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Stretching, embeddedness, and scripts in a sociotechnical transition: Explaining the failure of electric mobility at Better Place (2007–2013)

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ABSTRACT

Based on field research, interviews, and participant observation, this study explores the failure of Better Place—a now bankrupt company—to successfully demonstrate and deploy battery swapping stations and electric vehicle charging infrastructure. To do so, it draws from concepts in innovation studies, sociotechnical transitions, management science, organizational studies, and sociology. The study expands upon the notion of “fit-stretch”, which explains how innovations can move from an initial “fit” (with existing user practices, discourses, technical form) to a subsequent “stretch” (as the technology further develops, new functionalities are opened up, etc.) in the process of long-term transitions. It also draws from the “dialectical issue life cycle model” or “triple embeddedness framework” to explain the process whereby incumbent industry actors can introduce defensive innovations to “contain” a new niche from expanding. It lastly incorporates elements from design-driven innovation and organizational learning related to schemas and scripts, concepts that illustrate the vision-dependent and discursive elements of the innovation process. It uses the case study of Better Place to test and build upon these concepts. With a market valuation of more than \$2 billion, Better Place was poised to become one of the most innovative companies in the electric mobility market. Yet after operating for five years it declared bankruptcy and saw its assets sold off for less than \$500,000. We suggest here that Better Place failed because it “stretched” to the point that it “broke;” that it provoked a defensive response from both old automotive manufacturers (such as General Motors) and new ones (such as Tesla); and that the fantastic nature of its visionary scripts convinced its investors and promoters to unrealistically raise expectations and downplay persistent risks.

1. Introduction

Project Better Place, later renamed “Better Place,” was a venture-capital backed international company that developed battery charging and switching infrastructures for electric vehicles and sold electric mobility services to drivers. While founded in 2007 and headquartered in California, it operated primarily in Denmark and Israel, where it saw the opening of its first charging station in 2008 (Noel and Sovacool, 2016). At the height of its success, it was considering expansions to a half-dozen other countries and had a market valuation that peaked at approximately \$2.25 billion (Orsato et al., 2009) undergirded with investments from General Electric, Hong Kong Shanghai Bank of China (HSBC), and Morgan Stanley, in addition to endorsements from prominent public figures. It also saw the launching of its first prototype vehicle (manufactured jointly with Renault) on the market in 2012. A mere year later, in May 2013, the company filed for bankruptcy and

saw its assets seized and sold off for \$450,000—the price of a single apartment in Tel Aviv (Kloosterman, 2013).

Why did Better Place fail after securing funding, attracting partners, and operating in two “green” countries with a novel idea? For business experts, the reasons stipulated are straightforward. They contend that Better Place’s financial difficulties were caused by technological inferiority—electric vehicles with limited range and battery designs not yet ready for extensive commercial deployment. Such technical difficulties were only exacerbated by mismanagement on behalf of its entrepreneurial but somewhat erratic founder Shai Agassi; wasteful efforts to introduce pilot projects in too many countries; and large amounts of investment sunk into charging and battery swapping infrastructure (see Woody, 2013; Kershne, 2013; Elis, 2013; Naor et al., 2015; Noel and Sovacool, 2016). On the other hand, some academics have praised Better Place for its presumed innovativeness and likely future success (e.g. Christensen et al., 2012; Key et al., 2011; Andersen et al., 2009).

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Overall, we maintain that neither practice-oriented or academic explanations offer a sufficient or complete answer.

To make this case, in this paper we use insights from innovation and management theory related to sociotechnical transitions, embeddedness, and schemas and scripts. By doing so, we not only provide a grounded account of an event that is too common in the car industry, but one that also provide insights for those seeking to change the technological regime of the automotive industry. Drawing from extensive original data collection derived from field research, we contend that Better Place failed because it attempted to “stretch” too quickly from its initial “fit” with existing user practices and conventions surrounding user mobility. We also argue that rather than existing in a vacuum, Better Place promoted a strategic response from competing industry stakeholders. Some of these incumbents, such as General Motors, responded by promoting their own battery electric vehicles and swapping stations in tandem with others, such as Tesla, which explored their own type of swappable batteries. Lastly, we maintain that Better Place subscribed to a vision-dependent corporate mission and strategy that ended up relying on unrealistic discursive scripts that overestimated benefits and underestimated costs.

In proceeding along these lines, the study sets out to make three contributions. First, examining the sociotechnical challenges facing Better Place brings to light pressing policy and economic questions about the viability of emerging business models for electric mobility. For all intents and purposes, Better Place *should* have worked or at least *could* have worked. It was backed by strong investors and solicited significant consumer and policy interest. The fact that it failed, somewhat spectacularly, serves as a stark warning for those seeking to promote more socially acceptable, politically attainable, economically justifiable markets for low-carbon transport modalities. Second, Better Place provoked a response from incumbents, and therefore better comprehending its struggles generate insights into patterns of obduracy, incumbency, and socio-technical lock-in that can stymie the adoption of socially beneficial niche innovations. Third, by synthesizing from three separate conceptual domains, the paper underscores the necessity of taking a ‘theoretically eclectic’ approach to the study of sociotechnical change (Sovacool and Hess, *in press*), in this instance the significance of techno-economic factors (such as automobiles, batteries, and tariffs as well as industrial strategy) alongside socio-political-cognitive factors (such as user perceptions of radicalism vs. incrementalism, cultural embeddedness, and rhetorical visions).

2. Research methods and concepts

Our data for this study was original qualitative research drawn from a mix of research interviews and longitudinal participant observation. Our primary data tool was semi-structured interviews. This means our data collection involved the asking of semi-structured questions to respondents, sometimes referred to as “guided introspection,” “intensive interviewing” or “responsive interviewing” (Hancké, 2009). This technique asks participants a set of standard inquiries but then allows the conversation to build and deviate to explore new areas. Such interviews are most appropriate when the goal of research is to understand the meaning that individuals give to their actions, particularly when the research objective is to comprehend complicated programs or events and how they intersect with perceptions, beliefs, and values (Drumwright and Murphy, 2004; Yin, 2003). We decided on an elite sampling strategy, meaning we targeted participants with control over the case in question, as opposed to laypersons, consumers, or voters (Lincoln and Guba, 1985; Dexter, 1970). Elite interviews are most useful when intended to reveal the motivations and actions behind decision-making, as it can depict how respondents perceive reality from the viewpoint of someone on the “inside.”

Forty-three interviews were completed with Better Place (BP) employees as well as competing automotive companies, some suppliers and some manufacturers over the course of 2008 to 2016. Context

interviews were carried out initially; these included interviews with elites/experts in the automotive industry. Collection of company-level data at BP took place in stages. Pilot interviews at Better Place took place in 2008 and 2009 (including one with the founder and promoter, Shai Agassi) followed by interviews with top managers and technicians of BP in 2009 and 2010 across several parts of the world (Denmark, Israel, Japan, and the United States). These were followed by a final set of interviews in 2015 and 2016 with automotive experts and former staff at BP.

A few other specifics of this research process deserve mentioning. Interviews lasted between 40 and 90 min; some of the context interviews lasted up to 2 h. The interviews were transcribed and a complete database was created. Given that the problem of access is a typical characteristic of empirical research in the industry (Bulmer, 1988), the authors utilized a “snowball strategy” to contact development (Robson, 1993). One of the authors first interviewed the experts familiar to them or colleagues before having them suggest others to meet, branching out to other companies and organizations. The chosen interviewing strategy thus had a strong focus on information provided by the respondent combined with a weak emphasis on the process of interviewing. In other words, “what” was more important for the applied interviewing strategy than “how” or “who.” This differs from “creative” or “active” interviewing, which is based on the idea that the process of interviewing is at least as important as the information provided by the respondent (Holstein and Gubrium, 2002). While active interviewing is indispensable for studying topics that touch upon the deep personal experiences of respondents, it was not applicable in the present study on BP management and work-related functions. Interviews were supplemented with company documents, direct observation, and site visits shown in Table 1. In the sections of the paper to come, we inductively and qualitatively build the storyline from both a mix of the interviews and literature, in order to enhance its coherence and narrative flow.

The data from these interviews is presented as anonymous—as coming from a “participant” or “interviewee” without full attribution—for multiple reasons. First, we are unable to offer more details or profiles of respondents because of confidentiality concerns. Confidentiality was mutually agreed upon at the beginning of each interview to adhere to the ethics guidelines at the authors’ institutions. Second, anonymity protects respondents from retaliation over divulging potentially controversial information, especially when the topic is as polemic as a company that went bankrupt. Moreover, anonymity encourages candor, as people often speak their minds if they no longer have to worry about their statements coming back to haunt them. Lastly, individuals were not speaking on behalf of their institutions and were instead giving their personal opinion, making institutional affiliation less relevant (though still important for sampling purposes).

To ensure triangulation, we supplemented our original data with a review of the peer-reviewed literature on both electric mobility generally and more specifically the contours and operations of Better Place. We searched key academic databases such as Scopus, ScienceDirect, and EBSCO-Host for articles published in the last ten years (2006–2015) looking at (a) the social acceptance of electric vehicles, (b) business models for electric mobility, and (c) case studies of Better Place (of which there were only a handful). We compiled dozens of studies though we reference only the most relevant ones here.

To filter this capacious amount of data, we rely on three distinct concepts: “fit-stretch,” the “triple embeddedness framework,” and the notion of “schemas and scripts.” To be sure, these three conceptual approaches are among many that could have been utilized; Sovacool (2017) interviewed social theorists about which theories best “fit” the topic of electric mobility transitions and generated a list of 54 relevant to the topic. Sovacool and Hess (2017) similarly interviewed theorists about conceptual frameworks seeking to explain sociotechnical change and generated a list of 96 theories. We selected these three in particular because we wanted one to address patterns of transition (“fit-stretch”); one on incumbency (“triple embeddedness”); and one on discourse and

Table 1
Overview of primary research methods utilized in this study.
Source: authors' compilation.

Type of data	Source(s)	Number (n)	Details (when applicable)
Context interviews	Experts in electric mobility	4 interviews	3 senior faculty at universities; 1 at a research institute
	Experts in the automotive industry	6 interviews	4 senior faculty at universities; 2 at research institutes
Company interviews	Pilot interviews at Better Place	9 interviews	- (confidential)
	Management interviews at Better Place	14 interviews	- (confidential)
	Interviews at other companies	10 interviews	3 at Tesla, 4 at Volkswagen, 3 at General Motors Group
Company documents	Internal documents		30 documents, reports, memos, white papers
	Annual reports		4 documents
Direct observation	Guided tours of Better Place facilities		12 h
	Attendance of seminars for representatives of Better Place		40 h
	Attendance of three automotive fairs (Germany, Japan, United States)		12 h

innovation (“scripts”). This selection essentially means we draw from concepts analyzing a mix of sociotechnical change, industrial strategy, and rhetorical narratives. Table 2 provides a high level contrast of these three theoretical lenses. The remainder of this section of the paper introduces each in turn.

2.1. Fitting and stretching in sociotechnical transitions

The first concept we employ is that of “fit-stretch” from innovation studies, transition studies, and strategic niche management (Geels, 2005a; Geels, 2005b; Orsato et al., 2012). This literature has noted that during earlier transitions in mobility, such as from the horse drawn carriage to the modern automobile, technologies compete with each other for dominance across at least two dimensions: technical form and design, and user context and functionality. These two dimensions can even be plotted visually on a graph, as Fig. 1 illustrates. New systems, such as the automobile, are adopted only when disruption to both dimensions—the technological and behavioral “discontinuity”—is not too great. Put another way, new innovations must successfully harmonize a coevolution between technical form and social function, where they initially fit with existing regimes before gradually expanding into new technological forms or concrete user experiences. Early builders of

automobiles, for instance, saw themselves as promoting a device that “fit” (and even was designed to look like) a “horseless carriage” (Geels, 2005a). As the internal combustion engine was refined, however, automobiles began to diverge in their technical and stylistic attributes so that by the 1930s they looked nothing like carriages and had greatly expanded driver experiences. We see similar “fitting” and a focus on familiarity, rather than radicalism, beyond the domain of transport technologies as well: in the late nineteenth century, General Electric designed its first electric lights to look like gas-fired streetlights, it also manufactured early electric stoves to look like the earlier gas ranges and coal stoves (Sovacool and Hirsh, 2009).

Smith and Raven (2012) add that in order to succeed, new innovations or niches need to properly utilize a sort of “protective space” during a “nurturing stage” where they tap into processes such as learning, articulation of expectations, and the facilitation of networks that sustain their growth. Very radical niche-innovations that deviate in many dimensions from existing socio-technical regimes often entail a “stretch-and-transform” pattern since their diffusion requires adjustments in wider contexts, which are likely to be more difficult, entailing various struggles. Niche-innovations that are less radical may “fit” easier in existing contexts (and are thus easier and often preferred/supported by incumbent actors). As Geels et al. (2016) write, new niche-

Table 2
Overview of sociotechnical transitions, triple embeddedness, and design driven innovation conceptual frameworks.
Source: authors' compilation modified from Sovacool and Hess (in press).

Name	Discipline(s)	Description	Emphasis	Key author(s)
Multilevel Perspective (MLP) on Innovation	Innovation studies and transitions management	The development or introduction of new technologies leading to new socio-technical configurations depends on pathways involving niches, regimes, and landscapes	Sociotechnical transitions	Frank Geels, Johan Schot, Arie Rip, Frans Berkhout, René Kemp, Wim A. Smit, Rob Raven
Triple Embeddedness Framework and the Dialectical Issue Life Cycle Model	Innovation studies and transitions management	Firms face selection pressures from the broader social, political, or economic environment. Firms can respond to these pressures in a variety of ways, from better managing their supply chains to changing marketing or operations practices to lobbying for political support.	Incumbency	Frank Geels, CCR Penna
Design Driven Innovation	Management science, product development, organizational studies, and sociology	Innovation can be envisioned as a social constructivist interpretation of product markets where needs or wants are not a priori or “given,” but instead result from a socially negotiated process between consumers and firms. Utilitarian, symbolic, and even emotional needs are therefore co-created.	Visions, discourse, and narratives	Roberto Verganti, P. DiMaggio, Andrew Hargadon, Y. Douglas

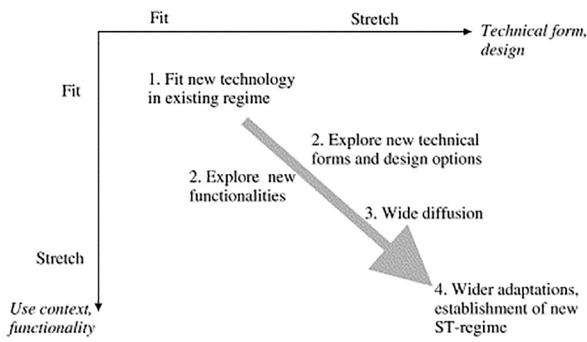


Fig. 1. The “fit-stretch” concept. Note: ST = socio-technical. (Source: modified from Geels (2005b).)

innovations need to compete in an existing selection environment where incremental adjustments or conformity may produce more desirable results than radical change, discontinuity, and disruption.

2.2. Embeddedness and the dialectical issue life cycle model

Our second concept also draws from the innovation and transitions literature, but focuses on a different constituent element: incumbency. In their “triple embeddedness framework” or “dialectical issue life cycle model,” Penna and Geels (2012), Geels (2014), and Penna and Geels (2015) seek to synthesize insights from lifecycle theory (which conceptualize the dynamics of social problems) and innovation studies (to conceptualize the dynamics of technical solutions). They created a framework that illustrates the constant conflict that occurs between problem-related pressures and responses from industry actors. According to the framework, firms face selection pressures from the broader social, political, or economic environment. Firms can respond to these pressures in a variety of ways, from better managing their supply chains to changing marketing or operations practices to lobbying for political support.

Although the framework is fairly vast and complex, we draw particularly from one of its components: that of resistance, where incumbent firms are reluctant to make substantial changes to address a problem or respond to selective pressure. They remain committed or “embedded” to their core strategy. As the framework notes, firms are understandably reluctant to change under arching beliefs and mindsets, to revise corporate missions, and to develop new capabilities and technical knowledge. Thus, they can use innovation strategies to defend the existing regime and develop incremental solutions. In sum, and as Fig. 2 illustrates, each industry sits at the nexus of an ecosystem, and this ecosystem has multiple pathways that influence it. However, it also means that the ecosystem is slower to change since all of those

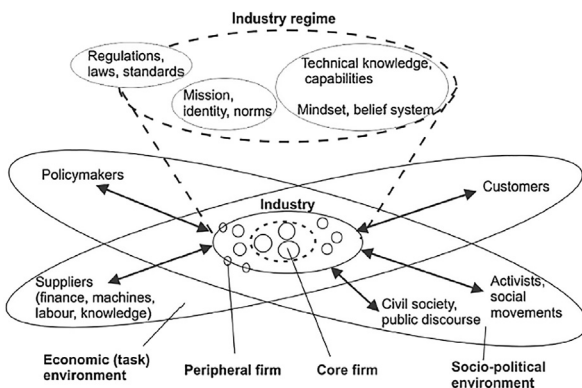


Fig. 2. Triple embeddedness framework of industrial regimes. (Source: Geels (2014: 266).)

pathways create inertia. Given this inertia, path dependence, or obduracy, firms may find it easier to confront a perceived radical innovation by deploying incremental technologies that stay within the bounds of the existing regime.

DiMaggio and Powell (1983) utilize the term “mimetic isomorphism” to explain how organizations (in this case, firms) can copy each other’s strategy or novelty in an attempt to pattern themselves on successful competitors. Mom (2004) refers to it as “mimicry” where incumbent actors try to imitate some properties of emerging and potentially challenging technologies, essentially “stealing” their potential. Johnstone et al. (in press) note that incumbents can often attempt to retain their dominance by “recreating” or “reinventing” conventional systems as new and novel ones, discursively reframing older technologies in narratives similar to ones being articulated by the novel innovations they are competing with.

2.3. Design-driven innovation and scripts

Our third and final concept derives from management theory, and it relates to the notion of schemas and scripts from design-driven innovation. The basic idea of “design” has a long history, and it is generally concerned with the subjective meanings that users come to ascribe to products. This etymology of design provoked Krippendorff (1989) to declare that at its core, “design is making sense (of things)”. All too often, however, interpretations of design remain closely linked to “product development” with occasionally a more intensive focus on users and “user-centered design” (Battistella et al., 2012). Instead of being dictated by user requirements, “design-driven innovation” begins with the idea that it is a firm’s particular vision about a new product that serve as the primary conduit by which it can germinate new product meanings and languages that eventually achieve social diffusion. As Verganti (2008) elaborates, design-driven innovation can be envisioned as a social constructivist interpretation of product markets where needs or wants are not a priori or “given,” but instead result from a socially negotiated process between consumers and firms. Utilitarian, symbolic, and even emotional needs are therefore co-created, and design-driven innovation reflects a symbiotic dialogue with and stimulation of market demand for a new product. Design-driven innovation employs a vision-dependent or firm-centered view of innovation: user experiences are grounded and manifested through corporate strategy. Levitt and March (1988) refer to this as “target oriented” organizational learning.

Put in other terms, design-driven innovation sits closer to the “technology push” school of thought on technological diffusion rather than the “market pull” school of thought. As Fig. 3 depicts, when innovations are “market pulled,” they start from the analysis of user needs and only then subsequently search for technologies or discourses that can fulfill them. User-centered innovation would sit here within the market-pull typology. “Technology push” innovation, by contrast, emerges through the crucible of technological research and development, and it emphasizes that breakthrough technologies are often correlated with substantial or even radical alterations in product meanings. The meaning attached to a technology may be more important than its functionality. Verganti gives the example of the Swatch (watch) in the 1970s and 1980s, where the radical change was not in the manufacturing or performance of the watch but in altering its meaning from an instrument of time or a piece of jewelry to a type of fashion accessory. The shared area in the right hand side of Fig. 3 is meant to depict where design-driven innovation sits within this typology. Design-driven innovation therefore envisions technology “as an enabler of new product meanings for the customer” (Dell’Era et al., 2010).

Given its focus on semiotics and meaning, it may come as no surprise that one critical element of design-driven innovation is the discursive or performative dimension to niche innovations. As Hargadon

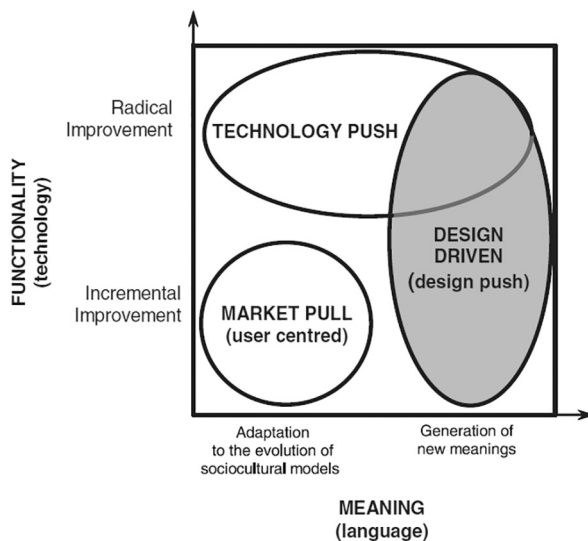


Fig. 3. Functionality and meaning in design-driven innovation. (Source: modified from Verganti (2008).)

(2003) and Hargadon and Douglas (2001) have argued, purely novel ideas or radically innovative products or processes often fail to register because no established logics or heuristics exist to describe or comprehend them. Instead, they go unnoticed and undervalued. Without invoking new levels of understanding and meaning, innovations and inventions will likely never be understood let alone adopted and diffused. Success, Hargadon and Douglas (2001) intone, requires entrepreneurs to locate their ideas within one set of understanding or to invent or create another. Ultimately these points reaffirm that design does not happen simply because of progress or intellectual discovery; instead, innovation occurs only through the concentrated efforts of collective designers and their intellectual or cultural worldview (Sheller, 2014: 57).

Here, the notion of schemas and scripts is most apt. DiMaggio (1997: 269) writes that scripts are “knowledge structures that represent objects or events and provide default assumptions about their characteristics, relationships, and entailments under conditions of incomplete information”. Hargadon and Douglas (2001) propose that to interpret new situations and advance coping responses, actors must choose from a set of scripts to direct action and understanding in highly particularized contexts. Barley and Tolbert (1997: 271) suggest that scripts fulfill a social logic of an “interaction order” where innovations can be read as “historical accretions of past practices and understandings that set conditions on action.” Scripts enable us to better understand why various actors act, and they represent the means through which understanding and action are embedded in different environments. Scripts can also constrain and exclude rather than empower, sort of like a film script that sets restrictions on what actors can or must do to adhere to the plot (Oudshoorn and Pinch, 2003).

When applied to “new” technologies such as electric vehicles, Gjoen and Hard (2002) add that scripts can fulfill varying roles from inscription of engineering designs into products, prescription of how adopters ought to use a technology, and subscription of a technology into a broader socio-material environment. They also note that users often assign certain meanings to technologies without necessarily recognizing all the originally intended inscriptions. In addition, Sovacool and Ramana (2015) argue that such scripts or “rhetorical visions” tend to have four interconnected attributes. They are (1) functional by fulfilling some perceived social need, and by enabling proponents to capture resources, serving to broker or anchor relationships between relevant social groups. They are (2) utopian, advancing a technology for its purported ability to bring about a society viewed as perfect or at least considerably better than the present. They are (3) strategically

contradictory, having an inherent degree of manufactured ambiguity so that they can be general enough to enroll actors but vague enough to withstand criticism. They lastly retain (4) a degree of “rhetorical selectivity” or “selective remembrance” in that they choose what aspects history to highlight and leave out potential challenges to their vision as if they simply did not exist.

3. The history and promise of Better Place (2007–2013)

Before demonstrating the explanatory power of the three theories above, it is useful to first provide a brief history of Better Place. Better Place was founded by entrepreneur Shai Agassi in 2007 with the aim of imagining a society that was no longer reliant on fossil fuels. Essentially, Better Place planned on building the system for electric vehicles before selling the electric vehicles. Based on the assumptions that the lack of a charging system was a main barrier to the adoption of electric vehicles, constructing this large system would have been a costly, but certainly logical foundation to base their business on. Moreover, by amortizing the high capital cost of the electric vehicle to more manageable yearly payments, Better Place appeared to set itself up as a solution to electric vehicle implementation’s biggest problems.

More specifically, Agassi believed that EVs would only sell if they were functionally the same as traditional internal combustion engine vehicles. They had to be the same price, or cheaper, but batteries made EV’s more expensive. They had to “refuel” or “charge” in the same amount of time, but depending on the charger available (at that time), fueling lasted between 2 and 8 h. They had to “feel” like a normal car, but extending driving range was untenable to mass production. So what could Better Place do? To make EVs more affordable, Better Place proposed to retain ownership of the battery and instead lease it to a customer—greatly reducing capital cost. To make refueling more efficient, Better Place patented a battery swapping technology where by a vehicle could be “refueled” in about 2 min. And to ensure that EVs “felt” like a normal automobile, they partnered with a traditional automotive manufacturer, Nissan-Renault, and sold the Fluence Z.E.

According to the Better Place business model, a client would first sign up to a mobility package, which varied according to location (country and area). In broad terms, the mobility package defined the number of kilometers per month that the client was entitled to drive for a given payment. The idea was that this would be similar to signing up with a mobile phone operator whereby you buy a device but also purchase “hours” to use it; the equivalent here for Better Place was kilometers travelled per year. The Fluence Z.E. was bought in parallel with the mobility package, enabling users to access Better Place’s network of charging and battery swapping stations. Again, as in the mobile phone business, more expensive contracts entitle clients to higher discounts, even to the point where certain phones may even be given for free. Although pricing depended on location and electricity prices (among other factors), frequent drivers were expected to pay less upfront for an EV than they currently pay for a conventional car. Ultimately, as the model progressed and costs declined, Agassi hoped that the vehicle could even be given away for free, charging only for the kilometers driven (like the most competitive of the mobile phone plans).

Intuitively, their business model had potential. To address range anxiety, the Fluence Z.E. had a stated range of 115 miles—but Better Place had a charging network to supplement that. To address a lack of public charging infrastructure, Better Place started building a network across their first two pilot countries, Denmark and Israel—in Denmark because it had aggressive climate and energy policies and supportive market research suggesting that at least 25% of drivers would be interested in Better Place EVs; in Israel because it operates as a sort of “energy island” that desperately wants to reduce dependence on foreign supplies of oil (Orsato et al., 2009; Noel and Sovacool, 2016). To address long charging times, their battery swapping scheme did actually take less than 2 min. And their battery leasing did reduce the capital



Fig. 4. A Better Place Fluence Z.E. at the Düsseldorf Autoshow, Germany, February 2012.

costs of purchasing an EV (though it only did this by raising costs for BP, since BP had to invest in several batteries per vehicle).

Better Place was backed not only by a bold business plan; it was supported by some major investors and regulators. The initial investment of \$130 million into the company came from Israel Corporation, Israel's largest oil refinery, but this ballooned to roughly \$850 million after General Electric, Morgan Stanley, HSBC and others got involved (Woody, 2013). This upped its total market valuation at one point at \$2.25 billion. In Israel, BP planned a large network of charging and swapping stations to cover the entire nation by 2012. This plan included 2.5 charging spots for every car on the road in Israel, starting with 500,000 chargers, in total costing between \$50 and \$100 million (Andersen et al., 2009). Israeli planners supported Better Place with vehicle tax breaks and public investments in charging stations. To help Better Place, the Israeli government also subsidized the cost of purchasing EVs to make them equivalent to conventional vehicles and committed public tax dollars to build recharging and maintenance stations throughout Israel—it was (unrealistically) expected that one-third of drivers would be purchasing electric vehicles (Brown and Sovacool, 2011). In Denmark, DONG Energy also invested strongly in Better Place charging and battery swapping stations throughout Zealand, Fuhn, and Jutland, its three main islands.

Indeed, during the height of Better Place's popularity over this time, more than 100,000 people went on tours of Better Place's Visitors Center in Israel—including not only grade-school students and tourists but also dozens of U.S. congressmen, senators, and governors. Some 30,000 people sat down with a Better Place salesperson to pick a color and fill out a form stating their intent to purchase a car whose price had not yet been announced. Better Place also had aggressive plans to expand beyond Denmark and Israel to Australia, Canada, China, and California and Hawaii in the United States. The company hired local executives (some were former politicians) and made partnerships with a wide array of players in those countries. Better Place was also endorsed publicly by Israeli Prime Minister Shimon Peres, former U.S. President Bill Clinton, and *New York Times* journalist Thomas Friedman, among others. As one former employee told Chafkin (2014), “The technology worked, customers were satisfied ... It would have been a revolution.”

4. Insights for sociotechnical transitions

So why wasn't Better Place successful? After selling only 1300 cars across Denmark and Israel, Better Place declared bankruptcy in 2013, and its assets were eventually sold off for a paltry \$450,000. If the state of EV and battery technology at that time was not the sole source of failure, what was?

In this section, drawing from social theory, we offer additional reasons for why Better Place struggled. Although its business plan was

bold, it was not necessarily sound. The business environment BP was competing in should have been considered by a competent business development or executive team; grossly inaccurate understanding of capital expenditure and material costs also took their toll. The concepts of “fit-stretch,” “embeddedness,” and “scripts” offer three helpful, and interconnected, frames by which to assess these impediments.

4.1. From “fitting-stretching” to “breaking”

In some ways, Better Place was an obvious “fit” with the existing regime of automobility. It attempted to make EVs more like “normal cars” and sought to eliminate range anxiety and create a temporal parity in terms of refueling time. Dealers and salespersons of the Fluence Z.E. even quipped that it looked like “a slightly fatter Honda Civic” (see Fig. 4) and that the only thing missing compared to a conventional car, on the “outside” at least, was the lack of a cup holder where instead a center computer console was placed. It was only under the hood, on the “inside,” where the car differed: a normal 1.6 l internal combustion engine was replaced with a slightly smaller 70 kW electric motor, and a tank for petrol was replaced by a slightly larger 22 kWh lithium ion-battery pack.

However, a closer examination reveals that Better Place, in fact, represented much more of a “stretch” than a “fit.” First, unlike traditional business models, ownership of the vehicle was separated from that of the battery and, eventually, the vehicle was to become “free” with drivers paying only varied surcharges for mobility (kilometers driven). In other terms, the explicit intention to “fit” BP vehicles into the existing regime of automobility (recharging in minutes, limited range anxiety, feels like a normal car) directly conflicted with BP company visions and business plans, which sought to “stretch” beyond social norms as quickly as possible (free cars with high monthly payments as a business model, rapid expansion to other countries). In Israel, BP faced strong political opposition for representing—mainly via the Agassi family—a specific political faction. There was also the worry of clients to be under a monopoly of a startup and the opposition from other leasing companies. Overall, Better Place “fit” along the technical aspects of the vehicle, but “stretched” too quickly in other dimensions of their vision.

Second, Agassi was such a charismatic entrepreneur that he intentionally sought to innovate processes he didn't necessarily have to. One relatively infamous example relates to later abandoned plans for using a “robotic arm” to swap batteries rather than simply having humans do it. Agassi wanted desperately to “think differently,” and he brainstormed an idea where they could build a robotic system to un-install and reinstall batteries for what he guessed was \$250. In reality, wall mounted charger and cables alone for such a contraption cost \$700 and “thousands more” would have been needed for the automated

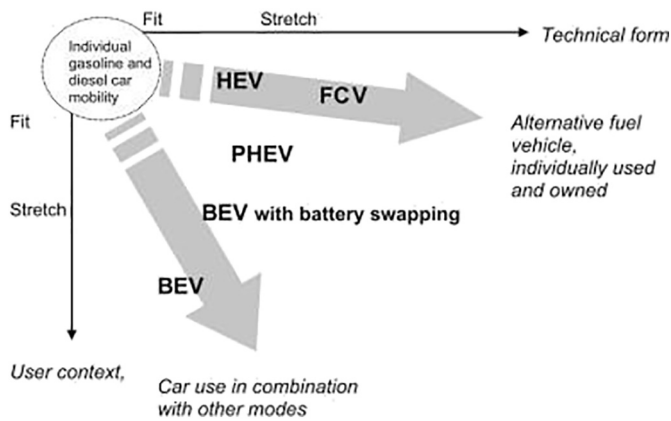


Fig. 5. The “fit-stretch” concept applied to electric vehicles.

(Source: modified from Dijk et al. (2013). Note: BEV = battery electric vehicle. BEV with battery swapping = Better Place. PHEV = plug-in hybrid electric vehicle. HEV = hybrid electric vehicle. FCV = fuel cell vehicle.)

robotic systems, similar to those used in the military for deploying nuclear weapons.

Thus, although Better Place “fit” with a degree of user preferences and mobility patterns, the company’s vision ultimately challenged or “stretched” them not only on fundamental grounds (cars for free, paid for via subscription services) but also technical grounds (unnecessarily sophisticated equipment at the planning and design stage, which they had to abandon). Indeed, we explore more on this point in the next section which discusses how some automotive companies viewed Better Place as a threat and they pursued innovations to undermine it. Therefore, if plotted in Fig. 5, Better Place occupies a sort of no-person’s land that “stretches” too far in both dimensions of user context and technical form. Put another way, Better Place’s actions amounted to a fit-stretch strategy where neither enhancements to form or function created a true “fit”.

4.2. From “embeddedness” to “disruptive innovation amidst diversification”

We posit that Better Place also faced difficulties because of the existing automotive regime. It became susceptible to strategic competitive responses from embedded incumbent actors. Although Better Place did its best to frame itself as selling a car equivalent in price and performance (or perhaps even better than its conventional counterparts), it can in fact be interpreted as a much more radical attempt to revolutionize the industry. As Orsato et al. (2009) have noted, under the logic of Better Place, cars themselves are “incomplete products.” Agassi himself used this sort of rhetoric when trying to sell the Better Place model to investors. As he wrote in his 2007 White Paper:

Cars are not complete products, as they would not provide any function without fuel and variety of services (such as maintenance). ... Contrast that with the electric vehicle where the container for energy, in this case a battery, costs roughly 7000 Euros, yet the electricity to run the car costs 2000 Euros for the entire life of the car ... At some point during the next ten years, the total cost of electric energy (with battery) for a car will equate the cost of fuel for a single year. We predict that at some point in time before that next cross-under point the entire car industry will tip to electric drive as the main design principle for new cars.

Such sentiments were confirmed in our interviews as well, with one noting that:

Better Place tried to reinvent mobility and the car itself; it was not an incremental effort, but a transformative attempt to change our notion of what driving and moving are.

Other respondents noted that conventional cars rely on complementary services and products ranging from roads, bridges, and highways to fuel

providers and maintenance shops to function. Moreover, the most expensive aspect of ownership, fuel, occurs during its usage rather than its specific point of purchase. Thus, successful commercialization of Better Place’s vehicles require consumers to transform their financial conceptualization of what a car is and does. They need to comprehend exactly how much they drive per month as well as the total cost of running a car, and be able to properly assess and discount fuel savings against capital costs over time. Agassi suggested repeatedly that “new design principles” were needed for cars and that Better Place challenged traditional concepts of both design and manufacturing.

Unfortunately, the conventional ideas about what a car “is” and “does” did not exist in isolation, and became embedded in automotive manufacturing capabilities and corporate strategy. As Kirsch et al. (2009) argue, ever since the introduction of Henry Ford’s “Model T” in 1908, most of the players in the automotive industry have rigorously adhered to a product based business model. Integrated original equipment manufacturers—perched atop complex and distributed global supply chains—design, build, assemble, advertise, and disseminate vehicles to franchised dealers who then sell it to the customer, who takes ownership and responsibility for the final product, and subsumes the risk or expense of all operating and maintenance tasks. This business model is anchored in the vehicle viewed as a product the consumer buys for a fairly high fixed cost, and profits accrue to the automobile manufacturer and dealership mostly at the point of sale (and later, in occasional situations, for maintenance). Whenever major incumbent firms within the automotive industry such as General Motors, Toyota, or Volkswagen, or even newer entrants such as Tesla, innovate and release new products, they tend not to deviate from this model. A Toyota *Prius* or a Tesla *Roadster* are still sold in a lump sum similar to the conventional cars they are replacing; the release of these new vehicles still follows a strategy that focuses predominantly on fuel efficiency and emission compliance while maintaining the basic, product-based business model.

Better Place, by contrast, challenged the entirety of this model. One interview respondent argued that:

The idea was pretty radical, from the start, which is why there was so much hope and hype around it. It was creative, it was thrilling, it was imaginative.

Although Better Place’s products did in a sense fit into one ecosystem, that of user functionality (trying to make the car like any other, its difference being a matter only “inside” the car’s engine and fuel tank/battery), they unknowingly perhaps did not fit into another one even more important, that of automotive manufacturing and franchising. As one Better Place manager put it:

Shai correctly wanted to create a situation where the automakers would move quickly to electric. The carmakers are used to a totally different ecosystem. Somebody from another industry trying to treat them as an equal partner is not in their DNA.

In this way, BP vehicles somewhat radically and completely challenged conventional norms of automotive design and manufacturing. They required a different body, made of different frames and composites to handle lighter weight. They required different engines, with advanced motors, power controllers, batteries, and regenerative braking systems. They required different transmission controls, chasses, adapted steering and brakes, as well as a different refueling and electronic charging system. An internal combustion engine will run for about 5000 h before needing serviced, but an electric motor can function for roughly 100,000 h, meaning it needs much less maintenance (Dyerson and Pilkington, 2005). In short, as Orsato and Wells (2007) state, EVs require competences that incumbents are not able to supply without major investments and time.

Better Place advocates attempted to frame these weaknesses as strengths, and talked about the vitality of BP’s business model for “massively disrupting” the ways that automobiles were made, and

challenging conventional practices. Agassi's 2007 White Paper framed this not so discretely in terms of winners as losers. In it, Agassi estimated that the “entire picture” of “markets affected” by Better Place exceeded some \$6 trillion per year. As he wrote:

The total economic dislocation seems almost incomprehensible. Fuel at the pump represents a market of \$1.5 trillion every year. Cars and components size roughly to the same size of market, \$1.5 trillion a year. Financing for new cars, gaining acceptance worldwide is estimated at \$0.5 trillion a year. Clean electricity generation for cars is a market that will reach \$0.15 trillion a year. ERG infrastructure construction will reach levels of \$0.5 trillion a year. Battery manufacturing will reach similar levels of \$0.5 trillion a year, accounting for reduction in battery cost as the market size will continue to increase. In-car services, such as GPS, media, phone as well as related services such as insurance and maintenance collectively worth more than \$1.5 trillion a year will be affected. Carbon credits alone will be worth roughly \$0.3 trillion when all cars are driven on clean electricity. In the aggregate, we are looking at an annual dislocation reaching roughly \$6 trillion a year.

One former BP manager astutely told us that:

Better Place took it as a badge of honour to put trillions of dollars fossil fuel and automotive assets under siege, but never seemed to realize that such disruption came with incredible risks.

In sum: BP actively encouraged its image as a threat to incumbent actors.

However, BP did more than merely attempt to frame itself as disruptive innovation—it actively avoided working with incumbents, even those that could have helped it. As one specific example, Better Place originally envisioned a partnership with General Motors and Chevrolet. Rather than change his design, Agassi refused—and General Motors proceeded to develop its own charging stations. It also meant that Better Place, at that time lacking a partnership with a manufacturer in the United States, was not eligible for funds as part of the \$50 billion bailout of GM in 2009. The U.S. Department of Energy offered loan guarantees to several clean technology startups, including Tesla Motors, but refused to give Better Place any of the earmarked funds on grounds of ineligibility. One Better Place manager would later refer to this as a counterproductive “*disrupt those closest to you*” strategy.

According to our interview data, although we could not verify it with public information, major incumbent actors such as Chevrolet and GM were not the only ones to defensively innovate—Tesla also incorporated Better Place ideas into its products. Tesla's primary mission is to develop and commercialize EVs first in the premium sports car market before moving into more mainstream vehicles such as sedans and non-luxury models (Sovacool et al., 2017), but their approach is less disruptive than Better Place's. Tesla's corporate strategy is more comparable to the computer and consumer electronics industry than it is to the rest of the automobile industry. This is clearly evident through their EV development roadmap, where they first launched their premium-priced-niche model Tesla Roadster, when production costs were still very high. Subsequently, the Model S was introduced, a high-end family sedan, with prices starting at approximately half those of the Roadster. Future models are expected to increase in volume and decrease to half the price of Model S.

Tesla, similar to GM, pursued a two pronged approach to “containing” (in the words of one interviewee) BP: battery swapping and charging infrastructure. As one of our participants stated:

After closely monitoring BP during its early years, Tesla made an internal decision to proceed with the consideration of battery swapping in 2012. They designed and piloted the technology in secret before showcasing it in 2013 at a facility at Harris Ranch in Coalinga, California. It is ironic that they launched their battery swapping the same year BP began to fall apart. Tesla attempted to mimic and mirror BP's strategy: the goal was to swap batteries in 90 seconds or less, with an initial market of drivers in

California wanting to drive their Model Ss from Los Angeles to San Francisco. Tesla even borrowed terminology from BP's advertisements, noting in their promotional material that “it's possible to replace a Model S Battery in less time than it takes to fill up a gasoline tank.”

As a bonus, the battery swapping approach also enabled Tesla to qualify for Zero Emission Vehicle Credits (ZEV Credits) under California law (Team, Trefis, 2014). In tandem with battery swapping, or perhaps as a fallback in case it did not work, Tesla invested heavily in a “Super-charger network” of 312 stations for charging and more than 1700 actual chargers deployed worldwide (with most concentrated in California). Advertisements for Tesla noted that such chargers enabled drivers to charge at “400 miles per hour.”

Tesla was not the only firm to “borrow” from BP's business strategy. The national electricity supplier in France EDF and the automobile manufacturer Toyota also announced the piloting of recharging networks and battery swapping stations across France and the United Kingdom in 2014, after BP declared bankruptcy.

Together, these new entrants and related businesses started a mutually reinforcing process that characterize a “regime amidst diversification” proposed by Dijk, Orsato and Kemp (2015). In such scenario, the dominant regime of automobility starts embracing socio-technical diversification via the emergence and diffusion of new market niches, which coexist with the dominant regime—in this case, of internal combustion engine cars. Within this perspective, if Better Place would only have survived for a few years longer, its chances of succeeding in the long run would also have increased, as competitors such as Tesla and industry incumbents would slowly reinforce the emerging regime—of the new EV ecosystem (swapping stations, fast-charging, etc.). A telling lesson here may be that a single actor or niche does not have sufficient power (the ability to influence) to transform the whole automotive regime.

4.3. From “design-driven innovation” to “inflated scripts” and “erasure”

BP fits the classification of “design-driven innovation” almost perfectly, given that it zealously pursued a particular corporate vision. Rather than beginning with a focus on better understanding drivers and users or improving manufacturing, the classic story of BP's germination (told to us repeatedly, and confirmed in other articles relying on interviews with BP staff, such as Chafkin, 2014) goes something like this. Shai Agassi, a self-named “serial entrepreneur” and “rising star” within the software industry, thought up the Better Place concept in Davos, Switzerland, at a Global Economic Forum meeting on a sunny afternoon in 2005. He started with a visionary question: “How would you run a country without oil?” Before leaving SAP, where he worked, hiring a single employ, or even taking a single meeting with a partner or raising capital, Agassi went public with his idea, presenting it in 2006 at the Brookings Institute in Washington, DC, where heavyweights such as Bill Clinton and Shimon Peres were present. They were so effusive and supportive of Agassi's ideas, the narrative continues, that he immediately quit his job and started BP. He then wrote a fairly extensive White Paper in 2007 entitled “Projecting the Future of Energy, Transportation, and the Environment.”¹ In press releases and public interviews connected with releasing the White Paper, Agassi intoned that he would sell millions of electric vehicles around the world, that he would create the world's “first trillion dollar company” and “a new Industrial Revolution,” and that transitioning to electric cars was a moral imperative as well, similar to the “abolition of slavery.”

Better Place's approach to innovation was therefore inseparable from this broader rhetorical vision. In one of his memos collected

¹ As our data collection process involved dozens of Better Place company documents and memos to file, we actually worked with three separate versions of the White Paper: a preliminary draft, a public version for public consumption, and a revised version circulated internally.

through our data gathering process, Agassi stated that he felt:

Anonymous, sitting next to giants. I could see myself in my imagination's eye on that stage telling the story of Better Place, before I knew how there was a story, a company, or how it will be called. The vision permeated everything.

Because BP began with and remained centered on this vision of national economies independent from oil, they explored almost every technological option and configuration. As one employee recounted:

We looked at things that would make you laugh. Air cars, slot cars on electric rails, self-driving robots, everything.

And, as Chafkin (2014) adds:

People were motivated by the vision: It was green, it was sustainable, and it was a little bit Zionist. It was a beautiful dream to dream; people got hooked. It was only later that you'd see the redundancy, the arrogance.

Agassi also compared his idea for electric mobility—giving the vehicle to consumers at a discounted cost and then charging them a monthly subscription—to Thomas Edison's lightbulb, James Watt's steam engine, Henry Ford's Model T, and the Apollo space program from the United States.

Another noteworthy aspect to the schemas and scripts surrounding BP relate to their positioning of Agassi and the company as radical and innovative. In this way, BP promoters succumbed to a process of “selective remembrance” (Sovacool and Ramana, 2015) where they ignored or forgot historical data suggesting that BP was neither novel nor the first to propose battery swapping. For instance, the Electric Vehicle Company in the United States operated a Battery Exchange Station on Broadway in New York City for a fleet of electric taxis in 1900 which ran until 1912, and the battery swapping itself occurred in 3 to 4 min via a hydraulic stabilizer (Kirsch, 2000). The Hartford Battery System Service in Connecticut also sold glider trucks without batteries and then charged a service fee to drivers per kilometers driven throughout the 1910s and 1920s, operating until the end of World War I when cheap diesel trucks and jeeps from the War flooded the United States market (Kirsch, 2000). In this way, neither BP's idea for battery swapping nor charging customers a fee for battery use or mobility were new. Yet when Agassi was apparently told about this history, one of our respondent said “he didn't want to hear that he hadn't invented it.”

The scripts and schemas surrounding BP became so broad and all encompassing, however, that they ended up missing a number of important details. What is also interesting here is not necessarily what was included, but what was excluded or erased. Most critically, the scripts repeatedly misrepresented actual vehicle ownership and operating costs to users. Agassi repeatedly said in meetings and speeches his car would be cheaper than conventional ones or even free; yet the first Renault Fluence ZE cost about \$30,000 and on top of that, customers did not own the battery, and had to pay an extra \$200 to \$500 a month as a “subscription” to use BP's charging and swapping network. In Denmark, due to higher transportation costs and income taxes for dealerships, a BP car cost close to \$40,000 (excluding the cost of the battery). In an early meeting with investors in 2008, Agassi told reports that Better Place's cars would be priced “half that of the equivalent gasoline model today” even though Better Place had yet to agree with Renault on a price. This is an exemplary example of placing the vision of BP before facts. This act of discounting costs later came to be jokingly and repeatedly referred to by colleagues of Agassi as “Shai math.”

The visionary and optimistic scripts circulating BP also influenced hiring decisions—those expressing criticism or skepticism, even a moderate amount, were “told they were not the right fit for BP” or in some cases “removed by forceful security guards in the middle of interviews.” As one of our respondents reaffirmed:

The numbers never, never really made sense, they didn't add up. Any competent business person, or investor, would have known this, but the

company had surrounded themselves only with ‘yes men’ to the point where they became delusional.

This meant that BP ended up hiring an initial staff who shared Agassi's vision, but lacked any experience whatsoever with automobile manufacturing, management, and infrastructure. As one BP manager stated in 2009:

We had not a single automotive expert, nobody who had built or designed a car in their career.

Agassi hired his little brother Tal Agassi to manage the battery swapping stations components of BP, despite the fact that he had experience only in accounting.

The vision-oriented scripts of Better Place, coupled with a selection bias in the hiring of its staff, meant that BP excelled in terms of focusing on the “big picture,” but in doing so they missed what one respondent called “the small, vital details necessary to run a successful business.” The company lacked caution and also ignored important areas where they should have cut costs, modified strategy, focused on maximizing profits and minimizing losses. One example here was spending \$5 million on the construction of a visitors' center inside a large oil-storage tank that had been converted into a showroom and featured a 3 kilometer-long track where interested customers could test-drive a car, a movie theater with 30 vintage cars seats, and even a holographic machine which projected a life-size image of Agassi himself.

These and other costs quickly added up: before BP ever sold its first car in January of 2012, the company was losing money on operating expenses, research, salaries, and payments to suppliers at a rate of about \$500,000 per day. A fascination with the BP vision also meant that BP managers didn't pay close enough attention to their contracts with suppliers which created more than \$100 million in liabilities that started to accrue as delays and technical difficulties occurred. BP lost \$80 million with troubles over billing system software with the firm Amdocs. BP later became bankrupt, saw its assets liquidated and its patents being transferred to other firms. As Chafkin (2014) noted when he spoke to one of the early adopters who purchased a Fluence Z.E., “We didn't know how bad the state of the company was when we bought the car—we just really believed in the vision.”

Thus, Agassi and his promoters blinded themselves to the real potential pitfalls surrounding their business model. As one respondent noted:

There was a fundamental flaw to BP's business model that only became apparent over time: people don't want to buy a car the same way they buy a phone. Hardly anybody likes their wireless phone carrier, instead, they love their iPhone or Samsung Galaxy. They love and identify with their car, not the mobility it offers. Conspicuous consumption needs rooted in a product, not a practice.

Yet, as another BP employee lamented:

The tragedy of the company is that we were trying to accelerate the trend toward electrification and we may have retarded it.

Thus, returning to theory, BP decision-makers came to suffer from varying degrees of what Veblen (1914) came to call “trained incapacity” and Burke's (1984: p. 7) “occupational psychosis,” related terms that describe how people prepare to see the world in certain ways, while simultaneously developing a bias that blinds them to other perspectives. Hargadon and Douglas (2001) note that although successful innovations must evoke strong emotions from early adopters, “Entrepreneurs must initially present the meaning and value of their innovations, including their novel features in the language of existing institutions by giving them the appearance of familiar ideas.” The schemas and scripts circulating BP did the opposite: they framed the technology as fantastically disruptive, unfamiliar, and revolutionary.

5. Conclusion and implications

The traditional reasons given in the literature for the failure of Better Place point to a mosaic of inferior technology, mismanagement, overstretch and waste, and poor business strategy. Although these elements certainly had a negative impact on BP—and we highlighted many salient ones—three other factors also played essential roles. BP stretched too far beyond existing niches to the point where it was incompatible with both user expectations (high upfront prices for the vehicle and high monthly service costs for battery swapping and reaching) and functionality (design requirements extending well beyond what major manufacturers were capable of). According to our original data, BP took an antagonistic approach towards collaboration with incumbent actors such as General Motors and Toyota and new entrants such as Tesla, and thus left themselves open to defensive innovations on the part of those firms in two of BP's core areas, battery swapping and charging stations. It amounted to a “disrupt those closest to you” strategy that was self-defeating. Moreover, the compelling and at times captivating scripts and schemas deployed by BP sponsors downplayed risks and inflated expectations to the point where empirical difficulties with vehicle and battery pricing, hiring, supply chain management, software, billing/accounting, and contracts were downplayed or, worse, ignored. In outlining this more complete explanation, we offer at least three conclusions for those interested in innovation management, transitions, and design-driven innovation.

First, new innovative niches have limits to how far they can stretch. BP did not present itself as an initial “fit” with existing user practices, discourses, and technical form and thus deviated from existing regimes in ways that made it too demanding for users and manufactures to adopt (too much “stretch”). It was a “stretch” with regard to the car regime (especially core elements such as manufacturing and franchising), despite efforts to make it look more like a “fit” by making reference to a model that was common in mobile telephony. Such “stretching” was made even more visible by the inherent tension in BP predicating their business model on selling cars as similar to an internal combustion vehicle but having a prominent spokesperson for the company (Agassi) viewing himself and his company as one of the most revolutionary figures in history. Agassi thought of his ideas as a “fit” (i.e., battery swapping), but focused almost exclusively on his visionary “stretch” (i.e. becoming the next Henry Ford, transforming society beyond oil).

Second, innovations do not occur in a vacuum, and incumbent actors rarely, if ever, remain static. Incumbents including General Motors and Toyota, and new entrants such as Tesla, pursued a dynamic approach to “containing” BP. They took advantage of opportunities and reoriented themselves towards new technology such as swappable batteries and charging infrastructure, leading to a marginalization and eventual defensive disruption of BP's mission and strategy. What was clearly missing from Better Place's vision was the functional use of chargers, which is what Tesla, GM, and Nissan have since focused on, as well as fitting into broader user (and financier) conceptions of the automobility regime. Compare BP's overinvestment in swapping stations with Tesla's expansion of their Supercharger network. One explanation for this overinvestment could be that Agassi explicitly removed potential employees that could have helped BP recognize the business value of chargers. Battery swapping may have been preferred by a marginal number of drivers, but by refusing to compromise or expand their vision, or work with other actors in the automotive industry, Better Place in a way “contained” themselves. Said another way, BP exclusively focused on their vision while ignoring any and all facts contrary to it.

Third, innovators may try to make their radical innovation look more incremental in discursive terms—they employ scripts and schemas that present the technology as familiar and non-disruptive. BP, however, did the opposite, and promulgated a vision about freeing national economies from petroleum-based transport. In doing so, they

did meet the criteria of functionality and utopianism inherent in similar rhetorical visions about future energy systems. BP's vision was functional in that it fulfilled multiple social needs related to lessening oil dependence, diversifying away from fossil fuels, and promoting low-carbon transport, and they were utopian for arguing that BP could radically transform the entire automotive industry and disrupt roughly \$6 trillion in global annual assets.

However, BP's vision suffered from two drawbacks inherent in these types of rhetorical strategies: their vision was strategically contradictory, at times talking about the viability of business models and returns on investment and at times talking about how cars could be given away “for free;” and they were “rhetorically selective” in ignoring the century-old history of earlier efforts to commercialize both battery swapping and fee-for-service electric truck driving in the United States at the turn of the last century. Moreover, the schemas and scripts deployed by BP inflated expectations about the real costs of EV ownership and operation and at times ignored other core elements of business strategy, falling victim to “Shai math.” The tendency for BP to hire top-level managers based on their adherence to the vision rather than competence in automotive manufacturing meant the group insulated itself from criticism and feedback that may have corrected such difficulties at earlier stages of research and demonstration. BP thus offers a stark warning about the drawbacks inherent with overconfidence, hubris and radicalism, attributes that made BP's vision alluring and attractive at the same time they sowed the very seeds of the company's downfall.

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