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Material temporality: How materiality ‘does’ time in food organising

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Abstract

The organic and, hence perishable, nature of food makes it particularly useful for understanding how the temporal dimension of materiality influences organising and innovation. We present, as our main theoretical contribution, the concept of ‘material temporality’ to account for the transformation of materials *in* time and their imagined states at different moments *across* time, which we label processual and epochal temporality, respectively. Our empirical study shows how two organisations in the beer and dairy industries searched for novel solutions in their past and future and how the organisations’ potential for more consequential innovation was greater when they engaged the distant past or distant future epochal temporalities. However, in terms of processual temporality, distant epochal temporality may also become uncertain and contested. We discuss the implications of material temporality for industries other than food and for organising in relation to the natural environment.

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Introduction

In September 2018, the Danish brewing company Carlsberg announced a new packaging concept for their six-packs. Instead of the six cans being wrapped in plastic or held together with plastic rings, they would be glued together. As part of Carlsberg's sustainability strategy, the innovation was expected to save 1200 metric tonnes of plastic per year. The only plastic used on the product would be a handle for carrying the six-packs, to be made from recycled plastic. Developing the technologies took three years, from 2015 to 2018. The rollout will be conducted over several years, as part of the company's newly developed long-term strategy for achieving a carbon-free footprint by 2030.

This example illustrates how the making of materials involves innovation processes. It also illustrates how materiality may be interpreted differently along the dimension of time, from the temporally present to the temporally distant dimensions. In this case, the processing of the solution occurs as ongoing processes in the present, which we call processual temporality. Processual temporality describes the nested, continuous, and intersecting flows of materials. A six-pack of beer contains components that connect through nested flows processed at different speeds and with different durations, which are assembled into the processual temporality of the six-pack. The beer itself is a living, perishable substance that evolves organically over time to achieve a certain quality before it is processed through pipes and into containers. The aluminium cans, having been developed from extracted underground bauxite and processed to become cans that contain beer, are designed to slow down the beer's perishing time long enough to allow transport, storage, and consumption, before the cans are recycled for reuse. The glue would be timed so that it would enter the production process at the right moment and have time to harden. The plastic handles would emerge from separate flows of retrieval, assembly, and recycling.

The second temporal dimension describes that which is temporally more distant, which we label 'epochal temporality'. Used here, epochal temporality expresses how produce is imagined as a provisionally finished product at different times in the past or future. As noted, three years of research

and development enabled Carlsberg's changes announced in September 2018, and two to three years remained for the global rollout after the announcement. We describe this as epochal temporality because it expresses how stakeholders anticipate a particular state of a product at a later time, such as six-packs of Carlsberg without plastic wrapping being sold throughout its global distribution network within two to three years. When actors imagine the produce or product at a different time, a different picture of intersecting processes may emerge. For example, they may see production processes as intersecting with different patterns of acquisition, consumption, and disposal than what occurs at present. This is also a premise of innovation; to envisage a context for a product that is different from the present, although that context also includes the 'materials of the present' (Schultz and Hernes, 2013). As our analysis shows, epochal temporality may occur at different temporal spans from the present. In the case of Carlsberg's six-pack, this temporality is also framed by the company's projected long-term horizon of sustainability, which anticipates zero carbon emissions at Carlsberg's breweries by 2030.

A contribution of our paper is to show how the processual and epochal dimensions of material temporality interact in innovation processes in two food organisations. We argue that particularly when *distant* past or future epochal temporalities exist, the potential for more-consequential innovations is greater. However, under such conditions, material temporality may also be more uncertain and therefore subject to controversy and negotiation. A notable contribution of our analysis is that searches for both future and past novelty may engender considerable uncertainty.

In this context, food becomes a particularly interesting object of study. Consisting of organic and hence perishable living matter, food is continually transforming and needs to be processed in time. In the case of milk, for instance, present-day organising is partly a legacy of the late nineteenth century, when dairy cooperatives were established to provide collective solutions to the problem of transporting fresh milk from individual farmers to consumers in the cities (Dupuis, 2002). The complexity of food arises partly from interactions with humans, whether food is considered in terms

of production, consumption, or in an imagined state in the past or the future. Hence, as Atkins (2011) argues, the internal constitution of food produce is inherently difficult to predict for the future and to evoke from the past. This, in turn, makes innovating food produce a highly ambiguous, uncertain, and potentially contested process.

In what follows, we argue for the need to extend current research on temporality and materiality, to account for how time works as a medium of materiality. We argue for a view of how materiality ‘does’ time, how it *embodies* time rather than being defined by time. We then suggest a theoretical framework, based on the distinction between processual and epochal temporality, which constitutes material temporality. After describing the data collection and analysis, we present four cases, two from the brewery Carlsberg and two from the dairy co-operative Arla Foods. Each case shows how different interplays between processual and epochal temporality influence actors’ search for novel solutions. We conclude by discussing our findings and their implications for sectors other than food.

Processual and epochal temporality

Scholars have traditionally considered how time works as a ‘backdrop’ against which materiality is understood (Bluedorn, 2002). Examples include the ways that historians define materiality epochally. For instance, historical analysis, according to Rowlinson, Hassard, and Deckert (2014), focuses primarily on the making of a reliable narrative about the past. In such studies, scholars either deduce materiality from the epoch or deduce the epoch from the materiality, what Birth (2012, p. 25) calls an ‘artefactual determination of time’. Other scholars have begun to take a different view, whereby they see time (or temporality) as the medium through which materiality transforms. In this view, time emerges from the transformation of materiality, rather than vice versa. For example, Vaujany et al. (2014) discuss how organisations are constituted by material artefacts through time. Other organisational scholars have discussed how material objects may affect people’s construction of the past (Abbott, 2001; Blagoev, Felten, & Kahn, 2018; Hatch & Schultz, 2017; Schultz & Hernes, 2013) and help them reconstruct salient features in order to imagine a different future. Schultz and Hernes

(2013, p. 5), for example, suggest that materiality enables the imagining of past actors' experiences and the materialisation of future projects.

We extend such views by paying more attention to how time works as the *medium* through which materials transform rather than as a chronological backdrop for measuring material transformation through time. Thus, our concern is not how materials are defined *by* time but how materials *do* time, to paraphrase Barad (2013). A shorthand definition for how materials 'do' time is how they *embody* time rather than being defined by time. Adopting this view, we follow materials as they make their way through time and examine how their movement through time transforms them and, thus, 'creates' time in turn. We define this movement of materials through time as 'material temporality'. The movement may be ongoing as materials age, perish, go out of fashion, or otherwise transform, or one may imagine the movement in time as a projection upon more-distant past or future times. Hence, on the one hand, materials 'do time' through ongoing processing in the present, which typically involves temporal concepts, such as timing, ordering, and duration. On the other hand, materials 'do time' when one imagines them at a different time, which may be in the past or the future. We purposely use the word 'imagine' to express how determining the internal constitution of produce is a matter of projection in time from the present, through which the produce can be directly observed and analysed.

The nature of food brings attention to how both observing ongoing processes and imagining a past or future state of the produce may invite uncertainty, ambiguity, and consequently controversy. Atkins (2016, p. 55), for example, describes how even a seemingly straightforward substance like milk may obstinately resist analytical exploration in the present, making its knowability in a distant past or future even more difficult, just as, for example, the meaning of clean water has changed over the years. Such factors, argues Atkins (2011), not only make the materiality of food central to how it is produced and managed, but they also bear out Callon's (2005) argument (in Atkins, 2011) that economics has generally undervalued and under-conceptualised material quality. Blagoev, Felten,

and Kahn (2018) make a similar argument in a recent paper, that research should give more attention to how the dynamic qualities of materiality enable actors to search in their past. We build on these works by focusing more specifically on the effects of the temporal distancing of materiality, represented by the distinction between processual and epochal temporality.

For this paper, we use the term ‘temporality’ instead of ‘time’. Although the two terms may sometimes overlap or be synonymous, ‘time’ signals a resource that may be expressed as a universal, objective, measure. Temporality, in contrast, signals that the time in question belongs exclusively to the entity; it is a measure endogenous to the entity’s or substance’s movement through time, rather than being imposed exogenously.

To extend the conceptualisation of how materials may ‘do’ time, we work with the notions of processual and epochal temporality, which represent salient dimensions of material temporality. The distinction between processual and epochal temporality is central to studies on the philosophy of time. Although philosophers differ significantly in their use of terminologies, they recognise a common basic distinction between the temporally present and the temporally distant (e.g., Bergson, 2010; Mead, 1932; Whitehead, 1929). The present manifests through direct experience, whereas temporal distancing requires imagination. Contemporary scholars of materiality concerned with the philosophy of objects and time suggest similar distinctions between what is actualised in the present and what is imagined as a past or future potentiality. For example, Bryant (2014) argues that any given object in the present harbours a potentiality to be actualised in some other place or at some other time (see also Hernes’s 2014 discussion of Whitehead on actuality and potentiality). Beyond the present, which actors experience as actuality, substance embodies the potential to become actualised ‘otherwise or differently under different conditions’ (Bryant, 2014, p. 5). ‘Being different under different conditions’ implies ‘at another time’, which may be in the past or in the future. What takes place in the form of flows in the present is imagined as a different state in a more distant past or future.

We label the temporality of ongoing flows in the present ‘*processual temporality*’. This implies the temporality of the processing of produce as ongoing practice¹; that is, the situated, continual, and flow-based processing of produce, which implies being immersed in temporal flows of matter (Bergson, 2010). Some ongoing flows take place in a given moment, such as yeast acting during fermentation of the beer; while others are provisionally terminated, such as barley having been harvested; and others are in preparation, such as bottling of the brew. Processual temporality refers to a ‘human-substance present’ (Hernes, 2014), as in Latour’s (1999) vivid description of how Pasteur interacted with the substances involved in his experiments. Latour describes in detail how Pasteur and the substance interact, as Pasteur tries to influence the fermentation process but cannot fully control it, so he instead chooses to accompany the fermentation process as it moves through time. Although the processes include human and material actors, they are not juxtaposed processes but more like *resultant* processes (our term), similar to what Hofmeister (1997, p. 315) calls the ‘physical processes’ acting as ‘mediators between humans and materiality’. Hofmeister’s underlying argument is that human and natural systems are not to be seen as opposites but as part of each other. The physical processes, according to Hofmeister, occur from nature not having a concept of time, whereas humans have incomplete knowledge of nature’s temporality.

The temporally distant, which we label *epochal temporality*, on the other hand, signifies the imagined state of materiality at a different point in time. It is labelled ‘epochal’ because it assumes that a state of affairs imagined in the past or future persists for a certain amount of time, similar to what Whitehead (1920, p. 53) called a ‘slab of nature’. Hence, epochal temporality assumes that time consists of finite epochs or events (Bluedorn, 2002) during which things are imagined to stay reasonably stable. Whereas processual temporality reflects the direct experience of ongoing material flows, epochal temporality invites the use of concepts, of ‘intellectual snapshots that freeze for thought the intelligible patterns of reality’ (Felt, 2002, p. 20). In making sense of an old recipe, for

¹ We are grateful to one of the reviewers for making this point.

example, we imagine that it persisted for some time in the past, just as envisaging a future product or technology will occupy a certain duration of time in a reasonably stable state. In addition, while processual temporality assumes continuity, epochal temporality assumes discontinuities that can be identified as distinct phases in the flow of time (Teixeira, 2011). Epochal temporality invites imagination of what things may have been sometime in the past or what they may become sometime in the future. To imagine a past or future state, it is necessary to distance it from the actual (in the present) and make it 'virtual' (Bryant, 2014, p. 4). To aim to launch a new product in five years' time means to imagine the intended product five years from now, including the processes that constitute it and the intersections with related processes, such as distribution, acquisition, consumption, and disposal. Epochal temporality may also involve locating an object in the past. An ancient recipe locates a dish in time, as preparing and eating the dish is a process of bringing it forward from an ancient past. It does not really matter whether we speak of produce or a physical object, such as a bottle.

Our analysis investigates the interplay between these two dimensions of material temporality, by asking how this temporality becomes a source of challenges and potentialities when actors innovate in food organisations. The following section describes how we, through our research process, developed and refined the two dimensions.

Research process

Our interest in the temporality of the food industry dates to 2010, when during a previous study of Carlsberg, we observed how what we now conceptualise as material temporality took centre stage as management tried to transform 'beer' into 'liquid' (Schultz & Hernes, 2019). Whereas the term 'beer' was meaningful to actors in terms of combining brewing heritage with innovations directed toward a more responsible future, the term 'liquid' aimed to speed up the manufacturing process. However, the latter created an emotional outcry amongst employees, suggesting how the same material can reflect tensions between different temporalities.

Our growing awareness of the temporal uniqueness of food organisations motivated us to extend a longitudinal study of the organisational transformation of Carlsberg (2009–2014) and, since 2015, to focus on temporality. To support our focus on food organising, we included another food organisation that sells ‘milk’, Arla Foods (see link to Arla at the end of this paper). Whereas Carlsberg Group is a listed, foundation-owned brewery group which was founded in 1847 and is the world’s third-largest brewery, Arla Foods is a farmer-owned dairy co-operative with a history dating to 1882. It is the seventh-largest dairy company in the world by turnover (Rabobank, 2017) and the world’s largest producer of organic dairy products. We further developed our research focus through collection of data from primary sources, such as annual reports (specified in the Appendix). Although the annual reports were not rich enough to allow deeper analysis of different temporalities, they enhanced the material foundation of food organisations and highlighted the most important innovations.

For the second step, we collected interview data. The size and complexity of both organisations suggested that we undertake specific projects, in which we found traces of the relation between materiality and temporality. We started with eight potential projects for deeper analysis. In collecting interview data, we both revisited data from the previous study on Carlsberg’s transformation and collected new data from both organisations. Our focused database comprised 37 interviews with 27 informants, as elaborated in the Appendix. At Carlsberg, we conducted the interviews for this paper between 2016 and 2017 as our research questions developed, while we visited Arla twice in two-week periods in 2016 and 2017. We conducted multiple interviews in both organisations with informants of interest to the projects.

In addition, we had several opportunities to observe participants. For this, one of the authors presented analytical frameworks (Arla) or insights based on the ongoing research (Carlsberg seminars) as a basis for discussion amongst 20–40 middle managers and specialists. All events provided a platform for further exploring the dilemmas involved in innovating the material

temporality of the produce. These dilemmas include, for example, how to balance the pressure for large-scale efficiencies with the wish for small-scale craft-like products and how to reach a future zero carbon footprint while reaping short-term benefits.

Our qualitative data collection led us to realise that we needed a conceptualisation of temporality suited for the study of food organising and its reliance on living and biological materials, which pointed us toward the idea of material temporality. The conceptualisation of material temporality spurred further development of the distinction between processual and epochal temporality as constitutive dimensions of material temporality, which guided another round of in-depth empirical analysis. We selected four projects best suited for analysing material temporality, in order to have ample space for a reasonable representation of the data and to show the complexity of material temporality.

Drawing on our refined theoretical framework, we conducted an additional analysis of the four cases. We first wrote a narrative outline of each case and then inserted what we considered the most relevant interviewee statements. We used search words that emerged during the analysis and re-read the full transcripts of interviews with key informants. We analysed each case separately and did not impose additional comparative dimensions. All informants understood that our data would be used for academic purposes only. We have not encountered any restrictions regarding our analysis of the two organisations.

Our research process was inspired by abduction (Alvesson & Kärreman, 2007; Locke, Golden-Biddle, & Feldman, 2008; Mantere & Ketokivi, 2013; Timmermans & Tavory, 2012) in that we moved iteratively between emerging concepts and empirical exploration, based on triangulation of our multiple data sources. However, a theoretical interest in temporality guided our study from the outset, whereas our focus on material temporality and further elaboration of processual and epochal temporality emerged through several rounds of empirical analysis, each of which was enriched by returning to theory. Finally, through the interrelations between emerging theoretical concepts and

empirical insights, we made our final selection of the cases that served as the foundation for our empirical analysis.

Material temporality between processual and epochal temporalities

We have organised our findings as four cases showing how material temporality is mobilised as actors searched for novel solutions in their past and future. In all cases, we analysed material temporality according to its processual and epochal dimensions, showing different types of interplay between them.

Rebrew

Carlsberg Group made several efforts to address the challenges posed by micro-breweries and consumers' growing preference for craft-based beer (e.g., Carroll & Swaminathan, 2000; Dann, 2015). A group of brewmasters and marketers undertook the first initiative in 1999, by engaging inspiration in taste, ingredients, and brewing methods from the founding period (Hatch & Schultz, 2017). After less than a decade, the initiative became what is still Carlsberg's line of micro-brewed beer, Jacobsen, which is brewed at the old facilities in Copenhagen. As the brewmaster explained after the launch of Jacobsen in 2005, the company used the cultural history evoked through epochal temporality to enhance the experience of the beer from the time of Carlsberg's founding:

Jacobsen is to be a hallmark of good, hand-brewed beer, and actively conveys Carlsberg's cultural history through taste and experience ... We want to get beer—and Jacobsen in particular—back on the dining table. We want to give people new taste experiences, and we want to challenge and develop beer culture (Brewmaster, Jacobsen Brewhouse).

A more recent project, 'Rebrew', marked a turning point in the evocation of processual temporality because the project shifted from drawing inspiration from old recipes and brewing methods to recreating yeast from the founding period in the 1880s. It started when construction workers renovating the cellars below the old Carlsberg breweries in 2013 found a crate of old bottles. As one

of the involved scientists explained, the company at first had no idea how old the bottles were and whether they contained the original yeast from the founding period, which was known for the discovery of clean yeast:

They found those old crates with beer bottles, dusty, old, dirty and so on, and we got them here in the Laboratory. And then we could see that there was this thick layer of a kind of precipitation at the bottom. And then we asked the yeast people here, ‘Try to take a little bit of that and see if there’s some living things in it’ (Managing scientist).

The brewmaster recounts how this was done:

At least those are the three bottles I saw being opened to find the yeast. But to give you the perspective, I think that was in 2013. Then they spent a year isolating the yeast; they then wanted to know if this yeast was the original yeast, and how can you know that? (Brewmaster).

The discovery of the bottles entailed a careful examination of the yeast and its biological substances:

So, we used a year to do a gene sequencing of the bottle picked up [and compare it] to the yeast we had in our collection... So, then we could conclude, OK, we have now the original strain [developed in 1883] both in our collection, and there was also one in the bottle (Brewmaster).

Occasionally, someone suggested that it would be interesting to try to brew beer using the old yeast, but researchers in the Carlsberg Laboratory were uncertain whether it would be possible, and the idea was competing with several other projects: ‘Internally there was this kind of, ‘Oh wouldn’t it be great to produce a beer using the old yeast’. And I think somebody somehow passed on that idea to others, but it somehow never really attracted attention’ (Brewmaster).

The celebration of the company and its laboratory’s anniversary provided the occasion for pursuing the possibility of brewing beer from the old yeast. The scientists embarked on a process that, amongst others, included testing 130-year-old barley seeds from the Svalbard Global Seed Vault and

experimenting with how to grow them. The scientists started at a small scale and sped up the harvesting by working in New Zealand:

Yeah, we did that [harvesting in New Zealand] a few times, two or three times, because we started with only ten grains, and in order to have two tonnes or three tonnes of this barley you need to have quite a few harvests growing old types of barley (Scientist).

Finally, the laboratory decided to conduct the high-risk experiment of trying to brew beer based on the original yeast and barley, which they managed to do although they only had one attempt. In addition, they recreated other aspects of that period, such as the shape of the bottles, through manual glassblowing. In 2016, the company launched a limited edition of the beer, along with a (re)telling of the narrative of how Carlsberg Laboratory discovered the clean yeast back in 1883 and shared it with the industry. The whole project was documented in a movie stressing the uncertainty of whether the research team could replicate ancient methods. In 2017, the company further scaled up the project into a new beer for the mass market and labelled the beer '1883', after the year in which the original yeast was cultured.

This discovering and replication of processual temporality became a springboard of appreciation for how science had been intrinsic to Carlsberg's strategy to brew craft beers. Although Carlsberg Laboratory had old strains of yeast long before the Rebrew project, the pursuit of the epochal temporality of relating the beer to the founding period enabled them to overcome the uncertainties of the process. While it took several years of research to explore the usefulness of their discoveries, the exploitation of the well-known founding epochal temporality made the replicated processual temporality meaningful to consumers. This case suggests how the interplay between processual and epochal temporality was mutually supportive in that the epochal temporality of the ancient brewing processes framed the processual temporality of experimentation and search while simultaneously being the very object *of* that search.

The Green Fibre Bottle

The Green Fibre Bottle is a beer bottle made from sustainably sourced wood fibre. The Green Fibre Bottle project at Carlsberg represents a search for a way to innovate the future material temporality of beer by transforming the packaging, while considering the epochal temporality of a more distant future. The project is part of Carlsberg's ambitious long-term sustainability goals: 'Concrete carbon footprint studies showed that packaging made up around 40% of our total carbon footprint, when you look at the full value chain; then we started looking more into packaging' (Manager).

The Green Fibre Bottle project emerged as a small Danish company approached Carlsberg with an idea for a new type of cardboard, which coincided with ongoing searches in Carlsberg's supply chain and amongst corporate social responsibility teams for more sustainable packaging. Thus, in 2014–15, several events came together at Carlsberg:

We [at Carlsberg] sat down and said, 'OK, so what opportunities are there? What is already there? And how might the future look?' We had a very concrete goal in the packaging project to find out how we could tackle biodegradability and bio-based materials, and then there was an actual real opportunity here (Manager).

Since then, more partners joined, as the project required more knowledge and skills, to overcome the significant uncertainties (see also Chesbrough, Bogers, & Strand, 2018):

We also knew that it wasn't easy, because you can just ask Tetra Pak [a multinational food packaging company], then they would probably have done it a long time ago if it was easy (Manager).

The project is still ongoing and challenges the processual temporality of packaging and beer in at least three ways. First, the bottle transforms the packaging from aluminium and glass to a fibre bottle, which has inspired the media to describe the bottle as a 'paper', 'cardboard', or 'wood' bottle (Berman, 2015). While it takes an aluminium can 200–500 years and a glass bottle 1 million years to decompose in nature, the new bottle is made of natural renewable fibres and will be biodegradable.

In their experimentation to determine which fibres could be used for the bottle, the team imagined a distant future motivating their eventual choice:

The truth is it can be from any fibre, but we start with wood fibres because the supply is stable, and they also have high quality... But actually, the dream scenario is that we can do a perfectly circular product, meaning that we can make bottles from the barley straw (Manager).

Second, the project connects the processual temporality of the bottle directly to that of nature, as explained in a corporate statement: 'Together we are developing ... a landmark in sustainable innovation. Its fibres will come from responsibly managed sources, with trees replanted at the same rate that they are harvested, or even faster' (Carlsberg A/S, 2016b). In this way, the project seeks to re-establish a lost connection to nature's temporality.

Finally, the Green Fibre Bottle seeks to extend the beer's cold temperature, altering its processual temporality. This was not part of the original ambition but emerged from online debate forums with interested consumers:

It will keep the beer cold for longer, and that was one of the traits that we hadn't thought about. ... We had some very, very, very knowledgeable, good consumers asking questions about this... So perhaps we'll make it a little bit thicker, of course with the environmental footprint in mind, because then it will have insulation effects (Manager).

Even though the project overcomes the technological challenges of transforming the processual temporality of beer, uncertainties remain. Introducing a wooden bottle would take Carlsberg into uncharted waters, because consumers have not experienced bottles made from fibre. One uncertainty relates to how long it will take consumers to accept or get used to drinking from a wooden bottle:

One thing is having the material. Another thing is saying what the optimal diameter for a bottle is. What does the pressure need to be? What shelf life are we looking at? ... and what type of opening is appealing to consumers? (Manager).

A second uncertainty relates to the processes involved in biodegradability. One argument against the project is that because the fibre bottle is biodegradable, people may throw it away in nature. The bottle's biodegradability might paradoxically make it less environmentally friendly.

People involved in the project were keenly aware that the Green Fibre Bottle needed to be renegotiated continuously. Not only were they up against other departments, such as marketing or supply chain, which had launched new drinks in glass bottles or aluminium cans for decades, but even if the object was attractive in the long term, the team also had to adhere to ongoing planning cycles at Carlsberg. For instance, the project team had to negotiate the project in ways that adhered to the company's common three-year cycle, implying that they had to define the project as a series of pilot launches:

We don't know how to do it, but we aim at a three-year project. We simply just have to take the same approach with the pilot launch and say, 'Listen, this is a pilot launch, and it's a pilot product, and what we said was that within three years we want to have a product with beer in it. The fact that it's not fully optimal yet, that's OK, and we'll be able to explain that, because we have a clear roadmap towards the optimal' (Manager).

However, the project also had to go beyond the three-year cycle, as a manager explained: 'We go much further into the future than we've done at any time in the 11 years I've been here'. When discussing how an uncertain epochal temporality could be sustained in a distant future, several managers emphasised how the Green Fibre Bottle project was the type of initiative that the founder, J.C. Jacobsen, would have supported in the distant past, more than 130 years earlier:

We're back to the fluffy stuff about the spirit. And because I work with sustainability, I've been advocating internally that if J.C. [the founder of Carlsberg] had lived today he would have wanted us to be an incredibly sustainable company. He would believe in climate change ... and he would want us to act on that.

The material temporality related to the Green Fibre Bottle unfolded as ongoing mutual interplay between processual (the temporality of the fibres, the replanted trees, and the coldness of beer) and epochal (the imagined distant past and future processes related to the Green Fibre Bottle) temporality and still remains to be settled. By referring to the founder's scientific orientation, project managers resorted to the distant epochal past to justify the long-term risks associated with the Green Fibre Bottle project. However, between the uncertainties of the future epochal temporalities of how beer is produced and consumed and the ongoing effort to innovate the processual temporality of the beer bottle, clear signs of unsettled interplay exist between these two temporalities, as the fate of the current experimentation and development may suffer in the face of uncertainties related to the distant future epochal temporality.

Skyr: Icelandic-style yogurt

At Arla, the growing societal desire for craftsmanship and healthy food has challenged current processual temporalities and motivated employees, particularly in R&D, to search for raw materials and inspiration in what was previously considered an irrelevant, pre-industrial past. A manager expressed this as follows: 'It's interesting for us to see what was done in the past. Sometimes we can make something for the future out of what was done.' The remaking of an old Icelandic product, skyr, exemplifies bringing processes from a distant epoch into contemporary food production. It has inspired numerous other initiatives to transform the temporalities of new produce with an aspiration to provide a longer, healthier life to consumers (e.g., the launch of the Arla Move, Arla Wellness, and Arla Cultura product lines).

Skyr originated from searches for a new 'superfood', reflecting a fast-growing trend amongst nutritionists and consumers away from concern with low fat and toward demand for more protein and less sugar (Oliver, 2016): '[T]here is a new trend, consumers look for better protein, they want to reduce their carbohydrates, it's a big trend right now. The dietary recommendations change, and people are now looking for different things' (Manager). In their search for high-protein products,

scientists from Arla stumbled upon an old Icelandic recipe: skyr. It has been produced and consumed in Iceland for centuries, and while some have dated it to the Vikings, it is not related to specific epochs. The ancient epochal temporality was uncertain. It was neither patented nor trademarked but existed in recipes and stories of how it was processed at the time of the Vikings. To the scientists in Arla, it was a return to a nearly forgotten recipe:

[Skyr] is interesting for us, because it was almost forgotten about. It came from Iceland now back to Europe, and what it is, it's a fermented milk. ... the Icelandic farmer, he didn't have technology on his farm in the past. He used to milk his cow, and then he fermented the milk, and then he put it into a piece of cloth that he would hang up in his farm, from the ceiling. And then you put a receptacle underneath, and then water drops out through the cloth into the receptacle, and then three days later the process is done. ... The original skyr is like that.

When Arla began to develop skyr in 2014, it was already produced on a much smaller scale in Iceland by a local co-operative, MS Dairies, which described skyr as 'Iceland's best-kept secret'. As Arla began to produce skyr as an 'Icelandic-style yogurt', using the original name 'skyr', spokespersons from MS Dairies contested the claimed epochal temporality of skyr, accusing Arla of making 'non-authentic skyr'. They also challenged Arla's processual methods: 'We own the recipe, they don't have our culture, so it's real skyr versus copycats', said Jon Axel Petersson, head of marketing at MS. This created what some Icelandic newspapers named the 'skyr wars' (Oliver, 2016).

Arla claims to have been able to turn skyr into a more industrialised product by shifting from microfiltration to nanofiltration technologies. This technology, they claim, enabled them to reproduce the ancient recipe through contemporary processual temporality. Their method entailed the ability to separate the milk into even more pure components, which, along with a new packaging line, they applied in a specialised production site in Germany dedicated to skyr:

We tried to reinvent skyr in an industrial way, where we had technologies to remove water from yoghurt. We can do that through membrane filtration, or with separators. Then we studied the

nutritional value, we didn't want it so fat, because we're not working as hard as the Icelandic farmer. ... Then you have reinvented a very old product in a new form using new technology.

That's a nice way to go (Managing scientist).

Although Arla Foods could have invented a product similar to skyr, it would arguably not be the same without invoking skyr, because skyr held special meaning, evoking purity and nature in untouched Iceland. In other words, the epochality of skyr resided particularly in the product's historical meaning. Still, despite speeding up the production process and using sophisticated technologies, a supply-chain manager claims that Arla still produces skyr in an 'old fashioned way':

We could have invented a skyr type product without the historic example, only then, most likely, we would have called it differently, because skyr is what it was called, and then the story wouldn't be so nice to tell. But we could have invented the same thing (Managing scientist).

Drawing upon an ancient recipe eventually forced Arla to negotiate the epochal ownership of that recipe because it was located within a certain epoch of Icelandic history. The epoch and its associated methods (represented by their temporalities) were also contested once Arla attempted to reconstruct those methods through modern techniques with their own distinct temporalities. In other words, they faced the challenge of converting the ancient recipe authentically into modern production aimed at mass consumption, while resembling the biological culture and milk used during ancient times. Although they transformed and scaled ancient processual temporality into contemporary industrial production for the future, the relationship between the ancient and the modern remained contested.

Connecting a farmer-owned past with a future of naturalness

At Arla, the combined proximity of its operations to nature and society's concerns about sustainability motivated the company to consider the distant future effects of their ongoing operations and strategies. Since 2008, the company has extended its epochal temporality by connecting a future of 'naturalness' with a past origin of being 'farmer owned', as a way to strengthen its focus on more natural and organic processual materiality.

From the outset (about 2007–2008), the CEO drove the initial focus on naturalness, often despite the scepticism of others in the company. A manager explained:

There's something that is very special about Arla, and that is [the CEO's] belief in naturalness. And whether he's looked into a crystal ball at some point, I have no idea. But he has never, ever deviated from a belief in what can make us the industry leader. And that is the quality that we want to provide.... And more and more of us believe it now, I guess (Manager).

'Naturally' was added to the vision in 2012 and directed the 'Good Growth' strategy in 2015, which aimed to add value to consumers' lives in a responsible, natural way. By then, society's demand for more natural and organic products had become an even more significant trend: 'When we look at long-term trends, this is where it points to—that this heavy processing of food is going to keep [going] back, and people are going to be concerned about the extent to which it has happened, and it's going to come back at us '(Manager).

As they developed a projection of a new, more natural future, people at Arla began to refer to their founding past more frequently by articulating that being a 'co-operative' means to be 'owned by farmers'. Some managers explained that the notion of being a 'co-operative' was contested:

I think consumers' relationship with the word co-operative in the U.K. is mainly linked to a retailer who's called The Co-operative (Manager, subsidiary).

It's different things in different markets. But in Russia, it was definitely something about the old age. We don't want to talk about it. In the U.K. it also became a bit old fashioned... But when you say you are a co-operative, and they say, what does that mean? Well, we're owned by farmers (Manager).

The awareness of how a co-operative past could be connected to a more responsible future emerged from a series of events enhancing the importance of linking ongoing efforts to develop more natural products and production processes with the credibility of past farming traditions:

A major change was in 2012 when the only successful co-operative in the U.K., Milk Link, merged with Arla, and suddenly Arla had owners in the U.K. And that's the first time that the U.K. dairy industry started going, 'Ooh, hold on a second, maybe Arla is a force for good, and maybe actually farmers are taking more responsibility, and a group of British farmers joining forces with Danish, Swedish, and now German farmers, is actually a good thing' (Manager, subsidiary).

At first, it was not obvious to everybody that referring to 'farmer owned' was the right choice for articulating the past:

You know, and when we first launched it [farmer owned] we really upset a lot of people within Arla, because the Arla brand people were like, 'No, no, no, no, the Arla brand does not stand for farmer owned, the Arla brand stands for nature, health', and [the Arla brand people were like] 'how dare you' (Manager, subsidiary).

However, 'farmer owned' took hold and became an intrinsic part of framing a 'future of naturalness', as expressed, in relation to the Good Growth strategy launched in 2015:

I think farmer owned actually goes much deeper than that, because it goes all the way back, the almost hundred and fifty years, and all the way into the very core of the Arla co-operative, yes, it does, but the way we have worked with it is, it's a communication initiative, that over time might shape something that is more valuable and more meaningful for us (Manager).

For some people at Arla, the meaning of being farmer owned sustained a belief in a long future: 'I think it's the resilience of the co-operative model that actually makes it successful. So, it is a sustainable model' (Manager). This reconfirmation of the epochal temporality also prompted new initiatives that created more transparency in how the naturalness of the processual temporality is sustained, as expressed by another manager: 'We also opened up on our farms, so they [consumers] can go out and visit our farms. So, everything is about the naturalness of our products or food habits, that's what we try to aim at in order to create the future of dairy'.

To our informants, the epochal temporality of being farmer owned enhanced the efforts to innovate the processual temporality of produce toward natural and organic products, as expressed in the strategic ambition to ‘create the future of dairy’. Yet, the company also uses ‘farmed owned’ as a label on everything from packaging, to trucks, and advertising, with the tagline ‘care in every step—from cow to you’ (see link to Farmer Owned at the end of this paper). Most recently, the company has taken this even further into the distant future by articulating a ‘Green Ambition for 2050’, claimed to be deeply rooted in the distant past and defined as ‘the collective strength’ of a ‘strong co-operative history’ ‘started by a few farmers coming together ..in 1891’ (see link to Green Ambition at the end of this paper). This suggests that the epochal temporality is now able to blend ‘co-operative’ and ‘farmer owned’ in ways that indicate a future combining naturalness and the aspiration to make a ‘positive change in the world’.

Summary of findings

The four cases demonstrate different types of interplay between the processual and epochal temporalities in processes of innovation. Specifically, the cases show how the interplay may vary from being unsettled and negotiated, such as in the case of innovating a distant future epochal temporality, to being mutually adaptive and evolving over time. Table 1 summarises the cases.

Insert Table 1 here

The Rebrew case shows how actors came across ancient methods that proved difficult to retrieve and whose consequences they could not know beforehand. Pursuing the uncertain quest of replicating a more than 130-year-old brew was motivated by the unfolding epochal temporality, which connected the potentiality of a novel brew with methods from the distant past. Nevertheless, the actors partly overcame the uncertainties of material temporality, as the reconnections between processual and epochal temporality led to the innovation of a novel type of beer based on the original yeast. The Green Fibre Bottle project aims to create an entirely new configuration of intersecting

processes, with corresponding uncertain temporalities. It shows how a potential novel processual temporality with a virtually nonexistent past and an imagined future epochal temporality may lead to unsettled interplay that multiple actors within Carlsberg and amongst the project's partners must negotiate.

The skyr case illustrates how the interplay between processual and epochal temporality may be contested over authenticity and claims for ownership of past epochal temporality. It shows not only how processual temporality is a way of making more healthy produce but also how this temporality acquires symbolic meaning through epochal expression. As a product, skyr may be interpreted as firmly embedded in the Icelandic culture, implying that Arla's transformation of it into modern manufacturing takes away some of its claimed authenticity. The case of 'combining a farmer-owned past with a future of naturalness' shows how the process of organising future novelty becomes more continuous, as the interplay between processual and epochal temporality is mutually adaptive. This case differs from the other cases by including both distant past and future epochal temporalities, which are mobilised in the innovation of more natural and organic produce in the present, thereby pursuing future sustainability based in past produce and processes.

Discussion

Our analysis demonstrates that material temporality can be analytically broken down into the two dimensions of processual and epochal temporalities. For each of the four cases, we show how the two dimensions are present and that processual and epochal temporalities may exert shifting influences on each other as actors search for novel solutions.

Interplay between processual and epochal temporalities

Our study shows how the characteristic of processual temporality becomes consequential in its interplay with epochal temporality. Both past and future temporalities may be difficult to retrieve and they may embody surprises, which make them hard to translate into the present. Whereas our analysis suggests that the uncertainties of processual temporality are partly overcome through the interplay

with epochal temporality, which paves the way for potentially radical solutions, the interplay remains open and unsettled. In the Rebrew case, the uncertainty revolves around scientists' and brewmasters' ability to retrieve and replicate a past epochal temporality and turn it into future epochal temporality, while transforming ongoing processual temporalities. In the Green Fibre Bottle case, uncertainties relate to the unpredictability of future epochal temporality, which is negotiated through a partnership with a more clearly defined epochal temporality (see also Chesbrough, Bogers, & Strand, 2018). In the two cases from Arla, the epochal temporalities were less uncertain but entailed a continuous search for healthy and/or sustainable solutions that could be transformed to an industrial scale. Here, the material temporality had to span an industrialised processual temporality and an epochal temporality reaching both into a distant past (skyr story and farmer owned) and distant future of natural health, which had to be continually negotiated.

The power of the distant

The analysis demonstrates how decisive interplays develop between the two dimensions of material temporality when they involve connecting the distant past and the present. In particular, when actors searched in the more distant pasts and distant futures, the interplay between processual and epochal temporalities influenced which novel solutions would emerge. We can explain this from different angles. Distant past solutions are more radically different from current practices than are near past solutions, just as solutions for the distant future are likely more radical than are solutions for the near future. In addition, envisaging distant past or future solutions requires changing multiple related routines, practices, and technologies to a larger extent than would be the case with solutions from the near past or the near future. Referring to the split between what is actualised in the present and what is a temporally distant potentiality (Bryant, 2014; Hernes, 2014), our findings suggest that temporal distance matters to the interplay between processual and epochal temporality. Increased temporal distance requires a more radical 'bending' of current methods, as formulated by an Arla manager; our analysis suggests that more imagination is required to translate more-distant temporalities into the

present, what Bryant (2014, p. 4) calls ‘presencing’. Actualising the potentiality of the distant past or future in the present enables, on the one hand, the development of more-radical solutions. On the other hand, as our analysis suggests, the uncertainties and risks are also higher.

Extending from food

Focusing on processual temporality as ongoing processes in the present provides a material lens through which actors may come to grips with the past or future. Our cases are exemplary because food produce is organic, which implies not only that it is perishable and in need of timely attention but also that it transforms through interplay with other processes, including the human organism. However, although ‘organic perishability’ is particular to food produce, industries other than the food industry operate with other forms of ‘perishability’. The fashion industry is a case in point, where the interplay between the processes of assembly in a given moment and the imagined cycles of finished product is crucial for connecting with imagined trends while syncing with the cycles of the market (Bengtsson, 2001). In the computer industry, ‘perishability’ relates to the risk of diminishing connectivity between software and hardware, or even to future connectivity, as software seems to be in an ongoing state of ‘perishability’. In the life sciences, actors seek to exploit the boundaries of material temporality defined by the natural environment (Bansal and Knox-Hayes, 2013). Given that other sectors’ technologies have different forms of ‘perishability’, the usefulness of material temporality as comprising processual and epochal temporality should apply beyond the food industry.

Regardless of industry, useful contributions integrating temporality and materiality might consider how the interplay between our two dimensions of temporality occur, particularly how solutions more distant in time may be imagined through material flows in the present. For example, multiple studies show how actors working in the present can envisage solutions for the future (e.g., Orr, 1998; Schön, 1979). A case in point is Isaacson’s (2013) description of how Steve Jobs would pay daily visits to the Apple laboratories. Holding various models in his hands, he would inspect them and raise issues regarding how the company was headed into the future.

Such examples refer to the notion of ‘presencing’, mentioned above (Bryant, 2014). In a material temporality view, presencing has a dual connotation. On the one hand, it implies bringing an imagined past or future materiality into the present. For instance, an intended product for the future may be explored through the lens of the material processes as they occur in the present, such as prototyping. On the other hand, presencing may also be an outward projection from the present, in which case novel materiality is imagined as a result of observing material processes in the present. The example with Steve Jobs illustrates how a temporally more distant materiality is imagined through practice and involves multiple actors. Our analysis offers some help here. In nature, the presencing of past epochal materiality is evocative, seeking to envisage previous materials through flows in the present, such as what apparently occurred in the Rebrew case. Future materiality, on the other hand, is projected upon a possible future and may be more subject to controversy and negotiation, partly because it is more binding on actors than is evocation of past materiality.

Reconnecting to ecological cycles

Our study offers a novel perspective on how to study the embeddedness of organising in the ecological cycles of the natural environment (Whiteman & Cooper, 2000; Whiteman, Walker, & Perego, 2013). Our analysis is relevant beyond the food industry by suggesting how to reorganise production and consumption in cyclical ways that blend with ecological material cycles, such as ‘cradle to cradle’ (McDonough & Braungart, 2002) and the ‘circular economy’ (Ellen MacArthur Foundation & McKinsey & Company, 2012). According to Bansal and Knox-Hayes (2013, p. 78), there has been a ‘shift in organizational theory from physical materiality to socio-materiality’, which has contributed to a temporal mismatch between the material flows of organisations and the natural environment (Bansal & DesJardine, 2014; Hofmeister, 1997; Slawinski & Bansal, 2012, 2015). Remediating this mismatch is difficult because natural forces and human forces have become inextricably intertwined in the Anthropocene Era (Hoffman & Jennings, 2015). Based in our distinction between processual and epochal temporality, the concept of material temporality allows scholars to analytically

disentangle these forces, as the concept focuses on the effects of temporal distancing and potentially how different temporal distances may be brought into the material temporalities of the present.

The idea of the circular economy focuses on how material flows connect human organising and ecological material cycles. Human organising extracts natural materials and transforms them for human needs, which often involves making them more durable. All material that becomes part of human organising stems from and eventually returns to the natural environment. Whether materials return to ecological cycles as ‘waste’ or ‘resource’ may be attributed to differences in their temporalities. Hence, the proposed transition from a ‘take-make-dispose’ to a ‘reduce-reuse-recycle’ paradigm calls for attention to the processual materiality with which materials return to the natural environment.

In terms of our framework, the literature has largely favoured epochal temporality, thereby underestimating the physicality and embedding in nature of processual temporality. Although we do not consider the natural environment itself in our analysis, the concept of processual temporality brings the materiality of nature into organising. Nature operates both as a potentiality for novelty (e.g., discovering of past natural substances and the attempts to create new ones) and as limitations to what is possible (e.g., seasonal harvesting and knowledge of how different fibres decompose in nature). Nature also poses limitations on how to organise processual temporality (e.g., transformation from small-scale natural products to manufacturing), just as it serves as a reference in the articulation of epochal temporality with respect to both distant pasts (e.g., origin in specific Icelandic nature) and distant futures (e.g., naturalness being healthy and sustainable). Having shown how the distinction between the present (processual) and the distant past (epochal) may be used, we propose that future studies focus on processual materiality and seek to explain how actors develop novel solutions by considering distant past and/or future materialities through material practices in the present.

The agency of material temporality

Finally, we suggest that further research address the temporal agency (Emirbayer & Mische, 1998) of the dynamic interplay between processual and epochal temporalities. We have kept them separate in the analysis in order to study their mutual influence. Future research, however, may focus on how certain processual temporalities transform into epochal temporalities. Some processual temporalities may become epochal temporalities, whereas others do not: the processes by which, for example, skyr was during one period the object of processual temporality, to be evoked as an epochal temporality centuries later. Yet, other contenders for epochal temporality likely existed at the time. It is important to distinguish between past and future epochal temporalities. Processual temporalities emerge to become retained and evoked as past epochal temporalities as actors move through time. Future epochal temporalities are more hypothetical, as they are part of innovation processes intended for the future, and their relationship with processual temporality in the present is more projective. They reflect more of what Schütz (1967, p. 59) called ‘phantasying of spontaneous activity’, described as an ‘intuitive advance’ of current activity. Just as processual temporalities may translate into epochal temporalities, the opposite is also worth studying. In the case of the skyr, Arla launched a processual temporality involving nanofiltration technologies. As to future epochal temporality, the epochal temporality of Carlsberg’s fibre bottle is expected to transform into ongoing processual temporalities as its production is launched in the future. Hence, the mutual transformations between processual and epochal temporalities, we suggest, offer a material dimension to debates about temporal agency (Emirbayer and Mische, 1998), whereby agency becomes located in the mutual transformation between the two dimensions of material temporality.

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Case links (entries May 2019):

Rebrew:

<https://carlsberggroup.com/newsroom/carlsberg-research-lab-rebrews-the-father-of-quality-beers/>

<https://carlsberggroup.com/products/carlsberg/carlsberg-1883/>

Skyr:

<https://www.arlafoods.co.uk/brands/arla-skyr/>

<http://icelandreview.com/news/2015/05/08/uk-skyr-war-heats>

The Green Fibre Bottle:

<https://carlsberggroup.com/newsroom/carlsberg-unveils-new-green-fiber-bottle-design/>

<http://www.carlsberggroup.com/sustainability/stories/Pages/TheGreenFiberBottle.aspx>

Farmer Owned:

<https://www.arla.com/company/strategy/strategy-2020/>

<https://www.arla.com/company/farmer-owned/>

https://www.arla.com/493b98/globalassets/arla-global/sustainability/climate-ambition/arla_201902_08.pdf

Tables

Table 1. Cases of material temporality

Case	Processual temporality	Epochal temporality	Interplay between processual and epochal temporality	Innovation
Rebrew	The processes of replicating beer from a distant epoch, based on old bottles found at the Carlsberg premises	The extracted composition of the beer from the founding period and the emerging near future epochal temporality (new product)	Distant past epochal temporality motivates replication through processual temporality	A marketable new type of beer brewed on original yeast
Green Fibre Bottle	Experimenting with highly uncertain combination of multiple processual temporalities (e.g., trees, wood fibres, beer temperature)	Distant future epochal temporality of assembled elements and how they interact to fulfil the goal of zero carbon footprint by 2030 (Green Fibre Bottle)	Negotiated and unsettled interplay between novel processual temporality and distant future epochal temporality	Prototype of biodegradable packaging (beer bottle)
Skyr: Icelandic-style yogurt	Re-creation of past methods, by using modern techniques, such as by shifting from microfiltration to nanofiltration technologies	Distant past epochal temporality (skyr's origin) related to ancient methods chosen for their health potential	Settled connection of novel processual and epochal temporality, while temporalities remain contested by others (in Iceland)	"Icelandic-style" yogurt reinvented as a consumer product fit for modern manufacturing
Connecting a farmer-owned past with a future of naturalness	Ongoing explorations of novel, more natural, and organic processual temporalities (sustainable practices, healthy products)	Redefining the meaning of distant co-operative past to 'farmer owned' in order to align with distant future of naturalness	Mutual adaptation between redefined distant past and future epochal temporality frames novel processual temporalities	'Farmer owned' public label used as platform for novel sustainable practices and products

Appendix: Data sources

Data Sources	Carlsberg Group	Arla
Annual reports:	1997–2015, 2,463 pages in total	1999–2015, 1,209 pages in total
<p>Interviews:</p> <p>Titles of informants are the titles they held at the time of the interview. See explanation below.</p> <p>All interviews were transcribed (except 1) and lasted between 1.5 and 2 hours.</p>	<p><i>Number of cited informants: 14</i></p> <p><i>Number of cited interviews: 20</i></p> <p>Chairman (2013)</p> <p>CEO interview (2011 & 2015)</p> <p>SVP Group Communication (2008 & 2009 & 2013 & 2017)</p> <p>VP of Corporate Communication (2017)</p> <p>VP of Corporate Social Responsibility (2017 & 2018 twice)</p> <p>Former SVP Technology and Innovation (2014)</p> <p>Brewmaster Jacobsen Brewhouse (2006 twice)</p> <p>Brewmaster Jacobsen Brewhouse (2009 & 2013)</p> <p>Archivist (2011 notes taken)</p> <p>SVP Asia (2012)</p> <p>Head of supply chain Asia (2012)</p>	<p><i>Number of informants: 13</i></p> <p><i>Number of interviews: 17</i></p> <p>Deputy Chairman (2016)</p> <p>CEO (2016)</p> <p>COO/Vice CEO (2016)</p> <p>CMO Marketing (2016)</p> <p>SVP Research and Innovation (2016 twice)</p> <p>VP Corp. Communication (2016 & 2015 twice)</p> <p>SVP UK (2016)</p> <p>VP Quality (2016)</p> <p>VP Strategy (2016)</p> <p>EVP Corporate Affairs (2017)</p> <p>VP Arla Denmark (2017)</p> <p>VP Corporate Social Responsibility (2017)</p> <p>VP Corporate Communication (2017)</p>

	<p>Head of supply chain Europe (2011)</p> <p>VP Group R&D Carlsberg Laboratory (2017)</p> <p>Head of brewing technology Carlsberg Laboratory (2017)</p>	
<p>Participant Observation</p>	<p>Visits to Jacobsen Brewhouse (2006 & 2011 & 2014)</p> <p>Visit to Fredericia Breweries, (2011)</p> <p>Internal launch of growth strategy and new innovations, including Null-Lox (2013)</p> <p>Seminar on the transformation journey in Carlsberg (2015)</p> <p>Seminar on use of history with interested Carlsberg managers, 2017. Notes taken.</p>	<p>Talk and dialogue with Arla Communication and Marketing teams (2014) on Arla identity and on Good Growth strategy 2020 (2015)</p>

EVP: Executive Vice President

SVP: Senior Vice President

VP: Vice President

BIOS

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