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Novels and novelty in trend research — Using novels to perceive weak signals and transfer frames of reference

Jan Oliver Schwarz [a,*], Rixa Kroehl [b,1], Heiko A. von der Gracht [b,1]

[a] Aarhus University, Business and Social Sciences, Department of Business Administration, Haslegardsvej 10, 8210 Aarhus V, Denmark
[b] Institute for Futures Studies and Knowledge Management (IFK), EBS Business School, Konrad-Adenauer-Ring 15, 65187 Wiesbaden, Germany

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ABSTRACT

Science fiction (SF) prototyping uses fictional stories about the future to investigate the implications of science and technology not yet feasible at present. Since such a setting enhances creativity and perception, it has been identified as a means to develop new products, services, and business models. Novelty starts with weak signals of change within an environment and leads to innovations. From a constructivist perspective, in which knowledge needs to be processed or "constructed", weak signals of change are not perceived by the outside environment. Rather, they have to be conceptualized in a cognitive process. We use this theoretical perspective to illustrate the value of novels in identifying and cognitively conceptualizing weak signals. With the support of sense-making theory, we illustrate how novels contribute to comprehending novelty in two frames of reference: by broadening the perspective, enhancing the creativity, and increasing the sensitivity of managers/corporate decision makers to detect weak signals; and by ensuring that the customer comprehends the link of an SF prototype to a future product or service. Our theoretical considerations are illustrated by an example from the novel, *Super Sad True Love Story*, in which the SF prototype is part of a broader fictional story.

1. Introduction

Minor changes in the business environment can evolve into major trends or herald the next innovation and can therefore be decisive for the success or failure of a company [1]. Such modest developments are called weak signals because they are not immediately obvious and are difficult to identify [1]. Due to their potential impact, they play a considerable role in corporate foresight.

Ansoff [2] first introduced the concept of weak signals and thus laid the basis for trend management [3]. Ansoff's [2] concept aimed at detecting indicators of environmental changes early that could lead to strategic surprises and events, which have the potential to jeopardize an organization's strategy. He described weak signals as external or internal signs, occurrences, and developments too immature to precisely assess their impact or complete reactions [4]. A weak signal can also be perceived as an upcoming trend.

However, how can companies benefit from detecting weak signals if we assume that the future cannot be predicted, it can only be shaped? What does this imply for organizations trying to detect and make sense of weak signals in their environment earlier than competitors in order to create and sustain competitive advantage? Furthermore, how can companies distinguish between significant and insignificant weak signals? From a corporate perspective, what makes weak signals attractive or worthwhile to invest in? And how can companies safeguard themselves from disregarding relevant weak signals and reduce blind spots?

One challenge for companies appears to be how to link weak signals to the world of the customer, in respect to designing products and services. However, we cannot predict

* Corresponding author. Tel.: +45 89 97895072.
E-mail addresses: mail@joschwarz.com (J.O. Schwarz), rixa.kroehl@ebs.edu (R. Kroehl), heiko.vondergracht@ebs.edu (H.A. von der Gracht).
[1] Tel.: +49 611 7102 2100; fax +49 611 7102 10 2199.

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the future. We need to find creative ways to imagine a variety of possible futures. In a sense, identifying and analyzing weak signals require individuals to imagine how weak signals could evolve in the future and how they can impact other developments or be linked to new or existing products or services. Thus, creativity, openness, sensitivity, receptiveness and an open mind are central in the search of weak signals [5]. This notion implies that creativity is vital for organizations. The challenge appears to be twofold: creativity and thus perception must be enhanced in order to detect weak signals; and the identified weak signals must be made relevant to the customer, or related to how the customer constructs his or her view of the world.

Davies and Sarpong [6], drawing on Chia [7], argued that art and literature can contribute to developing foresight since they address uncertain and social phenomena. Moreover, the authors contend that this aspect has been widely overlooked in research. Furthermore, the argument has been made that cultural products – such as novels, movies, comics, or works of contemporary art – can be used to assist organizations in developing strategic foresight [8–11]. More specifically, science fiction based on science fact can be applied not only to imagine the future but also to further develop new technologies, products and services. Science fiction can also be employed to explore the implications of future technologies. Therefore, science fiction prototyping (SF prototyping) can support corporate management [12].

In this paper, we determine how SF prototyping, or the use of fictional stories of the future to test scientific implications, can be implemented to detect weak signals and how organizations can benefit from SF prototyping. In answering these questions, we strive to explain how SF prototyping encourages creativity in an organization and serves as a source of reference to customers. Our objective is to introduce SF prototyping as a vehicle for managing weak signals more effectively. We support the double function of SF prototyping: detecting weak signals and making sense of their context for the customer. Since this is a novel approach to managing weak signals, we cannot apply a case study. However, by drawing on several theoretical fields we support our argument and illustrate our idea by providing an example of an SF prototype.

The remainder of this paper is organized as follows: we discuss weak signals from a constructivist perspective, elaborate on the concept of SF prototyping, and discuss how organizations can apply both. We present our ideas of how SF prototyping can influence frames of references and discuss an example of an SF prototype taken from the novel *Super Sad True Love Story* [13] in more detail. We draw conclusions, identify limitations, and make suggestions for future research.

2. Weak signals from a constructivist perspective

A constructivist perspective of weak signals is adopted for this paper because it supports in explaining why weak signal identification and management differ in scope among companies over time. Constructivism assumes that individuals do not have direct access to an *absolute reality* [14] that is independent from cognitive statements [15]. Statements about reality are entirely based on individual and subjective impressions [16] and are highly influenced by individual experiences [17]. Cognitive statements about reality are thus always subjectively constructed [18]. Individuals create their own *subjective reality construction* [19], or picture of the world in their minds, from how they individually perceive impressions.

The perception of weak signals is influenced by different factors. After examining the literature on trends and weak signals, Rossel [20] found it to be surprising how many authors do not recognize that the concept of weak signals is only a metaphor. Rossel [20] referred to weak signals, not as tangible language or occurrences, rather as intangible related concepts and processes, developments, shifting influences, and dynamic cultural changes.

Seidl [21] introduced a constructivist perspective to determine weak signals, which has been highlighted by other scholars in the field [e.g. 22, 23]. He criticized the epistemological assumptions regarding weak signals as being naive in the respect that cognitions are conceptualized as direct representations of the external world. He argued that weak signals would have to be integrated as experiences with one's existing constructions, which indicate future problems in some form [21]. Moreover, Seidl [21] argued that weak signals are not out in the external environment waiting for organization members to perceive. Rather, the signals are perceived differently by individuals because their personal cognitive conceptualization determines their interpretation. Therefore, it is questionable what actually influences a cognitive system, or what determines the perception and interpretation of weak signals.

In addition to the individual level, we would also like to provide insight in the collective level of perception. If individual reality constructions are introduced to the interaction process with other individuals, a socially shared (subjective) reality is created that serves as a basis for actions and behaviors in society [24]. Socially shared reality does not replace or disregard the individual with his individual interpretation background. In a social context, individual reality constructions are influenced by interaction with others and knowledge individuals acquire through this interaction. This interaction and shared knowledge in turn influence how an individual perceives, constructs and interprets the world [24].

The adoption and diffusion of weak signals are thus dependent on social interaction. Rogers' [25] work on the diffusion of innovations can be considered to be the basis for Wacker's and Mathews' [26] life cycle of a trend or of McCracken's [27] concept of “flock and flow”. The premise of these concepts is that weak signals emerge from the fringe of society and may diffuse over time to a mass-market phenomenon, thereby developing from weak signals to strong signals, i.e. trends. However, this also implies that in the process of normalization, a group reconstructs their perception of a weak signal over time, and a product or service previously perceived as abnormal is transformed into normality [28].

In the context of searching for weak signals, this implies that the aspect invention and diffusion are of relevance [28]: Invention refers to identifying what is new and what constitutes new; diffusion refers to the extent to which something new becomes widespread. Hence, searching for weak signals can be understood as researching novelty [28]. From a constructivist perspective, the consequence is accordingly also twofold. The detection of weak signals is dependent on the sensitivity and subjectivity of the observer based on his or her individual experience (invention). At the same time, the adoption of weak

signals within a society is based on sharing individual reality constructions within social interaction processes (diffusion).

3. Science fiction prototypes

Working with prototypes, especially in the context of innovation management, is not new. The relevance of prototypes in design [29] and in the process of innovation management, in particular during experimentation, has been emphasized earlier [30]. Scharmer [31] argued that if we acknowledge that the future cannot be predicted and we cannot rely on past experiences, we require new approaches to deal with the evolving future. Prototyping explores the future by experimenting, or engaging in experimental exploration of something new. Furthermore, Scharmer [31] emphasized that prototypes are significant for innovation since they often have essential characteristics of final products.

In order to describe what exactly SF prototypes are, Johnson [13] explained that science fiction stories, movies and comics have been created for over 100 years based on science and technology facts. However, SF prototypes differ in that they utilize fictional creations solely for the development process. Regardless of the profession or industry, SF prototypes enable the future to be imagined and envisioned in a completely new manner. Furthermore, Johnson [13] stated that the purpose of dealing with SF prototypes is to explore the implications and/or effects of the part of science or technology they are based upon.

According to Egerton et al. [32], SF prototypes can be used as design tools in the development of technology to provide a virtual reality in which a technology can be explored and, most importantly, to provide a new perspective on the technology itself. SF prototypes can cause such an upsurge in creativity that new paths are discovered and possibilities become apparent in a fictional setting that were never before imagined [33].

In addition, it has been argued that science fiction has not only inspired generations of scientists, [34] but has also influenced the design of products [e.g. 31, 35]. There is little doubt that items of modern technology, whether mobile telephones or portable computers, stem in form and function from science fiction [31]. SF prototypes have enhanced the creativity of designers, engineers, scientists, artists, students, and strategic planners. Being creative, or innovative, is essential for companies to survive and prosper. Styhre and Sundgren [36] defined organizational creativity as value produced in a collaborative effort to generate new ideas and ways of solving problems by integrating various scientific knowledge. While others already highlighted the relevance of creativity in organizations [e.g. 36, 37], SF prototyping fosters creativity by generating new ideas, broadening perspectives, and revealing other solutions to problems. How creativity and sensitivity can be enhanced through SF prototypes in the context of invention (the detection of weak signals) and diffusion (adoption of weak signals) can be theoretically explained by sense-making theory.

4. Creating sense in frames of reference

4.1. Theoretical considerations

Numerous research articles have been published regarding the question of how people make sense of developments and events in their environment [38–41], or sense-making. In the context of trend management, sense-making allows for the analysis of several different aspects: comprehension, understanding, explanation, attribution, extrapolation, and prediction [40] with regard to unexpected, unknown incidents. In a broader sense, sense-making describes the interwoven processes of information search, assignment of meaning and related action [41] in the field of trend management.

The starting basis for sense-making theory is formed by extracted cue and cognitive frame concepts [42]. Extracted cues are defined as simple, familiar structures in ambiguous environments that serve as a basis for the development of potential future occurrences [42]. Frames of reference, or cognitive frames, are described as a cumulative pool of tacit knowledge used to structure and interpret ambiguous social and situational information in order to enable understanding [43]. Within such frames, cues are identified, selected, and made aware of [42]. Thus, they enable the location, perception identification and labeling of unfamiliar events in the world of an individual [44]. Sense is then created if the cues, extracted from an ambiguous environment with the help of cognitive frames, are linked to frames of reference for their interpretation [42]: A cue or a frame of reference does not make sense alone, only a cue within a frame makes sense [42].

The function of cognitive frames of reference is thus twofold in the context of sense-making: On the one hand, it is assumed that individuals actively create the environment from which clues are extracted with the help of frames of reference and thus are also involved in the production of the environment they are confronted with [42]. This process is called enactment and is considered to structure an ambiguous environment [45] in order to identify and extract familiar structures from it. Thus, human agency is the starting point for the complex and ambiguous environments people have to make sense of and act accordingly [43]. On the other hand, sense-making itself is concerned with the creation of meaningful connections [45] through the combination of extracted cues with frames of reference in order to enable interpretation and sense attribution.

Frames of reference can take on different forms: ideology, third-order controls, paradigms, theories of actions, traditions, and stories [42]. Weick stated that all frames of reference share a common characteristic: They all depict past or present points in time or connections [42]. Protess and McCombs [46] argued that when individuals read or watch movies, they construct their own images based on their personal experiences. Czarniawska [47, p. 249] referred to the "constructive role of popular culture". Furthermore, Gerbner [48] argued that creative imaging and imagery, such as in fairy tales, novels, plays, comics, and cartoons are based on human understanding. Therefore, not only individual sense-making processes but also the social constructions of reality [24], i.e. collective sense-making, are based to a large extent on cultural products (e.g. movies, literature, and art and in particular novels, understood here as narrative fiction).

A central characteristic of cultural products is their narrative structure, which differentiates them from other frames of reference and the implied sequencing of individual events connected by a certain matter and related time [42]. Cultural products receive remarkable attention as possible frames of reference [49–53] because people do not think argumentatively or pragmatically but narratively. Balkin [54] indicated that

narratives are the prevailing forms of human thought: narrative structures are a particularly efficient form of human memory storage. Humans are better able to recall complex sequences of events in stories than complex lists of words and numbers, making narratives an excellent method of memorization [54]. Czarniawska [55] stated that narratives are the main mode of human knowledge and communication and also offer an alternative mode of knowledge [56]. Furthermore, Sennett argued that a novel provides more insight in complexity of motives and mutual perceptions than social-science research [Sennett quoted from 57].

Novels, as special forms of stories, are defined as written narrative fiction [58]. Science fiction is narrative fiction about situations not possible with today's current level of science or technology. It is hypothesized based on technological innovation [59] and deals with potential impacts on mankind [60,61]. Thus, the function of narratives, in this case (science fiction) novels, as frames of reference in the context of sense-making theory is twofold: to guide perception in order to identify and extract cues from an equivocal environment; and to provide the basis for the interpretation of those cues.

4.2. Novels as frames of reference to detect weak signals in trend management

Frames of reference, in our example novels, serve as a basis not only to create sense, but also to structure an ambiguous environment and to extract cues from it, which are then linked to other frames of reference to create sense, as previously argued. Several sources deal with the question where a development appears at different stages. Molitor [62] for example developed a model to describe the patterns of change. Choo [63] refined the advanced model by Wygant and Markley [64] which is based on Molitor's approach. He presented the information life cycle of emerging issues. In this context, he stated that sources, such as science fiction, artistic works, fringe, and alternative press, are valuable sources to find weak signals of emerging issues. Hiltunen [65] conducted a study to identify the sources from which future-oriented people find weak signals about forthcoming changes. In the context of the study, the author found that science fiction is used as a source to identify weak signals in the context of changes in society and culture as well as in the field of technology and science [65].

The results of the study show that in the context of searching for weak signals or trend management, novels can broaden the perspective of managers and increase their reception of weak signals and can act as valuable sources for upcoming trends. Our argument is that if managers are familiar with new, provoking, visionary, inspiring novels, they are more likely to discover weak signals earlier than competitors without a similar perceptive background. By reading novels, managers can broaden their cognitive perspective and perception of the corporate environment [66].

4.3. Novels as frames of reference to ensure the link to customers

In addition to individual frames of reference, shared frames of reference exist which are promoted through general socialization and interaction [67]. Social cognitive perspective refers to a set of shared beliefs by members of a specific community [68]. Therefore, it is valuable to provide insight on shared frames of references to have access to new and significant perspectives of how people make sense of particular aspects of the world [67]. Storytelling is traditional in humanity and, at the same time, is essential for shaping values, broadening understanding, and fostering learning [69].

Over the last years, the interest in the use of stories in marketing research has grown [70–76]. Apart from branding [e.g. 77], research often deals with the question of how marketing-relevant insights can be gained from customer stories, as revealed by Thompson [72]. He explained how patterns of meanings can be derived from customer stories and how implications for management can be deducted. The hermeneutic/narratological model of meaning construction, which is used for this purpose, assumes that individual events or experiences are integrated into a broader narrative of self-identity to achieve continuity in individuals' life experiences with the help of cultural, social frames of reference. The latter offer a wide array of interpretative options for this purpose. The meaning attributed to the consumption of a certain good is then influenced by both the individual self and available frames of reference.

Identifying social frames of reference, as in our example novels, can support managers in understanding customers' frames of reference and how the customer attributes meaning to consumption experiences in order to offer appropriate innovations and new products that the customer can make sense of and integrate in his or her individual reality construction as well as narrative of self-identity.

5. Case illustration: A future social media novelty taken from a novel

SF prototypes, taken from novels, can serve as vehicles for researching weak signals. To illustrate our line of argumentation, we highlight a novelty taken from the novel *Super Sad True Love Story* [13], published in 2011. While this novel is not described as a science fiction novel, with a very long time horizon into the future, we find it to be very interesting for our example. First, the technology usage described already exists: social media. This SF prototype is linked to an already existing technology. Therefore, it is easier to imagine how this technology might develop in the future. Second, the link to an existing technology allows us to develop an SF prototype with immediate market relevance.

The plot of the novel is situated in the near future. America is suffering from severe financial crises and Chinese creditors have gained in influence. While the novel centers around a romance, the central device in this novel is of particular interest. This device is the future version of a Smartphone, the so-called *äppärät*, and its applications. Its relevance and one of the many applications is described early:

> "*Learn how to use this thing immediately*", *Shu told me*. "*Especially the RateMe part. Learn to rate everyone around you. Get your data in order. Switch on CrisisNet and follow all the latest. An ill-informed salesman is dead in the water these days. Get your mind in the right place. Then we'll see about putting your name back on The Boards. That's all, Leonard.*" [*13*: *70*]

A particular social media application, called FAC or *From a Community*, is described, where it is possible for people to judge each other by placing the äppärät over their hearts. The described application relates not only to current developments, such as the face recognition application offered by Facebook, but it extends current applications to a future scenario.

> "*FAC? What's that? Who am I? Where's my diaper?*"
>
> "*It means 'From A Community'", Vishnu said. "It's,like a way to judge people. And let them judge you." He took my äppärät, and slid some settings until an icon labeled "FAC" drifted onto the screen. "When you see FAC, you press the EmotePad to your heart, or wherever it can feel your pulse." Vishnu pointed out the sticky thing on the back of my äppärät that I thought could be used to attach it to a dashboard or a fridge. Wrong again.*
>
> "*Then", Vishnu continued, "you look at the girl. The EmotePad picks up any change in your blood pressure. That tells her how much you want to do her.*" […]
>
> "*Set up your Community Parameters. Make it 'Immediate Space 360'-that'll cover the whole bar. Now look at a girl, then press the pad to your heart." I looked at the pretty brunette… Then I touched my heart with the back of my äppärät, trying to fill it with my warmth, my natural desire for love.* [*13*: *88–89*]

We have already argued that weak signals can develop over time into strong ones, or mass-market phenomena, due to the process of diffusion, but also through the process of normalization within a society. Therefore, it would be interesting to know if such an application similar to the *From A Community* already exists. Our research revealed that there is an application or "app" called Grindr, which was first launched in 2009 and is a location-based gay dating application for Smartphones. When a user opens the app, nearby users will appear in a photo grid. The user can click on the photographs to view a profile. A real-time chat feature is accessible. Only if the two users mutually agree, their location details are shared [78]. While this app is only used by a small group, the user scenario described in the novel *Super Sad True Love Story* [13] provides an idea of how mass-market apps could evolve.

Although a series of novels called *Gossip Girl*, written by Cecily von Ziegesar first published in 2002 do not belong to the science fiction genre, they are an example that non-science fiction novels could be relevant for SF prototypes. The novels deal with a group of spoiled teenagers, some from high-society families, at an elite New York high school. The plot evolves around these teenagers and their failures, love affairs, and problems. All of the gossip around this group of teenagers is collected in the blog of the anonymous Gossip Girls. In September 2007, the first Gossip Girl television series aired in the US, which now can be seen around parts of the world.

An important feature of the plot is that this group of New York teenagers monitors each other constantly. As soon as somebody is recognized, a text message is sent and pictures or videos with mobile phones are made. Nothing in their lives remains unobserved and all of the information is not only passed along to peers but also to the anonymous Gossip Girl, who then posts this information in her blog. However, one could argue that while the debate on privacy in the Internet is still evolving, these novels described a younger generation that perceives such surveillance as "cool" or "chic". The issue of privacy or surveillance is also taken up in *Super Sad True Love Story* [13]. However, being tracked is described here more as a form of affection:

> *I did the same, pretending it was something serious and work-related, but really I was just GlobalTracing Eunice's location. She was, as always, at 575 Grand Street, Apt. E-607, my home, deep into her own äppärät, but subconsciously saturated by the presence of my books and mid-twentieth century design furniture. It pleased me, in a parochial way, the fact that I could always count on her being there. My little housewife! She tracked me moment by moment as well, getting suspicious if I veered off course from the daily set of my life, an impromptu meeting at a bar with Noah or Vishnu or a walk in the unbloodied part of Central Park with Grace. The fact that she was suspicious of me, the fact that she cared — that pleased me too.* [*13*: *213*]

The *From A Community* application taken form *Super Sad True Love Story* [13] could then be perceived as a natural extension of such transparency in the Internet, in which numerous business opportunities could evolve. Managers familiar with this novel might perceive and identify this weak signal and corresponding business opportunities earlier than competitors.

6. Discussion

While we cannot provide a detailed case study on our proposal to use SF prototyping as a means to deal with weak signals, the text taken from *Super Sad True Love Story* [13] underlines that SF prototypes can fulfill a twofold function in corporate foresight. As science fiction novels provide a new frame of reference for managers, SF prototypes can serve as vehicles for researching weak signals and for identifying corresponding business opportunities as well as for ensuring the link to customers. However, to further elaborate on our proposal, we will discuss in particular two aspects: observations from classroom experiments and the link to scenario planning.

At two master classes at a university for media and communication in Germany, we included our approach in a course we taught on trend research. We handed the above-mentioned text from the novel to the students and asked them to link this narrative to trends they were aware of and to develop an SF prototype. They were thus encouraged to use this excerpt from the novel *Super Sad True Love Story* as frame of reference and to identify trends, which they can use as cues to link this frame of reference with. Through this meaningful linkage they broadened their perspective in order to develop SF prototypes. Although we will not discuss the entire experiment in detail, the interesting observation was that the student groups developed different SF prototypes.

Each group presented a prototype of a business model based on the excerpt from the novel *Super Sad True Love Story*. While the prototypes had a number of similarities, each one had also differing elements. Interesting was in particular the main purpose the students assigned to their prototypes. While in

the novel *Sad True Love Story* the described *From A Community* application serves more the purpose of identifying a partner for sex, the students interpreted this application in their prototypes more as one that helps to identify partners that are a good match, with the ultimate goal to avoid disappoints or an early breakup. The students not only interpreted the application of technology differently, they also incorporate another view on the value of relationships. Further, the described prototypes expanded the initially described idea in the novel and additional ideas for business models could be developed.

These observations link directly to a central characteristic of literature, the so-called polyvalence. The meaning of a text is not exclusively derived from the text itself, it is constructed through reading [79], reflecting the individual context of the recipient. The notion of polyvalence in literature underlines that a text can be interpreted in many different ways. Therefore, we draw the conclusion that the described approach to use SF prototyping to manage weak signals can also generate various (user) scenarios.

While scenarios have been described as prospective stories about the future [80], several authors have argued for communicating scenarios in a narrative format [81–85]. The main rationale for communicating scenarios in a narrative format is that narratives are crucial in engaging participants in a scenario exercise [86]. Some authors argue that science fiction and other forms of creative writing can help managers when trying to imagine an unpredictable future as they help to create visions of the future [87]. Science fiction can also help to envisage the potential economic and social consequences of innovations [88].

It appears to be of interest to further explore how narratives from novels can actually have the same effect in an organization as scenario stories crafted as part of a scenario planning exercise. It has been emphasized in scenario planning [85,89–91] that this exercise is about creating alternative pictures of the future, not the prediction of one's future [92]. In a sense, a SF prototype can only be perceived as one picture of the future. However, referring to the above described classroom experiments, one can argue that working with such SF prototypes and exploring the polyvalence of these pieces of literature can provide different pictures of the future, or at least serve as a valuable input in the process of creating scenarios.

If we consider the three phases of scenario planning, preparation, development and use [93], SF prototypes can for instance be an input in the development phase when it comes to the discussion of key drivers [85]. Further, O'Brien and Meadows [93] argue that there is gap between the use phases and the planning and preparation phase in scenario exercises. They propose that a scenario orientation phase can close this gap, engaging those more with the scenario that has not been part of the development phase. In this scenario orientation phase those SF prototypes used in the development phase could be used to support the familiarization with the scenarios. While we would not suggest to replace scenarios with SF prototypes taken from novels, a combination of both could be a promising field of further investigation.

7. Conclusion

Science fiction author Cory Doctorow argued that one could change the future by changing people's narratives. If the story is different from what people have imagined things will be like in the future, the future is actually changed. People have the capacity to change the future proactively by telling a story about the future [94]. We have argued that novels have exactly this ability to become part of the narrative of a consumer and therefore this applies for SF prototypes taken from novels. In the process of sense-making, science fiction novels can act as frames of reference and fulfill two functions. First, they can broaden the perception and sensitivity of managers with regard to weak signals and thus support the early detection of such signals. Second, they can ensure – as frames of reference for the customer – the link of prototypes and corresponding innovations to the world of the customer, so that the latter can understand the link of a SF prototype to a future product or service. It is necessary to enhance the capability of an organization to perceive weak signals and to transfer the signals to frames of reference for customers in order to successfully create new business fields. By referring to an SF prototype taken from the novel, *Super Sad True Love Story* [13], we have simulated how such a novelty not only provides a future user scenario but already can be connected to current developments.

We have argued why it can be beneficial to use novels in managing weak signals and have argued that practitioners could use this approach to select meaningful weak signals for their organizations, in particular when these can be related to the world of the customer. Managers as well as researchers should consider using science fiction novels and respective SF prototypes in corporate foresight to support other tools in this field. Reading science fiction novels clearly broadens the perspective and perception of managers as well as customers with regard to innovations. A shortcoming of this article is that we are not able to provide insight from the application of our approach other than evidence from a classroom experiment.

However, this example fosters opportunities for future research. We assume for instance that a qualitative study could be a possibility to evaluate the approach as proposed in the paper. Interviews would enable an assessment of the relevance, use and impact of the proposal. A similar approach was taken by Hiltunen [65] on useful sources when searching for weak signals. A procedure including interviews could also enable an analysis of the relationship between the approach itself and managerial and organizational performance variables. A likewise study was done by Amsteus [95]. Overall, this article can merely be perceived as a starting point for further examination of the novel topic.

Such a study can then be a starting point for research on practical recommendations. The goal should be to provide managers with a concrete model of how to use science fiction novels in practice to detect weak signals, to identify corresponding business opportunities and how to link them to the world of the customer. Especially regarding the last aspect, interrelations with marketing and the field of storytelling should be investigated. With such a sound process of science fiction prototyping practitioners would be able to leverage the full benefit of this approach. Moreover, SF prototyping should be considered an important tool in futures studies [96] and thus, further research regarding the link between SF prototyping and other tools of corporate foresight and futures studies is necessary. Especially the role of SF prototyping in the scenario planning process should be further investigated to achieve a clearer picture of similarities and differences and how the two approaches can cross-fertilize each other.

In this context, it needs to be considered how an organization can identify the novels relevant for them. In fact, Schwarz [10] has developed a framework for this task. While this framework can provide guidance to an organization as to how to identify relevant novels, the connection to the idea of SF prototypes provides an interesting field of application. Our discussion has also underlined why it appears to be interesting to venture into the field of novels from the perspective of strategic management or prototyping. Future research needs to be conducted to investigate how novels can be used in organizations to make sense of changes in the organizational environment.

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Dr. Jan Oliver Schwarz is a research associate at the Aarhus School of Business, Denmark and a strategy consultant. He previously was a research fellow at the Institute for Futures Studies and Knowledge Management (IFK), EBS Business School, Wiesbaden Germany. His research interests include various aspects of corporate foresight, weak signals, trend research, business wargaming and the usage of cultural products in strategic management. His articles have been published in several books and in peer-reviewed journals, among others Technological Forecasting & Social Change, Futures and Foresight.

Dr. Rixa Kroehl is a project manager and post-doctoral researcher at the Institute of Futures Studies and Knowledge Management (IFK), EBS Business School in Wiesbaden, Germany. She holds lectures on strategic management and social-scientific fundamentals and is in charge of research projects with companies as well as the German Federal Ministry of Education and Research. Her research interests are strategic management, storytelling, sense-making, systemic management, as well as corporate and organizational identity.

Dr. Heiko A. von der Gracht is an external Post-doctoral Researcher at EBS Business School in Wiesbaden, Germany and Head of the Think Tank for Futures Management at the Institute of Corporate Education e. V. (incore), which is supported and sponsored by KPMG in Germany. His research interests include corporate foresight, Delphi and scenario techniques, decision support, and foresight support systems. His works have been published in several books and in peer-reviewed journals, among them Technological Forecasting & Social Change, Futures, Foresight, European Journal of Futures Research and Business & Society.