival data by going through news articles about the company, job postings over a couple of years, and annual reports. This served to illustrate how the company presented itself and the logics that it faced in its field. I also consulted the employees' social media profiles, such as LinkedIn and Google Scholar, to analyse how employees presented themselves and what key skills they highlighted about themselves.

Table I provides an overview of the data.

DATA ANALYSIS

To conduct the analysis, I moved iteratively between data, relevant literature, and the emerging theory (Gioia et al., 2013a). Through a process of grounded theory (Glaser and Strauss, 1967), I moved from raw data to categories and themes. The analysis proceeded through three steps.

Step 1. Identification of institutional logics in and around Supertech. A common theme that emerged through my coding of the raw data was that informants noted that they had 'different mindsets' and came from 'different cultures'. As this was a recurring theme, I started to look into the literature for good ways to frame this; for example, I considered that this may be a pure organizational identity story. However, as I coded, I noticed that these 'mindsets' and 'cultures' were determined by where informants had worked in the past. Members of R&D all had a PhD and some had a longer research career. They also worked like researchers in labs, and when hiring new members, they emphasized how their work 'was fundamental to Nobel Prize winning research' (Job post, 2016). In contrast, members of Operations frequently commented on their experience in large corporations and how crucial it was to make Supertech more efficient and profit focused. Thus, I searched for a theoretical lens that made sense of how prior experience in either academia or corporations would shape the 'mindsets' of the two groups. This led me to the institutional logics perspective (Thornton et al., 2012). By employing Reay and Jones' (2016) pattern matching technique, I managed to link each group to the scientific logic and the commercial logic respectively. Building on Thornton et al. (2012), I then identified higher-order institutional logics that characterized Supertech's context; that is, the scientific logic and the commercial logic. Based on previous literature (Murray, 2010; Perkmann et al., 2019), I identified these logics through Supertech's stakeholders. Historically, Supertech had been embedded in a scientific field. It was a spin-out of a technical university, founded by university scientists, and its primary market consisted of top researchers at elite universities. More recently, another group of stakeholders had entered, namely large original equipment manufacturers (OEMs). These stakeholders were interested in Supertech's scientific prowess, but also demanded more efficiency and standardization. In relation to this, I noted a change in how the owners described Supertech in the annual reports. Whereas one early annual report (2008) praised the intellectual property base in Supertech as completely unique, later annual reports

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(2013–15) highlighted a demand to commercialize by highlighting strategies to cut costs, scale-up, and increase EBITDA. Using Reay and Jones's (2016) method, I matched the first group of stakeholders and the initial owner stance as adhering to the science logic, and the latter group – the OEMs – and the later owner stance as adhering to a commercial logic. Furthermore, I used interviews and archival data to code for how these logics changed in prevalence in the field.

Step 2. The enactment of institutional logics in Supertech. Through coding interviews and observations, I identified how the logics were represented in two sets of different practices, beliefs, and identities. Members representing the scientific logic had typically been working in a 'tinkering' fashion. Historically, Supertech would have received a custom order, and a group of R&D workers would then work on this project independently, often moving across the organization from R&D to the delivery unit and tinkering with the product along the way. A strong belief was that Supertech existed because of their scientific know-how. Moreover, they also believed that their technology was extremely complex and fickle, so that it required special skills to work with it. They identified themselves as researchers who came to a business because that was the best way to further the science of photonics.

Conversely, the members representing the commercial logic worked in a very structured fashion, immediately setting up processes and implementing strict lean standards. They believed that Supertech was becoming more successful because they had been able to create a functioning Operations unit that allowed for scale. These members espoused more of a production engineering mentality, such as how they could set up efficient processes. They also identified more with the firm than with a profession.

I then coded the excerpts of field notes, interview transcripts, and documents and assigned first-order codes that described the relationship between the two groups by, for example, looking at positive and negative sentiments (for example, praise or anger). This analysis revealed that the relationship had started out as positive. The science-oriented incumbents had welcomed commercially-oriented newcomers as they believed that they could use the new skills and ways of thinking to solve problems – particularly when catering to the new OEM stakeholders. Yet, the relationship turned antagonistic over time. This was surprising as most research on clashes between logics in organizations argues that clashes may be the initial reaction, but that socialization usually resolves tensions over time (Battilana and Dorado, 2010; Malhotra et al., 2021). Here I saw the opposite process: lack of tension in the beginning and then increasing tension.

Step 3. Building a process model. I then aggregated the codes into higher-order dimensions by coding together how logics were enacted in Supertech and how they changed externally. Here, I realized that the enactment of logics was tied to changes externally. As the commercial logic had become more prevalent due to a gradual change in sales towards OEMs, and due to owners pushing for commercialization, newcomers sought to push their logic onto incumbents. This was furthered by the newcomers' successful takeover of peripheral practices. Facing this attack, which now concerned the core identity of the organization, incumbents fought back. Here, my data shows that they often referred to their

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historical identity as a research company and that they returned to academic practices. To conceptualize these actions where the groups 'attack' each other, I relied on the concept of boundary work (Langley et al., 2019), a concept that refers to how actors or groups try to influence both symbolic and physical boundaries to either extend or defend their sphere of influence. This concept accurately captures activities as each group sought to extend or defend their boundaries; for example, Operations sought to expand their boundaries by demanding that R&D followed their project management model, while R&D physically entered Operations' space in the last phase. To outline a process model that showed how a new logic entered an organization and changed in power and compatibility in the organization, I 'temporally bracketed' (Langley, 1999) my analysis into three stages: a first stage where the new logic is dominated by incumbents and thus can be used in a compatible fashion, a second stage where the newcomers seek to challenge the incumbents supported by the increasing prevalence of this logic in the field, and a third stage where incumbents rallied to fight back, causing tension between the logics, thus causing the organizational identity to fragment as a result.

To ensure the trustworthiness of the analysis (Lincoln and Guba, 1985), I triangulated across observations, interviews, and archival data. This served, for example, to limit potential recall bias in my analysis. Finally, I conducted member checks to secure the fidelity of my interpretation of events. The resulting codes and dimensions with representative data are presented in Figure 2 and Table II.

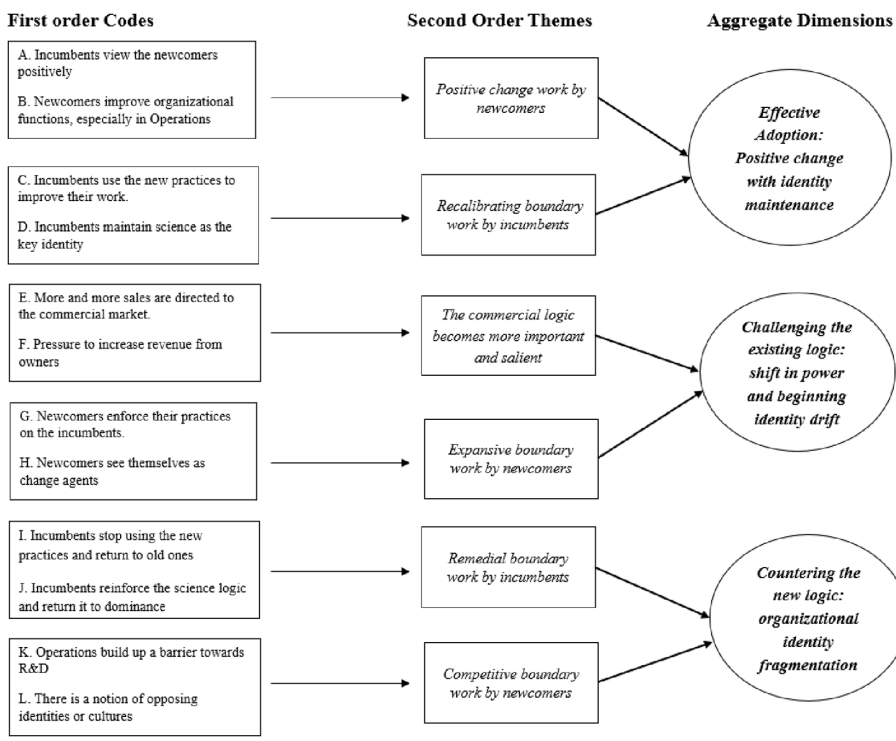

Figure 2. Data structure

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Table II. Representative quotes

Second-order themes & first-order categories	*Representative quotes, notes, and observations*
Overarching Dimension: Effective Adoption: Positive change with identity maintenance	
Positive change work by newcomers	
A. Incumbents view the newcomers positively	A. 'We changed our Operations team not that long ago. If you take a look into Operations now, a lot has happened. We are starting to reap the rewards of that change now' (CTO).
B. Newcomers improve organizational functions, in particular in Operations.	B. 'What have we chosen to do? We have invested heavily in Lean. Lean training for everyone. And not Operations-lean, company lean … We have had every single employee back in school… It is an investment that kicks ass' (interview, CEO 1).
Recalibrating boundary work by incumbents	
C. Incumbents use the new practices to improve their work.	C. 'R&D was very happy with the implementation of the project management boards [i.e., white boards with project data]. It really helped them prioritize tasks. The resource management board is the most important one in the whole organization' (external consultant).
D. Incumbents maintain science as the key identity	D. 'Our reason to be here, our "raison d'etre", is the unique technology we possess' (CTO).
Overarching Dimension: Challenging the existing logic: shift in power and beginning identity drift	
The commercial logic becomes more important and salient	
E. More and more sales are directed to the commercial market.	E. '2016 was also a transitional year in which the company migrated from a scientific laser and system manufacturer to a majority OEM manufacturer' (CEO 2 in 2016 annual report).
F. Pressure to increase revenue	F. 'Ben's' [the new CEO] goals are different than 'Jack's' [the former CEO] … they are more ambitious' (Head of R&D).
Expansive boundary work by newcomers	
G. Newcomers enforce their practices on the incumbents	G. The head of Operations sends a 24-point list of demands to R&D regarding the specifications of products. He demands that the criteria of this list to be met if products are to be transferred (field notes).
H. Newcomers see themselves as change agents.	H. 'It's a bit like "The Empire Strikes Back" or "Return of the Jedi"… am I the good guy or the bad guy? I think I am the Jedi. I come in with a new perspective and try to improve things. I am trying to make this company into a manufacturing firm. I try to improve quality… there was no focus on quality before… I am trying to implement structures in the organization, I am trying to do change management here' (COO).

(Continues)

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Table II. (Continued)

Second-order themes & first-order categories	*Representative quotes, notes, and observations*
Overarching Dimension: Countering the new logic: Organizational identity fragmentation	
Remedial boundary work by incumbents	
I. Incumbents stop using the new practices and return to old ones.	I. R&D starts to neglect some of the previous lean training and systems, e.g., they stop using lean boards and instead pack them up. They also refuse to use ERP systems. They become less structured and go back to their previous state (Obs. and field notes).
J. Incumbents reinforce the science logic and return it to dominance	J. 'Why are we here? It is not because we [R&D] are super-efficient in our business processes or because Operations are super-efficient. We aren't, nor is it because we are super sellers who can sell anything. No, the reason we are here is because we have a unique technology' (Director of R&D).
Competitive boundary work by newcomers	
K. Operations build up a barrier towards R&D	K. 'Today, we have created a different culture in Operations on how to do things. But because we do not have a real collaboration with the rest of the organization it has not spread. What has happened is that we have built a barrier' (Production engineer 1).
L. There is a notion of opposing identities or cultures	L. 'We have two completely different cultures and that creates clashes. My own personal opinion is that it would be really good to have more engineers in Operations, which could act as go between. Because right now, we have really, really many engineers in R&D and really few in Operations' (Department head, R&D).

FINDINGS

I present the findings by gradually zooming in by first outlining the case setting. This serves to provide a 'thick description' of the logics at play. I then explore the different phases of how the logics changed in power and compatibility, and how this finally caused the organizational identity to fragment.

Case Setting (2000–13)

From 2000 to 2009, Supertech served to develop the basic science for BIG's core products in power cables and optical instruments. Supertech would collaborate with universities around the world, educate PhD students, and apply for grants and patents. Finally, Supertech sold customized orders of its lasers to researchers at leading universities. The plan was that the researchers would find commercial applications for Supertech's technology down the line. Hence, Supertech engaged with key scientific stakeholders to convince them of the value of its technology. The original CEO

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described their plan: 'It is just a classic go-to-market strategy with new technology; find your blue-chip customer. When you are right at the edge innovation-wise, then that will not a be an industrial-customer but a university' (interview, CEO 1, 2015). To achieve legitimacy in the eyes of top researchers, Supertech had to secure basic science patents and publish research in top journals. The organization at this point resembled a technical university with a lot of labs spread out, and research teams working on different projects.

In this period from 2000 to 2009, Supertech can be classified as a science-based venture where the science logic defined its identity and practices. This classification rests on four criteria (Perkmann et al., 2019, p. 301). First, Supertech's research and development was basic, and its technology was far from a specific application. It sold to researchers at universities who tried out different configurations of the technology. Second, the scientists in Supertech worked in a loose and flat organization that much more resembled academia than a corporate work setting. Informants referred to this as a 'garage shop', where the researchers could walk around and tinker as they pleased. Third, the researchers in Supertech published in academic journals, supervised PhD students, and applied for public research funding. Fourth, even though Supertech did sell fibres and early-stage lasers, it sold them to researchers at top universities, meaning that Supertech had to be legitimate in the eyes of scientific stakeholders.

In 2012, Supertech managed to land its first big corporation as a customer. This provoked a change in how the conglomerate viewed Supertech. Whereas BIG before had focused on the technological development, it started to emphasize the commercial aspect. For example, the original CEO noted that the board around this time told him that: 'money doesn't grow on trees, how about you start making some money yourself' (interview, CEO 1, 2014). Now, Supertech faced demands to move away from selling to research environments to sell more to the big corporations, the OEMs as informants called them. This was demanded because sales here would be larger-scale and more profitable:

> 'In 2013 an increased number of Supertech's products and solutions proved their maturity, being implemented in an expanding range of industrial solutions. This underlined the successful change of emphasis in recent years, away from a focus on research environments towards solutions for industrial customers'. (Annual Report, 2013)

The first OEM customer, a Fortune 500 company,[4] could not accept the lack of clear and standardized processes and structures in Supertech if it were to buy from them. For this reason, it sent out its own lean consultants to train the employees at Supertech in how to produce its technology following lean management standards. The OEM stakeholder did so because the company did not trust Supertech's loose way of producing. The right way was to implement lean practices, resembling how large corporations typically produce. The idea of lean was tied to the commercial logic as this practice aimed to reduce waste and increase efficiency and profitability. This meant that a new Operations team was hired between 2013–15 to facilitate the change. These employees differed from the R&D personnel because they did not hold PhDs in fibre and laser technology and instead were mostly production engineers. Also, they were separated by their different backgrounds. While it was not uncommon for R&D personnel to have been in the firm since

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its inception, or to have only worked in the laser industry, the personnel in Operations and quality management had diverse experience, working in manufacturing firms in the phone, automobile, and electronics industries. The COO, who headed the team, exuded a very different approach to the product:

> 'We went from being a small company to a bigger one, and this just changes expectations from your customers. Before, you could produce some crap, but scientific customers liked it because it was just what they needed – for the next 20 hours … Now, we need to ship a product that clears 10,000 hours and has field service capability and a built-in self-test. This is where we are going'. (Interview, COO, 2015)

Consequently, 2013 stood out as pivotal year for Supertech. The new, large OEM customer send out a team to drill the employees at Supertech, BIG started to demand profitability, and Supertech started hiring a team into Operations that represented a completely different logic. The new COO exemplified this new logic: 'You have had make the researchers to understand that their end goal is to produce a product that can be sold, and which can be produced at cost, so we can make money' (interview COO, 2015). The logic that the newcomers had reflected the market; it was a *commercial logic* focusing on reducing costs and increasing profits (Perkmann et al., 2019). Now, Supertech faced the challenge of combining this new logic with its ingrained science logic, in order to please its owners and customers. As seen in Table III, the logics had very different elements.

Table III. Institutional logics at play in supertech

Institutional logics	*Science logic*	*Commercial logic*
Origin	Technical Universities	Corporations
Locus of legitimacy	Success on the early scientific market. Demands for radical innovation from OEM customers. Demands from the owning conglomerate to innovate on the technology.	The demands of efficiency and standardization from OEMs. Demands for higher profits from the owning conglomerate.
Goal	Development of products and technology, 'fear of missing the market'.	Increasing efficiency and quality, decreasing cost and being faster to market.
Behaviour	Loose, flexible practices, where actors walk around the firm and tinker. Often going from lab and back to their own PC. Very little interaction and activity in open office. Informal standing meetings every other day. Very informal approach to work with no clear hierarchy.	Structured and rigid practices revolving around lean boards. Focus on clear deliverables, such as yield. Clear hierarchy and processes. Formal and structured approach to work that includes whole teams, not individuals on their own.
Proponents	Incumbents, mainly in R&D	Newcomers, mainly coming into the Operations unit

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The original CEO was well aware of this demand for change. He used the euphemism that Supertech was 'crossing the chasm'. He knew that he had to reform the organizational identity from pure science and into something that was more commercially oriented to accomplish this crossing. On one hand, he felt that this was the right and necessary way to go, as he realized that Supertech could not be a scientific 'garage firm' but had to become a real company that made money. He noted that BIG usually had a timeframe of around 10 years before it expected to see returns; now it was losing patience with Supertech. But he also feared making this change:

> 'We dream of making something for the "benefit of mankind"… We come from a scientific world. The researchers who started all this, they were passionate, I almost had to kick them home at night. I can never lose that DNA. I think that the moment I lose that DNA, then we are no different than anyone else'. (Interview CEO, 2014)

Thus, Supertech faced a challenge: could it adopt a commercial logic and form a new identity without losing its original science identity, its 'DNA'?

Stage 1: Effective Adoption: Positive Change with Identity Maintenance (2013–15)

Stage 1 outlines how the commercial logic was successfully introduced into the company, creating positive change while being kept in check, allowing the science logic to be maintained without significant changes to it.

Positive change work by newcomers. Surprisingly, the CEO and other incumbents did not see a conflict when they hired newcomers who held a commercial logic. Instead, incumbents noted the positive effect that the newcomers had. For example, the CTO noted how the newcomers had improved production and solved problems: 'I have to give it to Operations: we are ready to scale up big time. I would dare say that the challenge is more between me and sales than it is between me and Operations' (interview, CTO, 2014). Before the newcomers had entered, Operations had not been running smoothly, which resulted in many RMAs (returned merchandise authorizations) as well as errors in the production line. The first goal was to fix this and produce the technology more efficiently. Here, the skill and knowledge that newcomers brought from different firms were useful in accordance with the science logic as it helped fix issues, such as organizing production, thereby increasing the impact of the individual scientists in R&D. There was little disagreement between employees with different logics at this stage; both could agree that they needed to ship products on time. In fact, several incumbents, such as the head of R&D, noted that they were pleased with the work of the newcomers and how this had fixed problems and reduced complaints from customers. Similarly, a new project manager described the improvements made: '… we do quite well in relation to our customers, we get enormously good feedback from our customers that they feel comfortable and safe that our products are delivered and that we take care of complaints' (interview, Project Manager, 2015).

Seeing this improvement, the incumbents, mainly in R&D, were willing to shed resources and help the newcomers transition the production floor from a set of labs into a mass

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production system. To them, this part of the commercial logic was quite compatible; they wanted to ship their technology to customers, and they wanted to reduce errors in production. R&D also utilized lean concepts and the training they received. This was physically evident as they put up lean boards in the R&D department and held meetings every other day. These meetings were quite short, around 15 minutes, and quite effective in delegating tasks. The employees in R&D enjoyed this part of the new logic; they liked that meetings were shorter and more effective. The incumbents also enjoyed how the lean ideas helped them rank projects and use their resources more efficiently. To them, these changes were acceptable and did not threaten their way of working and thinking but improved them.

In turn, newcomers noted that the collaboration with R&D worked well. For example, both the incumbent CTO and newcomer COO noted how a 'silo' between Operations and R&D had evaporated. Furthermore, newcomers were very happy with how they were able to change the production floor from a set of loosely coupled labs to a real production floor with flow and connection. The Operations manager in charge used the analogy of a football team where he, as a coach, had been able to reconfigure the tactics so that the team now played well together, unlike before.

Recalibrating boundary work by incumbents. While the incumbent researchers in R&D showed some willingness to change, this change was limited to adopting a few commercial logic practices, such as task delegation. However, the incumbents set a boundary to resist change around their core practices in scientific product development. The CTO exclaimed: 'Developing new products is the holy grail for R&D engineers! That's simply how it is!' (Interview, CTO, 2015). This notion was the key identity of most of the incumbents. The Director of R&D was an example of this. He explained how he had left the university to work in Supertech because he felt that there were better possibilities for taking the photonics technology further here. He was here to do science, practical science albeit, but science all the same.

A key element in the initial adoption period was that incumbents allowed newcomers to take over what they considered peripheral functions. Incumbents (mainly in the R&D unit) did not care that much about Operations; that was just a necessary evil to get products out there. If new people came in and made this part work more smoothly, all the better. Newcomers could change Operations from labs to a factory floor; that was okay because the lifeblood of Supertech was the R&D department and their labs, which were right above the factory floor. As long as the incumbents could maintain their space and just initiate smaller changes, such as using lean boards, they accepted the changes. Thus, my findings point to an ambiguous change process where the incumbents were willing to take in some practices and ideas from the commercial logic, but where they also set up clear limits to what they wanted to change.

I refer to this phenomenon where the incumbents took in some practices from the commercial logic but also shielded against larger changes as *recalibrating boundary work*. This form of boundary is a middle ground between competitive boundary work, where actors seek to protect their domain, and collaborative boundary work, where actors collaborate across domains (Langley et al., 2019). In my case, the incumbents were willing to collaborate with the newcomers, but set up clear boundaries that kept newcomers out

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of R&D's labs. Hence, the term *recalibration* refers to a group that is willing to consider ideas from another logic, but only to a certain degree.

The CTO noted this element of protecting the science logic against encroachment, stating his fear that too much focus on process would hurt their identity: 'It is pretty easy to set up some matrixes and make everything very rigid. But if you do this full on in this type of organization, then you kill the innovation culture. We are very, very aware of that' (interview, CTO, 2015).

The reason for R&D's ability to protect themselves against encroachment was that the science logic was dominant in the organization; it was embedded in activities and in the business model of Supertech. During this time, the original CEO portrayed medical imaging as a long-term market, where Supertech's lasers could replace ultrasound and provide images that were magnitudes better than current products. Having such long-term dreams privileged the science logic because it required basic research to develop this technology.

In sum, during the first stage, the commercial logic was introduced as a supplement to the science logic. Incumbents stayed dominant and used the new logic more as a complement to existing practices, while letting newcomers fix problems that were outside their core expertise of research, such as setting up Operations. My findings indicate that the dominance of the science logic was key in securing compatibility between the logics. Because the science logic dominated interactions, the commercial logic could be adopted and acclimatized with beneficial results. Supertech's management described the adoption as a success. They had improved key functions, updated their identity to include commercial logic ideas and practices, but overall maintained their 'DNA' or 'innovation culture', i.e., the scientific identity:

> 'Lean has been proclaimed to be a lot of things, but it has been very well received. The best is that the developers in R&D say that it is very exciting, and they want to do it too. We have succeeded in creating an innovation culture. But it is also an innovation culture that is ready for change, which has always been my dream'. (Interview, CEO, 1, 2014)

Stage 2: Challenging the Existing Logic: Shift in Power and Beginning Identity Drift (2015–16)

Stage 2 outlines how the newcomers – holding a commercial logic – grew in power and challenged the incumbents by, for example, demanding that the incumbents followed their standards and performance measurements. This started a negative spiral towards conflict as incumbents felt that their core identity was threatened.

The commercial logic becomes more important and salient. Although Supertech found initial success in selling to the OEM customer group, they increasingly came under more pressure from BIG to sell to this group exclusively. This was partly driven by a change in the ownership structure where Supertech's chairman, a technology enthusiast with a PhD and strong ally of the CEO, was replaced with a management board

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mostly consisting of MBAs. The new board did not find that the CEO was swift enough in commercializing Supertech, and fired him. A new CEO, more willing to make the transition, was hired instead. He proclaimed: 'It's going to be more of an evolution into being more market-focused as opposed to technology-focused. So, there is technology focus, but we are doing things that are market-focused' (interview, CEO 2, 2016). The 2016 annual report further outlined this approach: Supertech was to pursue commercialization and profitable growth through organic growth, fast product introduction, and lean manufacturing.

This allowed the large OEMs to define Supertech, which became dependent on succeeding here in order to please its owners. This happened in several ways. For example, there was more focus on short-term projects and reaching financial goals in each quarter:

> 'It has always been important that we reached our annual goals. But now it is even more important that we reach goals in first quarter, second quarter, and third quarter than it was under 'Jack'[5] [the previous CEO]. When Jack was in charge, it was more that we had to make the final quarter or be able to see that we can make it. But it was not important when we sent stuff out. Where 'Ben'[6] [the new CEO] is saying that the owners report each quarter, so we must reach our goals each quarter. No excuses'. (Interview, Head of R&D, 2017)

Due to Supertech's transition towards the commercial market, the logic of these stakeholders, the commercial customers, became more important and salient. This fact was boosted by BIG also switching its focus from technological development to profits. This phenomenon, where a logic is more strongly enforced on an organization, what Besharov and Smith (2014) refer to as centrality, means that it becomes more natural and relevant to use the new (commercial) logic to frame problems and activities internally. I refer to this mechanism as *logic centralization*.

Expansive boundary work by newcomers. Meanwhile, the newcomers had not been idle. They had hired their own lean consultant, gone into lean training camps, and joined 'lean academies' where they could further their skills and meet other likeminded people who were not in Supertech or the photonics industry. This not only increased their skills but also affirmed their belief that this was the right way to go. Having now successfully transformed the Operations unit from a group of labs into a smooth factory floor, it was now time to take on the rest of the organization and make it into a 'real manufacturing firm', as they described it. They saw this as an important quest and the COO called himself 'a Jedi' who had come to improve the company and take it away from the unprofessional past with no real organization or structures. A quality manager described their quest to transform the company:

> 'For the business, it is life or death to create standards, quality, and performance measurements. We need to create the same product over and over again… But it is a huge challenge to get that 'quality mindset'. We in quality live and die for quality, but this mindset is lacking overall in the company'. (Interview, quality manager 2, 2016)

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The incumbents in R&D were not quite aware that the newcomers were planning such radical change, and they did not, at first, concern themselves with the changes in operation.

They did not realize that it was not only going to be peripheral elements that were going to be changed by the arrival of newcomers holding the commercial logic. As a department head described it:

> 'R&D has probably been involved [in the lean evolution], but they have not understood what was going on. They are saying "But we used to able to go around and tinker in the corners" and Operations are going "No! You are not allowed to do that anymore"'. (Interview, Head of manufacturing engineering, 2016)

The increased focus on the commercial logic in Operations made Operations into a 'square lean regime' in the eyes of many R&D people, who did not understand the need for such dramatic change. They saw members of Operations as somewhat fanatical in their adherence to lean. One member of R&D casually remarked that he was getting quite tired of 'hearing how great Toyota factories are, every time I am down there' (informal interview in field notes, Project Manager in R&D 5, 2016).

Thus, my findings point to two mechanisms that increased the power of the newcomers holding the commercial logic. First, *logic centralization* meant that Supertech had to adhere more to the commercial logic in its set-up, such as providing quarterly reports showing that it met its revenue targets, as well as ensuring production standards. Supertech could only sell to large Fortune 500 companies if it had an ISO certification, which signalled that the customers could rely on a professionally-run operation in Supertech. Hence, it seemed natural to the newcomers that they should not only take control of peripheral activities but core activities as well. Simply, being pressured to follow commercial logic norms by stakeholders empowered the newcomers, who wanted this logic to dominate decision making in Supertech, such as decisions on how to design the product. Second, as the newcomers took over the peripheral functions and went into lean training camps, they were able to fully *activate the commercial logic* inside Supertech. This increased power and the confidence gained from successfully fixing the Operations unit gave the newcomers the chance to challenge the incumbents. Simply, newcomers transformed the Operations unit into a 'beachhead' that they controlled and where they had shown the importance of the commercial logic for the firm. From this position, they would then challenge the incumbents.

I had a conversation with an Operations manager that illustrated this. He took me back to the storage unit to show me a component that caused the customers a very basic problem; they turned it the wrong way when installing it. This could be solved by putting a sticker on both sides of the component. The Operations manager lamented the inability of R&D to listen and design such as a rudimentary solution to a simple problem that annoyed the customers. Tired of this problem, he got more involved in management and tried to make R&D take on more structured approaches. He wanted R&D to be much better at finishing the products and making them easier to produce. He did not rate members of R&D because they lacked experience from different industries, whereas he had worked in large corporations and even worked in R&D departments himself. To try to force the R&D department to be more structured, he sent a 24-point list of demands

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he wanted to be fulfilled before he would accept a transfer of a project from R&D to Operations. Members of the R&D department did not like this; they saw him as a 'lean fanatic', whose ideology was more fitted to a Toyota factory than to a small photonics firm. Members of R&D referred to him as a 'bulldog' that was constantly on their case with strict demands.

I refer to this activity where newcomers challenged the core practices of the incumbents and tried to enforce their practices upon them as *expansive boundary work*. This form of boundary work is when actors seek to break down existing boundaries and take over elements previously outside their domain. In this case, the domain that the newcomers sought to take over was how the products was designed: 'With our new PLC [product life cycle] process, I expect better quality management and needs throughout the process, so that you take the people in Operations into account … Not as you do today, where you only consider us very late or not at all…' (interview, COO, 2016).

Incumbents knew they had to change, and they admitted that the product had been 'overengineered' and that it needed to be more commercial. However, they put their foot down regarding having the development of products taken over by a commercial logic mindset of 'designed for manufacturing'. A member of the fibre technology department in R&D simply stated, 'If we become a nuts-and-bolts factory, then I think a lot of us will not be here. That is not how we see ourselves!' (Interview, Head of Fibre Development, 2016).

Thus, as Supertech further commercialized and the commercial logic grew in importance for the company, they faced the issue that newcomers now had the power to challenge incumbents and expand beyond established boundaries. The logics now start to become incompatible because they each vied to define the organizational identity. This caused the organizational identity to drift, especially in the eyes of the incumbents. They expressed that they did want to become the company that the newcomers sought to create.

Stage 3: Countering the New Logic: Organizational Identity Fragmentation (2016–17)

Stage 3 outlines how the incumbents reactivated the science logic and remedied their boundaries. In response, newcomers sought to protect their own boundaries. This 'cold war', where both sides sought to protect its own turf, fragmented the organizational identity, leaving little agreement on direction and core values.

Remedial boundary work by incumbents. Facing newcomers who sought to expand beyond established boundaries and reformulate the organizational identity to be less scientific and more commercial, incumbents engaged in two defensive actions. First, they *reactivated the science logic*. To do so, incumbents connected the science logic to the commercial demands, arguing that Supertech's competitive advantage was the research and the technology: 'We have this unique technology that offers something unique that nobody else can. This has made it easy for our salespeople because we are basically selling something unique' (interview, Head of R&D section, 2017).

When making this connection between the science logic and commercial demands, incumbents would use a specific framing when they argued that Supertech's markets

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were of a special nature, demanding new technologies for new markets, meaning that the R&D behind the products had to be cutting-edge and not standardized:

> 'We have this area [draws up a matrix and points to the top right corner] called "co-evolution", where it is new technology and new markets, where our technology gives our customers new markets. This is where we are comfortable … Our advantage in this market is that we have a competitive advantage, and we can exploit it … then down here in the existing market [points to the bottom left] there is fierce competition'. (Interview, CTO, 2017)

Incumbents would use this framing to negate newcomers' call for more standardization and documentation. When a newcomer in Operations, such as the Department Head, would call for more standardization, then incumbents in R&D would respond that while this may fit short-term demands from the customers, it did not fit Supertech's overall strategy of following new technologies in new markets. On top of this strategy, the incumbents would then emphasize the science logic as the key identity of Supertech, what the former CEO had referred to as the DNA.

> 'People are interested in the technology and think it is exciting to work with it. We are leading in this technology and way ahead of all others, right? And people think this technology is exciting with all the stuff you can do with it. They have an identity in working with this technology'. (Interview, Head of R & D section, 2017)

The new CEO bought this claim that their core identity and offer to the market was based in science. When asked about whether Supertech would become a more traditional high-tech but also high-volume company, he answered:

> 'Ultimately, yes. I mean there will be a branch that will do that. But our strength is in new products and in higher-margin products. Newer applications and, you know, a lot of people joined the company because that's the part they enjoy as well'. (Interview, CEO 2, 2016)

Importantly, he bought into the science logic framing of the market and he noted that 'a branch' would become driven by the commercial logic of high volume, lower production cost, and high efficiency; the rest would be dedicated to science. With this backing, incumbents successfully used the old identity to reduce the impact of the newcomers and the commercial logic. By re-establishing the science logic as the 'DNA' of the company and by convincing the CEO that the science logic was key for future competitiveness, the incumbents returned the science logic to primacy.

Secondly, having reactivated their logic, the incumbents now sought to rid their space of commercial logic practices and to reclaim the old boundaries. I refer to this as *remedial boundary work*, which covers how the incumbents took back their space and regained their dominant position in shaping the company. In practice, this meant that the lean boards and meetings that they had held every Tuesday and Thursday morning for years were scrapped, as were the boards themselves, even though R&D

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had beforehand been glad to use them. The head of R&D admitted that 'we are now less systematic than before'. When asked about the use of boards he explained: '… We still have two boards. One with must-win projects and another one, and at the other one most projects are on pause' (interview, Head of R&D, 2017). From a visual standpoint, the change was clear; there used to be 5 to 10 boards outlining projects, status, resources used, deadlines, and so forth. Now there was, in effect, one board with a couple of projects on it. Other members of R&D were even blunter in how they ridded themselves of commercial logic practices. One project manager simply remarked: 'I've marked it with grey [stage-gate model], I have not completed it. I have chosen to say: "Fuck it, I have not anything to do with it". You can do that' (interview, Project Manager in R&D 1, 2016).

Competitive boundary work by newcomers. As the incumbents reactivated the science logic, once again making it central to the organization, and as they remedied boundaries, newcomers were now back in a subservient position. This was evidenced by the COO being fired. An informant described how the COO had been on the losing end of the power struggle over where to take the company: 'He was an elephant in a porcelain shop. He was trying to move in one direction, but the others wanted to go in a different direction' (interview, Head of manufacturing engineering, 2017).

At this point, R&D now sought to enter Operations space and use their resources to develop a laser for a large OEM customer. This caused a reaction from members of Operations, who feared that R&D would return them to the pre-commercialization phase: 'We can't just let R&D come in and throw stuff in left and right; we can't return to a stage where it was all laboratories!' (Interview, Operations Manager, 2017). As a result, the newcomers sought to protect their turf through *competitive boundary work*, a form of boundary work where actors seek to protect their space from encroachment by other groups (Langley et al., 2019). To protect their turf, Operations set up what R&D members called a 'fence'. This was a set of rules that Operations set up for allowing R&D members to operate on their turf and even to send products from R&D to Operations. Operations enforced this 'fence' by referring to the demands from owners and customers that Supertech had to have efficient lean Operations. Simply, Supertech had to acquiesce to the commercial logic to secure legitimacy, despite the fact that incumbents were pushing back.

The 'fence' between the two groups allowed them to avoid open conflict, but it hampered their ability to solve complex tasks in unison. The mistrust and clashes between the logics made the two groups avoid each other. I noted that R&D rarely interacted with Operations or vice versa. One informant described it as such:

> 'The operations manager runs it, and he is doing a good job. But he is putting up a fence … So if you come and meddle with the fence, then he [operations manager] comes and growls at you. Inside his own square his is operating really well. It just does not fit in'. (Interview, Head of manufacturing engineering, 2017)

As a result, informants in Supertech noted that the two units, R&D and Operations, were essentially compartmentalized, meaning that incumbents and newcomers were

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separated. They also noted that the feeling of 'who they were as an organization' was broken. For example, one informant noted: 'I think we should sit down and ask ourselves why does this company exist? It is here because it is built on values of some sort. There is something that makes us who we are. But we need to identify what those values are …' (interview, Director of R&D, 2017).

Similarly, the CTO noted at the end of my data collection that he felt that the company was being split apart. He noted that R&D and Operations struggled in working together and he had a hard time finding a solution. He oscillated between an idea of splitting them up completely and putting them in two different places. Then, a little later, he completely changed tune and now talked about the importance of creating one joint identity that everyone could be part of:

> 'We, who sit up in R&D … we have had the luxury to be in the company since the founding. We have grown up the with company, right? And you cannot expect that this is normal. And the other ones [newcomers] they do not feel a part of this … so what do we do?'. (Interview, CTO, 2017)

During this stage, the logics had again fluctuated in power, now swinging back to favour the incumbents as they reactivated the science logic. This enabled them to resist the encroachment from the newcomers and their commercial logic, and even threaten to take over the newcomers' domain. As a result, the logics were now seen as incompatible and opposed to each other, leaving each group isolated from the other. This caused the organizational identity to fragment as there was no agreement on where the company was going or even what core values it was built on. Lacking this joint identity, conflict was constantly brewing, and processes were often slowed down due to disagreements. The CTO talked about facing a 'burning platform' where they had to resolve their conflict for Supertech to survive and continue growing.

DISCUSSION

Based on the findings, I built a theoretical process model of how the fluctuations of the commercial and science logic caused the organizational identity to fragment in a science-based venture during its journey from the scientific to commercial field (Figure 3).

This process model can be separated into three stages.

Stage 1

In the first stage, the commercial logic was successfully adopted in such a way that it improved important, yet peripheral, functions, leading incumbents to welcome the change. My findings point to the fact that the science logic was dominant in the field and organization as the key reason why the logics were compatible (this dominance is illustrated with the science logic being on top in the model). The science logic being dominant in the field meant that the incumbent researchers could secure key boundaries and then set up 'hybrid spaces' (Perkmann et al., 2019), where they took in commercial logic practices and ideas, but then kept them out of core practices, such

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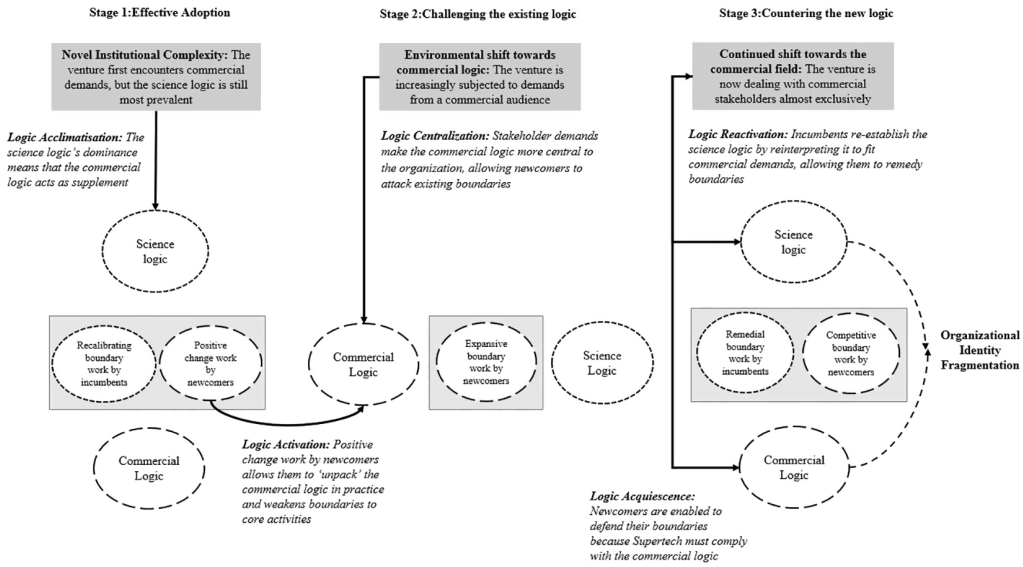

Figure 3. Process model of how fluctuation in logics fragments the organizational identity

as the ability to develop technology in a creative manner. This finding fits Besharov and Smith's (2014, p. 368) speculation that when one group in an organization can dominate the other, then logics are more compatible because the weaker group cannot influence the jurisdiction of the dominant group. I term this mechanism where the supremacy of one logic over another allows for compatibility and successful adoption as *logic acclimatization*. The result is that informants felt that the adoption of the commercial logic had been successful because functions had been improved, making Supertech seem legitimate in the commercial field while the core science identity was maintained.

Stage 2

In the second stage, the logics fluctuated in power with the commercial logic becoming a real alternative to the science logic (as illustrated in the model by them being on par with each other). There are two reasons for this swing in power. First, the venture was increasingly subjected to demands from commercial stakeholders. This enabled the newcomers to increasingly demand internal concessions to meet these demands. I refer to this mechanism as *logic centralization*. Second, the newcomers activated their logic through their positive change work, which unfolded the commercial logic in daily practices and allowed newcomers to shape peripheral functions according to the commercial logic. This *logic activation* allowed the newcomers to engage in *expansive boundary work*. In practice, this meant that newcomers would demand that R&D followed their logic in their practices, such as operating after a project management model adapted from a large corporation. This caused the organizational identity to start drifting because newcomers sought to change key activities and provide an alternative view of the company. At this stage, the logics started shifting from compatibility to incompatibility because the commercial

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logic now presented an alternative to the science logic and because boundaries set up to protect the science logic were crossed.

Stage 3

In the third stage, the incumbents reacted to the encroachment from the newcomers and the commercial logic by remedying boundaries and pushing the newcomers back. Incumbents could do so as they *reactivated the science logic* by connecting it to present demands, in this case arguing that their core competitive advantage was science and not lean manufacturing. Furthermore, incumbents included the argument that the science logic was core to Supertech's identity and therefore had to be maintained to protect the 'DNA' of the company and to secure consistency in the eyes of stakeholders. This shifted the power back to the incumbents (illustrated in the model with the science logic being on top once more). The push back from incumbents then provoked the newcomers to protect their space through *competitive boundary work* (Langley et al., 2019). Newcomers could do so because Supertech had to *acquiesce to the commercial logic* to be legitimate in the commercial market. As a result, the organizational identity was fragmented as each logic provided an alternate identity. These two identities cancelled each other out. The science logic was reactivated and brought back to dominance, while the commercial logic had to be accommodated to please the commercial stakeholders.

In sum, the process model illustrates how the organizational identity of science-based ventures can fragment during scale-up. The core driver of the organizational identity fragmentation is the fluctuations in each logic's power. When feeling powerful, actors enforce their logic and expand their boundaries, thereby making the logics incompatible and causing conflict. Accordingly, members of the organization feel that they do not know the core values of the company and they feel a loss of identity, not knowing who they are anymore.

This process model provides insights into organizational identity processes, dynamics of institutional logics, and the scaling of science-based ventures.

Organizational Identity Processes in Ventures: Understanding Organizational Identity Fragmentation

Recently, scholars have argued that ventures form legitimate organizational identities based on institutional logics, often adopting new logics and mixing them with existing logics (Cornelissen et al., 2021; Fisher et al., 2016; Perkmann and Spicer, 2014). While other studies in this stream find successful identity formation and provide 'recipes' for how to form new identities (e.g., Gioia et al., 2010), my study provides insights into the challenges that ventures face in trying to adopt new logic and a form a new identity.

The *key insight* is that organizational identity fragmentation is caused not just because logics have opposing elements, as most literature has theorized until now (e.g., Battilana and Dorado, 2010; Grimes et al., 2019; Smith and Besharov, 2019), but because they fluctuate in power causing abiding instability. The first fluctuation, the increased dominance of the commercial logic, causes the organizational identity to drift as newcomers push to reform the venture. While this drift may cause some conflict

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and dissatisfaction among incumbents, shifting towards a commercial identity would be a natural step for a growing science-based venture. If completed, the venture's organizational identity would fit better with the now commercial environment (Fisher et al., 2016; Kaehr Serra and Thiel, 2019). It is the ability of incumbents to reactivate their logic, and shift the power back to themselves, that is especially damaging because it leaves the venture in a situation where the organizational identity cannot be resolved. The commercial logic, and organizational members representing it, cannot be ousted because this would make the venture illegitimate, while the science logic is too strongly embedded in the organization to be replaced or made subservient. Finding a compromise is also severely hampered as the fluctuations cause mistrust and leave actors waiting for a chance to reclaim power.

In contrast, in the prior work that found it possible to form organizational identities out of contradicting logics (e.g., Battilana and Dorado, 2010; Perkmann et al., 2019; Smith and Besharov, 2019), the logics do not fluctuate. This consistency may play a significant role in allowing organizations to form identities out of contrasting logics. For example, Smith and Besharov (2019) found that organizations can do so if they have stable 'guardrails', such as goals and metrics, that set boundaries and keep actors from engaging in conflict. However, in my study, such 'guardrails' were not stable. For instance, when the newcomers felt that the commercial logic was becoming more central, they encroached on incumbents and sought to 'move the guardrails' by enforcing their goals and metrics. Thus, my study highlights that boundaries in organizations are not stable but connected to institutional logic dynamics. I found that when logics fluctuate in power, boundaries become permeable, and this permeability allows for conflict and organizational identity fragmentation. This explains why logic fluctuation caused conflict in my study compared to other studies where logics and boundaries are stable.

Overall, my study extends work on venture identity formation by highlighting fluctuations in logics as a key reason for why new organizational identity formation fails and leads to fragmentation.

Dynamics of Institutional Logics and Identities in Organizations

The debate around how institutional logics affect organizational identities also ties into the growing literature on how to understand the dynamics of institutional logics (Cappellaro et al., 2020; Gümüsay et al., 2020; Ramus et al., 2017; Smith and Besharov, 2019). My study extends this recent work in a couple of ways. My study shows how logics in organizations may draw their power from different sources. In this case, the science logic had influence over Supertech because it had been imprinted during its founding in the scientific field. Supertech had had a lot of success in the phase of developing the technology, e.g., they gained a lot of rewards and patents. Such success imprints a logic in the organization and make its influence over the organizational identity both long-lasting and powerful (Snihur and Clarysse, 2022). By contrast, the commercial logic's influence over the organization was largely due to external demands from the commercial stakeholder audience. Realizing that logics may draw power from different sources allows researchers to better understand the

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dynamics of logics inside organizations. For example, Cappellaro et al. (2020) find a similar development where incumbents reasserted discretion over practices. But they did not explain where the incumbents got the power to do this from. My study points to a mechanism of *logic reactivation* where incumbents revived the imprinted logic by connecting it to present demands. In this case, incumbents argued that science was a key competitive advantage. This mechanism works as managers fear dramatically altering the organizational identity, which can cause negative stakeholder reactions (Fisher et al., 2016). My finding here echoes the notion that scientific legitimacy continues to be crucial even when ventures engage with commercial stakeholders (Fisher et al., 2016, pp. 398–99, Wry et al., 2014).

Moreover, studies have shown that organizational legacy and imprints have a surprisingly large effect on the organization in its present (Hatch and Schultz, 2017; Ravasi et al., 2019). These studies show that actors often revive past identities, ideas, and practices, and enforce them in the organization. Put differently, organizational legacy is a powerful tool in shaping the present organizational identity.

The findings also enrich the nascent work that combines organizational identity and institutional theory ideas (e.g., Ashforth and Reingen, 2014; Gioia et al., 2010, 2013b; Kraatz et al., 2016). In particular, my study improves understanding of the interplay between organizational actors seeking to create identities that are legitimate to stakeholders and meaningful to themselves. I find that organizational actors draw identity meaning from legitimation of their preferred logic. For example, logic centralization, which made the commercial logic more salient and important, inspired newcomers to use this logic to reshape the organization. Vice versa, before incumbents could remedy boundaries, they had to reactivate the scientific logic and find ways to make it legitimate in use. Thus, legitimacy and meaningfulness are related. For an identity script, such as an institutional logic, to be used in action in an organization, actors must legitimate it. They need to be able to justify why their logic should be used, and to do so they often have to refer to stakeholder demands, e.g., that investors or customers desire specific actions or outcomes. As such, my study supports and extends Gioia et al.'s (2010, 2013b) notion that legitimacy and meaningfulness should be seen as connected elements. To their theorization, my study adds the notion that the way that actors legitimate their preferred identity script, i.e., their logic, is highly agentic. For example, incumbents reframed their logic as key to the venture's success, relying on the fact that success in the scientific field provided goodwill in the commercial field as well.

Overall, my study extends the increasingly conjoined debate on dynamics of institutional logics and identities (Ashforth and Reingen, 2014; Cornelissen et al., 2021; Gioia et al., 2013b; Smith and Besharov, 2019) by showing how and why logics shift in power and how this corresponds to organizational identity dynamics.

Why Science-Based Ventures Fail to Scale: Imprinted Organizational Identities as 'Time Bombs'

Outlining how a venture's identity may fragment over time due to fluctuations in the logic, and outlining why the logics fluctuate also adds to the debate around how

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imprinted organizational identities hinder scaling (Alexy et al., 2021; Maurer and Ebers, 2006; Snihur and Clarysse, 2022). Currently, a dominant view is that ventures fail to scale because they fail to adapt their organizational identity and thus become illegitimate (Fisher et al., 2016; Zimmerman and Zeitz, 2002). The primary reason that ventures fail to adapt their identity is what Fisher et al. (2016, p. 397) refer to as 'venture identity embeddedness', meaning that leaders form a cognitive attachment to the original identity and logic of the venture, e.g., the science logic, and do not see a need for change. For example, Maurer and Ebers (2006) found that leaders of science-based ventures may be so attached to the science logic that they fail to see that they need to create a more commercial organizational identity. In this view, identity imprints, such as a science logic in a science-based venture, are rooted early in the venture's history. Being rooted deep in the venture's history provides identity imprints with a taken-for-granted status, which makes it hard to get rid of them (Alexy et al., 2021; Kaehr Serra and Thiel, 2019; Maurer and Ebers, 2006). To use a metaphor, an imprinted identity is like an 'anchor'[7] stopping the venture from initiating change as leaders are tied to the existing identity.

Yet, outlining how organizational identity fragmentation happens over time, I provide a different view. I pose that an imprinted identity is more like a 'time bomb': it does not hinder change in getting underway but reappears later with negative effect. In this case, the imprinted science logic identity, what the first CEO referred to as the 'DNA', did not hinder the adoption of the commercial logic; indeed the leaders pushed adoption due to stakeholder pressure. It was later, when the commercial logic started threatening the science logic identity, that conflict erupted. Conflict was thus delayed until the instance that the new logic stood as an alternative, not when the logic was first adopted and was weak.

This metaphor that an imprinted identity can work like a 'time bomb' reflects recent work on imprint metamorphism; how imprints may change in character and force over time (Simsek et al., 2015). Simsek et al. (2015) argued that not only do imprints persist and cause inertia, i.e., work like an 'anchor', but they may also shift nature and become more ingrained over time, thus creating conflicts later on. This is more in line with what I found. I found leaders aware that they had to change but who lost control over how the logics each tried to shape the venture's identity, leading to fragmentation.

Overall, my study provides a new explanation for why ventures fail to scale, the organizational identity fragmentation over time, and a new metaphor of imprinted identities as 'time bombs'. This metaphor is particularly useful for explaining failure to scale in cases where leaders are aware of the need for change. In these cases, the failure to scale is not caused by naivete or resistance to change, but more likely by mission drift where the organizational identity fragments over time (Grimes et al., 2019).

PRACTICAL IMPLICATIONS

My study has practical implications and ties into a burgeoning practitioner literature on scaling (e.g., Eisenmann, 2021; Gulati and DeSantola, 2016). This literature also focuses

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on the problem of integrating newcomers. Yet, it focuses more on the problems created by specialization and differentiation of functions. Instead, I propose that conflicts between newcomers and incumbents is a question of identity: who they are as an organization. This form of conflict may be especially prevalent in ventures founded in fields dominated by non-commercial logics, including social enterprises and healthcare ventures. As such, I suggest that managers of such ventures should *have a clear strategy for how the organizational identity should be adapted* when transitioning between fields. In Supertech, the management focused more on the market and less on the inside of the organization and its identity. This allowed newcomers to act more aggressively, partly because they believed that this was their mandate. This could possibly have been avoided if expectations had been clearer from the beginning.

Interestingly, my suggestion here differs from current wisdom in the scaling literature (e.g., Gulati and DeSantola, 2016; Sutton and Rao, 2014). Here, it is suggested that managers should sustain and spread an existing identity. Yet, based on my findings – and through integrating insights from prior research – I argue that for many ventures, in particular ones founded in fields where non-commercial logics dominate, this is not good advice. The challenge for managers is instead to form a new identity that includes incumbents and newcomers, and then to stabilize this identity to reduce fluctuations and conflict.

LIMITATIONS AND FUTURE RESEARCH

As an inductive single-case study, my study naturally comes with caveats. With single case studies there will always be a question of generalizability of the findings that are important to discuss. First, my study is only directly generalizable to science-based ventures that are founded with science as the core mission, and which then hire new, non-academic members. This does cover a wide array of science-based ventures, as it is a common occurrence that science-based ventures have to adopt the commercial logic in the form of new people, practices, and values (see for example El-Awad et al., 2022; Fisher et al., 2016; Vohora et al., 2004; Wry et al., 2014). Yet, my findings may also pertain to other ventures and their scaling problems. For example, Smith and Besharov (2019) show that social enterprises struggle with integrating members with different logics and also face challenges in maintaining a coherent organizational identity. While Smith and Besharov (2019) find that some social enterprises may ameliorate these problems through installing 'guardrails' around the core mission, other enterprises may not. Indeed, Ramus et al. (2017) show that external shocks may cause conflicts in social enterprises. Hence, it may be possible that social enterprises face similar problems with fluctuating logics and destabilized organizational identities when they scale. This could be an avenue for future research.

Second, in my study the two logics, science and commerce, were clearly delineated in each their own group, incumbents in R&D and newcomers in Operations, respectively. This is similar to other studies, where newcomers also represent a novel logic (e.g., Cappellaro et al., 2020). In other studies of science-based ventures, commercial and science logics similar map cleanly on non-academic newcomers and academic incumbents (e.g., El-Awad et al., 2022). However, in other studies the demarcation

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is not so clean. For example, Powell and Sandholtz (2012) noted that some science-based ventures are 'in science to do business'. Scientists in this type of science-based ventures may be less loyal to the science logic. In fact, scientists of this sort may be ones who prefer the industry over academia (Sauermann and Roach, 2014). These scientists may be much more willing to let go of scientific norms, such as publishing, and embrace the commercial logic instead (e.g., Maurer and Ebers, 2006). Hence, it is important to note that that my findings and model may not generalize to all science-based ventures, and that they may face different organizational identity dynamics, depending on who the scientists starting them are. Third, at the end of my study, Supertech was in turmoil and it continued to be in turmoil as I did member checks after my main data collection. However, as organizational identity is always evolving (Cornelissen et al., 2021), I cannot rule out that it will eventually find a way to combine the commercial and science logics.

Thus, my study opens for future research to investigate more deeply how science-based ventures can adapt their organization to move out of the chasm between the scientific and commercial market. For example, future research may investigate how science-based ventures can shed the scientific logic (Fisher et al., 2016). This could be studied through longitudinal qualitative studies, but experiments could also be used in this regard. For example, Glaser et al. (2016) use experiments to provoke institutional frame switching in subjects. Future research may also engage more with how science-based ventures can sustain innovation processes while trying to adopt a commercial logic. Here, future studies employing longitudinal multiple and single case studies would be useful to develop new theory on this matter. Such research could add to the past focus on how ventures obtain resources (Vohora et al., 2004), competencies (Rasmussen et al., 2011), or social capital (Maurer and Ebers, 2006), by focusing on how science-based ventures can construct a coherent organizational identity that allows them to scale.

CONCLUSION

This paper investigated the internal dynamics that science-based ventures face when they seek to commercialize science. When doing so, the ventures face a significant challenge: they must adopt the commercial logic and form a new organizational identity when entering the commercial market. The study shows how such a logic may be accepted and taken in, as it is compatible in the beginning, yet over time it starts to seriously challenge the status of science in the organization, leading incumbents to fight back. As a result, the organizational identity fragments due to the incompatibility and instability of the logics.

Overall, the paper provides key insight into how ventures can 'come apart' while scaling up. Doing so, the paper points out that not only do ventures face key challenges in finding markets, dealing with stakeholders and improving capabilities, but they also face difficult challenges in forming and stabilizing their identity.

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NOTES

[1]I am grateful to the anonymous reviewer who suggested this term.
[2]Examples of science-based ventures are biotech (Maurer and Ebers, 2006), nanotech (Wry et al., 2014) and medical research (Pahnke et al., 2015).
[3]Industry Report 2013 from German Federal Ministry of Education and Research.
[4]On the request of informants, the identity of these large OEM customers will not be revealed.
[5]Pseudonym.
[6]Pseudonym.
[7]I borrowed this metaphor from Grimes et al. (2019).

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