The Psychological Aspects of Corporate Foresight

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Abstract

The article considers the psychological mechanisms of collective foresight activities. Corporate foresight is considered a collective relection, an open strategic dialogue about group objectives and joint actions that helps group members construct a collective image of the future and adapt to future challenges. The results of expert panel revealed several organizational and psychological barriers that hinder corporate foresight effectiveness in Russia: distrust toward long-term forecasting, the avoidance of responsibility for one's own future, a poor focus on the future, and low levels of social cooperation. Special attention is paid to overcoming the cognitive biases and socio-psychological effects during foresight sessions that hinder group reflection, including: the effects of overconfidence, the desirability effect, framing, future anxiety, neglect of the scope of risk, future stereotyping, uncertainty of outcome, availability heuristic, the generalization of fictional evidence, the visualization effect, hindsight bias, future discounting, cognitive dissonance, regression to the mean, planning fallacy, explanation effect, common knowledge and polarization effects, technophile's bias, and self-fulfilling prophecies. Directions of future psychological research in the field of foresight studies are proposed.

Keywords: corporate foresight; collective image of the future; social forecasting; time perspective; leadership vision; group identity; group reflexivity; cognitive biases; social psychology of foresight.

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The increasingly high rate of change and complex, ambiguous global economic prospects prompt Russian company managers to systematically analyze weak signals of emerging change [PWC, 2014]. In the innovation and strategic management domain, Foresight tools are now commonly used for these purposes. Essentially this methodology involves regularly collecting data about change, stakeholders taking a position about the most likely future, forging a desirable vision of the future, and making decisions regarding steps to be jointly taken in the present. In a broader sense, corporate Foresight can be seen as a system of procedures, organizational processes, structures, values, and norms supporting the company's (or the professional community's) ability to foresee and anticipate change as well as adapt its behavior and activities in line with the trend analysis and future development scenarios [*Sokolov,* 2007; *Gracht et al.,* 2010; *Rohrbeck,* 2011; *Portaleoni et al.,* 2013; *Meissner et al.,* 2013; *Vishnevskiy, Karasev,* 2016]. The application of Foresight techniques by Russian companies encounters opposition due not only to economic, political, and cultural preconditions, but also due to psychological reasons.

Cognitive mechanisms of corporate and industry-level Foresight studies in the technology and innovation sphere command the growing interest of researchers [*MacKay, McKiernan,* 2004; *Meissner, Wulf,* 2012; *Boe-Lillegravena, Monterdeb,* 2015; *Warnke, Schirrmeister,* 2016]. However, no systemic reviews of cognitive and socio-psychological factors affecting Foresight studies' productivity have yet been conducted, those that take into account the various effects emerging over the course of experts' joint work in developing possible future scenarios. This paper fills this gap on the basis of Russian and international socio-psychological studies.

Organizational and Socio-Psychological Factors Affecting Foresight Studies at Russian Companies

Corporate Foresight studies are expected to help companies meet the challenges hindering their abilities to foresee the future [*Rohrbeck,* 2011]. Firstly, these challenges include the accelerated rate of change: shorter product life cycles, the speedier creation and dissemination of innovations increase uncertainty and make long-term planning more difficult. In industries where the rate of change is particularly high (such as the production of computers and semiconductors, the movie industry, etc.) strategic flexibility, i.e., sensitivity to change, and management teams' ability to think in a variable, scenario-based way become key success factors [*Nadkarni, Narayanani,* 2007]. Secondly, companies' lack of response to evidence of change hinders the ability to perceive future trends because in most cases their planning cycle matches the financial year and is not designed to take long-term trends into account. Top managers are unable to cope with the flow of information and therefore cannot set priorities while signals of change frequently simply do not reach the executive floors because they are filtered out by mid-level managers who try to protect the interests of their units and departments [*Ilmola, Kuusi,* 2006]. A good example of such lack of sensitivity is provided by Kodak, whose engineers developed the digital photography technology as early as 1975. However, in the 1980s the top management ignored the "weak signals" of the forthcoming market revolution and failed to persuade heads of independent divisions to change their priorities [*Lucas, Goh,* 2009; *Barabba,* 2011]. Finally, due to the inertial nature of their development, companies fail to react in time even to the changes they do notice; a possible explanation is the complex multilevel (divisional or product) organizational structures that comprise wide networks of subcontractors and strategic partners and an unwillingness to abandon the customary technologies and product lines that remain profitable in favor of investing in new products and services.

Typical barriers hindering corporate Foresight studies include the inadequate perception of long-term forecasts' practical value by the management; complex hierarchies that slow down decision-making; performance assessment and motivation systems focused on short-term objectives; and a high turnover rate on management teams. At small companies, the relevant problems mostly involve a lack of resources, managers' excessive concentration on current activities, and a lack of incentives for the staff to try and foresee the future [*Vishnevskiy et al.,* 2015].

Group reflection is the key corporate Foresight mechanism, i.e., team members' open discussions about their common goals and ways to accomplish them by changing internal and external environments [*West,* 1996; *Zhuravlev, Nestik,* 2012]. Without using the term, numerous researchers call "reflection" a basic Foresight mechanism. One of group reflection's strengths is its potential to support "strategic dialogue" as a precondition of productive scenario planning [*Schwartz,* 1996; *van der Heijden,* 2005; *Mack,* 2013]. Another major principle of the Foresight methodology is discussing competing visions of the future [*Berkhout,* 2006; *Durand,* 2009], comparing alternative interpretations of the present [*Ogilvy,* 2002], and forging a common basic vision of tomorrow [*Blackman, Henderson,* 2004].

Shell's long experience in scenario planning indicates that the main objective of this technique is not supporting management decision-making but maintaining a strategic dialogue between company

executives about the future [*Wilkinson, Kupers,* 2013]. One of the paradoxes of conventional forecasting (i.e., the extrapolation of observed trends into the future) is that the accuracy of short-term forecasts does not depend at all upon an understanding of the reasons behind forthcoming events. Authors of present-day futures studies increasingly often urge one to promote group dialogues, various forms of reflection, and the contemplation of current processes and emerging trends [*Nelson,* 2010; *Treyer,* 2011; *Mack,* 2013].

Our previous empirical studies of Russian companies and their managers' behavior allowed us to identify three main socio-psychological mechanisms which affect management teams' attitudes towards the future: 1) group reflection of a common future; 2) group identification, based upon a positive vision of the common future forged by the management (leaders' vision); and 3) collective anxiety and protective mechanisms launched by a perceived threat to the group's continued existence [*Nestik,* 2013; *Nestik,* 2014b].

If group reflection increases the management team's ability to adapt to changing conditions (strategic flexibility), group identification based on a positive vision of the future performs a quite different function: it increases loyalty to common goals despite changing conditions for joint activities. The vision of the future forged by the leaders motivates the team and brings it closer together, while at the same time "blinding" individual team members and strengthening peer pressure and risk proneness effects. On the contrary, group reflection promotes greater openness to information which contradicts basic group convictions.

Despite their different directions, these processes are closely linked to each other: group reflection of the long-term future can only be possible if a positive group identity and trust are in place. Looking ahead, company managers face a paradox: the delusions of being able to control the future and excessive optimism negatively affect the quality of strategic decisions, however, they are necessary to support the management team's focus on long-term goals [*Rosenzweig,* 2014]. The corporate Foresight methodology is expected to deal with this psychological controversy through a strategic dialogue about the future based upon reliable information.

More than 30 various quantitative and qualitative data collection, analysis, and interpretation techniques are available for corporate Foresight studies [*Popper,* 2008], which can be divided into several groups: 1) techniques based upon making use of participants' knowledge and experience (such as Delphi, roadmaps, critical technologies); 2) methods mobilizing participants' creativity (wild cards, science fiction, game modelling); 3) methods oriented towards obtaining evidence (bibliometric and patent analysis, mathematical modelling, benchmarking, etc.); 4) techniques based upon participants' interactions (such as brainstorming sessions, conferences, scenario building workshops, stakeholder analysis, etc.).

The summarized data about 1,794 Foresight sessions reveals that four methods seem to be particularly popular: expert panels, literature reviews, trend analysis, and scenario analysis. Meanwhile in Asia and Latin America, anonymous surveys appear to be the preferred choice (i.e., Delphi), while the US and Europe typically favor Foresight sessions, i.e., face-to-face forums for expert group discussions [European Commission, 2009]. In Russia, Foresight sessions became a common practice at development institutes and medium-sized high-tech companies.

Experts and Foresight studies' organizers taking part in group discussions face numerous organizational and psychological barriers. The expert poll we conducted in 2014, covering the organizers and moderators of corporate Foresight sessions from the Strategic Initiatives Agency (SIA), the Moscow School of Management Skolkovo, and experts from the HSE Foresight Centre allowed us to identify

Table 1. **Barriers Affecting the Practical Application of Foresight Studies' Results (average scores on a 5-point scale, N=42)**

Barriers	Effect
1. Lack of long-term future analysis and planning culture in Russia	4.4
2. Decision makers' poor interest in Foresight studies' results due to the remoteness of the projected future	4.3
3. Poor awareness of Foresight studies' potential among the general public	3.9
4. Customers' inclination to use Foresight studies to justify previously made decisions	3.8
5. Decision-making at organizations commissioning Foresight studies lags behind the dynamics of the innovative processes	3.8
6. Inefficient horizontal communications between project participants	3.6
7. No plans for the application of Foresight studies' results are typically made before the study commences	3.6
8. Insufficiently regular meetings between the project group and external stakeholders	3.5

Source: composed by the author based upon expert polling.

Table 2. **The Distribution of the Experts' Answers to the Open Question "In your opinion, what are the main barriers hindering projects aimed at foresight in Russia?" (N=42)**

Answer options	The option's share in the total number of answers (%)	Number of experts who selected this option*
Low awareness of Foresight techniques among managers: the lack of a culture for conducting such studies in Russia; a lack of trust in the methodology; an inadequate understanding of its application and functionality; the lack of relevant habits; wider society does not believe the challenges the country is going to face in the future can be met with the help of Foresight methods; insufficient knowledge about the methodology; an insufficient understanding of its nature and potential as a tool for increasing the productivity of the economy.	14	27
Insufficient focus on the future: a focus on dealing with current issues using conventional tools; a focus on short-term results; a short planning horizon; one does not believe it is even possible to make accurate forecasts; customers' fear of the future; top managers' reduced strategic planning horizon and range of vision; an inadequate culture for assessing the future of the country, the business, and one's own, alike.	11	22
Immature Foresight studies market: the application of administrative resources to promote one's particular (own) methods and approaches among the more important players; the lack of a competitive market for Foresight studies; inadequately adapted, undeveloped Russian methods and techniques; the insufficient application of scenario analysis; the lack of necessary skills and competences; the lack of professional teams; the lack of a commonly accepted methodology.	10	19
Weak connections between society and the state: undeveloped feedback mechanisms; deep corruption; a lack of interest from officials; the state's unwillingness to fully implement roadmaps;	9	16
The lack of competent clients; no competent demand: low demand; exceedingly high importance assigned to finances; the economic backwardness of regions; insufficiently developed professional communities; etc.	9	16
Managers' unwillingness to take responsibility for the future: passing responsibility for the future onto external authorities; people who make forecasts should be responsible for their coming true; it is easier and safer to live in chaos and uncertainty; the unwillingness to actually plan; customers lacking political and managerial will to implement Foresight studies' results.	9	16
The low level of social trust and lack of a cooperation culture: diminishing social trust; a focus on competition, not cooperation; generally low level of trust in the country; a lack of a communication culture among stakeholders; inter-agency barriers; "manual control" habits.	7	14
Using Foresight studies as a manipulation tool: the mismatch between the true and formally declared objectives; declarations not matching actual actions; a gap between customers' real and declared goals; etc.	7	14
The short-term orientation of the public administration system: legal limitations on long-term planning; less-than-perfect budgetary mechanisms; one- to three-year planning horizon; inter-budgetary imbalances; certain specific features of public authorities' operations; short horizons of decision-making systems at all levels.	7	14
Fatalism and learned helplessness: the lack of trust in change; people have learned to expect to fail in their undertakings; low ambition of individuals and companies alike	4	8
Lack of connections between Foresight studies' results and the subsequent action plans: the inability of Foresight studies' organizers to explain the meaning of and ways to apply the results; the uncertain prospects for subsequent projects; a "cosmos" of creative results.	4	8
The low level of experts: inadequate competences of experts; the snobbishness of participants; the devaluation of the methodology in the eyes of experts.	4	8
Constantly changing "rules of the game" in the country's political and economic domains: inadequate political mechanisms, unstable "rules of the game"; politics; high levels of economic uncertainty.	3	5
Other factors	2	2

* The experts were allowed to choose several options.

Source: composed by the author based on expert polling.

the following particularly important socio-psychological barriers hindering the practical application of Foresight studies' results: a biased attitude towards long-term planning and forecasting and management teams' unwillingness to assume responsibility for the strategic future (Table 1) [*Nestik,* 2016a].

Answering an open question about the problems encountered while trying to foresee the future in Russia, along with the above barriers, the experts also noted managers' insufficient focus on the future and the public administration system being primarily interested in accomplishing short-term objectives (22 and 14% of the experts, respectively); an insufficiently transparent market for Foresight studies (19%); weak connections between the public authorities and society (16%); the low level of social trust and the lack of a cooperation culture (14%), etc. The above barriers predominantly have institutional and psychological characteristics (Table 2).

Table 3. **Common Mistakes Associated with Group Attempts to Foresee the Future in the Scope of Corporate Foresight Studies (average scores on a 5-point scale, N=42)**

Type of mistake	Score
Events in the distant future were perceived by participants as less important than the current or forthcoming events.	4.0
Experts tend to describe the future on the basis of information that caught their attention in the media and on social networks;	4.0
Experts tend to underestimate the probability of events with which they have no personal experience (or similar ones);	3.9
The amount of time required to implement the planned action is usually underestimated.	3.8
Conclusions about future phenomena and people tend to be unreasonably generalized and assessed in line with present-day stereotypes (age-, gender-, ethnic-related, etc.).	3.6
Experts tend to disregard the facts and information sources that do not match the position they have taken from the start.	3.4
Over the course of group discussions, initial suppositions about the future tend to turn into absolutes that cannot possibly be doubted.	3.2
Experts tend to place negative events far into the distant future.	3.1

Source: composed by the author based on expert polling.

The more common mistakes associated with group attempts to foresee the future have turned out to be of a psychological nature because: 1) events in the distant future were perceived by participants as less important than the current or forthcoming ones; 2) participants described the future on the basis of information that has caught their attention in the media and on social networks; and 3) experts tend to underestimate the probability of events with which they have no personal experience (or similar ones) (Table 3).

How can the aforementioned motivational and cognitive biases as well as the impact of the group dynamics on the results of corporate Foresight sessions be reduced? Studies show that training experts on the use of special techniques designed to diminish such negative effects increases the accuracy of the forecasts [*Mellers et al.,* 2014]. Let us take a closer look at the psychological pitfalls encountered by moderators and participants in Foresight sessions and suggest more detailed recommendations on how to be aware of them and avoid them over the course of group expert discussions. A common feature of such cognitive traps is that they hinder group reflection and reduce sensitivity to alternative visions of the future.

Psychological Barriers Hindering Corporate Foresight Sessions

Over the course of a well-known study presented in [*Tetlock,* 2005], 284 international experts proposed about 80,000 predictive estimates of several countries' future development. The next 20 years showed that these forecasts had not been particularly accurate. The approaches to forecasting that the experts use can be notionally linked with one of two strategies, those of foxes' or hedgehogs', to use the terms that philosopher Isaiah Berlin borrowed from the ancient Greek poet Archilochus: "The fox knows a lot, while the hedgehog knows one thing only – but it's the important one" [*Berlin,* 1953]. The least accurate forecasts were produced by the "hedgehog" experts who extrapolated a certain pattern observed in an area they knew well, into other areas of life. Predictive estimates made by "fox" experts, who used various data sources and alternative analysis models have turned out to be more accurate [*Tetlock,* 2005]. The laymen's forecast produced within the scope of the *Good Judgment Project* study confirmed this pattern: in the short term, people who are open to all things new, who are capable of reflection and self-criticism, and more importantly, are willing to discuss their insights and listen to other people's opinions, tend to be more successful at predicting the future [*Tetlock, Gardner,* 2015].

Indeed, a typical barrier frequently encountered during Foresight sessions aimed at developing corporate strategies is the *overconfidence effect*, i.e., the experts' insensitivity to other people's opinions and to information that contradicts their already taken positions [*Tetlock, Gardner,* 2015]. Taking special steps before the Foresight session begins to help the participants temporarily abandon their "hedgehog" roles in favor of becoming "foxes", which allows one to reduce this factor along with encouraging (or even forcing) the participants to listen to other people's views (e.g., by using techniques such as focus groups, "Idealogue"[1], brainwriting [*Rohrbach,* 1969], etc.). For example, session participants can be divided into groups, each of which is asked to interview the other groups on a certain topic and then summarize the collected opinions. During a brainwriting session, participants silently write down

[1] See http://caramboli.ru/?p=233 for more; last accessed on 18.01.2018.

their ideas on cards for five minutes, and then pass the cards around the table so other people could add their own contribution.

The *social desirability bias*, or *excessive optimism*, is manifested in the propensity of experts to forecast the future in order to increase the probability of desirable events while reducing that of the undesirable ones (compared with neutral events) [*Ecken et al.,* 2011]. On the whole, we tend to underestimate the probability of negative scenarios [*McKenna,* 1993]. The *scenario matrix* technique allows one to reduce this effect (as opposed to contrasting pessimistic and optimistic scenarios). In such a matrix, the more important (and more uncertain) factors affecting future developments serve as the axes. For example, analyzing the possible development of the healthcare sector, experts can use the axes of "passing on the responsibility for healthcare from the state to citizens", and "moving on to personalized and preventive medicine". Various combinations of these factors produce four scenarios that allow one to avoid simplistic binary logic. Techniques such as *black swans* and *wild cards* (i.e., events with a low probability of happening, but with the potential to radically change the relevant industry) can also help reduce social desirability bias [*Taleb,* 2007; *Mendonça et al.,* 2004]). Analyzing the positive and negative consequences of each scenario and applying a "desirability" scale in addition to the "probability" one to produce expert assessments are productive approaches too.

The *framing effect* occurs when given a negatively formulated objective ("how to avoid something"), participants tend to strongly adhere to the initial position and strive to preserve (sustain) what they have already achieved [*Tversky, Kahneman,* 1992]. In Foresight sessions this cognitive bias is closely related to *collective anxiety over the future*, manifested in the participants' inclination to shorten the planning horizon *[Nestik, 2014c]*; their thinking becomes more stereotyped [*Kelly et al.,* 2001; *Friedman, Foerster,* 2005], while the ability to take into account possible action by other players diminishes *[Leder et al., 2015]*. Our studies show that discussions about the group future at Russian companies in most cases are inspired by anxiety about changes that have already occurred or potentially possible negative changes, rather than by the need to maintain stability or become aware of new opportunities [*Nestik,* 2014b, 2014c]. Collective anxiety as a reaction to perceived threats to the team's continued existence can increase the staff's interest in the future. At the same time, anxiety over the future suppresses the group members' creativity and concentration when they try to make decisions and makes them more critical of one another [*Rhee,* 2007]. As a survey of 169 Russian executives revealed [*Nestik,* 2014b], they intentionally build up anxiety to mobilize the staff and increase their concern about the short-term future. However, the alarmism they provoke launches the mechanisms of positive group identity protection: the group turns towards the more positive common past and starts seeing the future in a predominantly gloomy light.

In Russian corporate and industry-level Foresight studies, the above effect manifests itself in the problems experts encounter when they try to forge a positive vision of the future: the focus of their attention shifts from opportunities to threats and ways to deal with the latter. Experts' trying to protect their positive identity – be it a corporate, professional, or national – produces the framing effect, increases adherence to previously made decisions and customary concepts. Such protective psychological effects arising over the course of pondering the future are particularly common for public companies and research and educational organizations whose staff have experienced a significant decline in their socioeconomic status and the prestige of their profession over the past 20 years. However, the "protecting positive identity" effect may emerge at more successful companies as well. Studies of social psychology of risks indicate that analyzing possible futures, experts tend to underestimate the probability of and overestimate the remoteness of events that threaten a positive assessment of their group, i.e., hurt their patriotic feelings, negatively affect pride in their company, profession, etc. [*Joffe,* 2003].

Discussing participants' shared history and values before starting to ponder the future can help reduce the "protecting positive identity" effect and strengthen the participants' self-assessment. Also, gaming techniques can be quite helpful in analyzing trends and scenarios, this is when participants try to play the roles of various parties interacting on the market [*Schwarz,* 2011]. Foresight session moderators can reduce the collective anxiety over the future by allaying experts' alarmism, avoiding excessively serious formats, introducing elements of (self-)irony, and putting the participants in a positive mood. The framing effect can be diminished by using a positive wording to set brainstorming objectives ("challenges" instead of "risks", "create" instead of "avoid", "can" instead of "have to"). Conceptual schemes are also applied to reduce this effect: before making a decision, managers graphically present the cause-and-effect links between relevant facts [*Hodgkinson et al.,* 1999, 2002]. Visualizing the interaction between trends on a timeline can serve as an analogue of such a conceptual scheme for a Foresight session.

Another protective mechanism that can be triggered over the course of analyzing future threats is called the *scope/extension neglect effect* and the "*callousness*" effect, which emerges when negative consequences are assessed. Essentially it means that people tend to be more willing to empathize with a specific person in the photograph rather than with an abstract statistical community of several million people [*Slovic,*

2013]. To diminish its impact when major risks are assessed, it is important to analyze their consequences for specific individuals (e.g., for one of the company's clients), as opposed to confining the analysis to measuring the consequences for faceless social groups.

The depersonalization of future events over the course of their assessment is related to another cognitive barrier – *future stereotyping*. Studies in the scope of the mental construction theory indicate that remote (in temporal terms) events are perceived in a highly abstract way, using general categories and customary stereotypes [*Trope, Lieberman,* 2010]. Accordingly, abstractly presented events are perceived as more remote and less likely to happen. On the other hand, a detailed description makes even remote events appear more probable [*Bilgin, Brenner,* 2008]. To compensate for this cognitive barrier over the course of a Foresight session, future events may be linked to specific, familiar places; prototyping and role playing games may be used, which help to more deeply imerse the participants in a future situation. Building scenarios and assessing possible consequences of the trends for specific individuals ("a person in the picture") also helps. For example, for the purposes of its Foresight study, a European company has actually built replicas of the residential and office premises in line with various ideas on how work places would look by 2020. These "premises from the future" were used to hold board meetings and other conferences in order to make the changes that would affect managers' work in the coming decades as realistic as possible [*Rohrbeck,* 2011].

The abstract and uncertain nature of events in the remote future also hinders risk analysis. If we treat a future event as one that has already happened – as if we already know how it ended – we take into account approximately 30% more possible reasons than if those same events were treated as distant possibilities [*Mitchell et al.,* 1989]. To overcome this *uncertainty of outcome* effect, participants of Foresight sessions can be asked to imagine themselves on a specific future date; relevant positive and negative events should be described to them as actual facts and the participants could be asked to identify their reasons. This approach is commonly applied in facilitation techniques Pre Mortem [*Klein,* 2007], Future Search [*Weisbord, Janoff,* 2010], and Appreciative Inquiry [*Lewis et al.,* 2008].

Stereotyping of the future is closely connected with two other psychological effects: *availability heuristics* and the underestimation of events never encountered personally. Availability heuristics amount to pondering the future on the basis of the most readily available information [*Tversky, Kahneman,* 1974]. In other words, experts tend to construct the future on the basis of the trends actively discussed in the media and on social networks. This frequently produces a *generalization of fictional evidence* effect, when experts rely on their "memory of the future" created by visually impressive and memorable Hollywood stories and computer games [*Yudkowsky,* 2008]. Memory of the future is supported by the modern multimedia culture and *visualization effects*: it turns out that future scenarios presented in the computer animation and video clip formats are perceived by viewers as more probable and predictable than those presented as texts with diagrams [*Roese, Vohs,* 2010]. To help session participants understand the effect news media have on their thinking, the *hype cycle* technique can be applied to assess and analyze the development of trends and technologies, suggested in 1995 by the Gartner research and analysis company [*Fenn,* 1995]. This method allows one to identify technologies actively discussed in the media and by the professional community thus overshadowing other important changes – barely emerging innovations or those that have failed to live up to expectations. It would also help one to consider how well the trends under consideration are represented in various sources of information (including social media) and to present quantitative data to session participants such as statistical indicators of the relevant markets, bibliometric analysis, etc.

The same brain structures are responsible for remembering the past and constructing the future in our imagination. In particular, this occurs in the zones located in the parietal and temporal lobes of the brain, the retrospinal cortex, and the cortex of the posterior part of the cingulate gyrus [*Gaidos,* 2008; *Spreng,* 2009]. The hippocampus (which is responsible for memory) also plays an important role in forecasting [*Buckner,* 2010]. Hippocampus dysfunctions and the loss of one's ability to associate events of the past stored in our memory with one another undermine one's ability to imagine one's future [*Kwan et al.,* 2010]. Underestimating the probability of events, the likes of which we have never personally experienced, becomes a natural limitation hindering our analysis of the future. People tend to rule out those events they cannot model because the required images are lacking in their personal autobiographical memory [*Arnold et al.,* 2011].

The opposite of this pattern is the *extrapolation of the past into the future* [*MacKay, McKiernan,* 2004]. Knowing the outcomes of events, we tend to overestimate the predetermination and predictability of the past (the *hindsight bias*), which leads to overconfidence and simplification when forecasting the future (the *foresight bias*) [*Fischhoff,* 1975]. To stir up the participants' imagination and help them to see beyond the customary limits, Foresight sessions may include an analysis of alternative versions of the company's past,

unlikely scenarios of the future (black swans, wild cards), and projection and metaphorical techniques (knowledge reactor[2], photo collage, prototyping, Lego Serious Play[3], etc.).

Generally, participants of Foresight sessions find it easier to build short-term future scenarios, while constructing medium- and long-term prospects usually turns out to be a much more difficult task. The reason is not just the objectively higher rate of change and uncertainty, which hinders planning for horizons of more than ten years long, but also various subjective factors such as *perceived goal value depending on its distance in time* [*Gjesme,* 1981] and the well-known *discounted future* effect. The essence of the latter is very well reflected in the saying "a bird in the hand is worth two in the bush": people go for real benefits in favor of possible future advantages [*Berns et al.,* 2007]. For example, given a choice between getting $100 now or $120 in a month's time, people would irrationally opt for immediate remuneration. However, given a choice between $100 in 12 months' time and $120 in 13 months, most people would go for the second option. Thus, the impossibility opting for the "here and now" prompts one to make more sensible decisions. Over the course of Foresight sessions, discounting the future leads not only to making inaccurate estimates of when events might occur, but to using a narrower strategic goal setting horizon and to the devaluation of long-term forecasts. Increasing the subjective importance of events under consideration would help one to compensate for these effects (at a certain stage of the session the participants should be asked to describe their personal goals and come up with ways to achieve them in the context of the trends and scenarios being discussed). "Time travel" may also turn out to be useful, asking the participants to imagine themselves in the past or the future to put aside the choices available "here and now".

An unwillingness to look into medium-term and remote future can also be explained by *cognitive dissonance*: we usually tend to underestimate the likelihood of events we cannot influence [*Festinger,* 1957; *Nestik,* 2016b]. Therefore, it may be useful to ask the participants to consider how they could speed up the arrival of the events under consideration, for example: "What can we do to increase the chances of this event happening, even by as little as 1%?"; "How can the "butterfly effect" occur in the scenario we're discussing?" Experiments showed that often we do not just overestimate our ability to influence events, but underestimate it too [*Gino et al.,* 2011].

An assessment of specific events' probability can be biased due to *regression to the mean*. When we try to predict the development of a trend, we compare possible outcomes with the intuitive norm: for example, after a period of high or low oil prices, we expect them to come closer to the average. We tend to believe that people with outstanding abilities would have clever children, while mediocre parents' offspring would surpass them with their achievements [*Kahneman,* 2011]. That is why when we assess the prospects of particular technologies, it is quite important to consider the mutual overlaying of trends over the course of a *cross impact analysis* [*Gordon,* 1994] using quantitative data, and, along with the drivers of change, also keep in mind limiting factors (e.g., with the help of the *force-field analysis* technique) [*Schwering,* 2003]).

At the project preparation stage, participants of Foresight (and strategy development) sessions may be affected by *planning fallacy*. This is the tendency to underestimate the time required to implement the plan [*Kahneman, Tversky*, 1979]. Such super-optimism turned out to be a universal pattern, practically regardless of the nature of the task or participants' personal traits (such as optimism or the propensity to procrastinate). This is particularly common when the session is focused on the future or on assessing long-term projects [*Buehler, Griffin,* 2003; *Min, Arkes,* 2011]. Planning mistakes may be due to a lack of experience in carrying out specific tasks or the inability to make good use of it. When, before making a plan, we analyze similar situations on the basis of objective data, the probability of making mistakes diminishes [*Roy et al.,* 2008]. Another interpretation of this kind of mistakes is that we tend to overestimate the likelihood of events we have explained. This *explanation effect* occurs after we have carefully considered a sequence of steps leading to the desired goal [*Hirt et al.,* 2004]. And, since it is easier to mentally go back to the just-completed plan than to find information about other projects, we tend to believe our project has better chances of being realized than alternative scenarios. It turns out that in group discussions, optimism regarding project completion time is higher than when projects are assessed individually since a group tends to first discuss ways to achieve success, not problems that can hinder the work [*Buehler et al.,* 2005]. We can diminish the explanation effect and planning fallacy by analyzing several alternative scenarios, developing a pessimistic scenario, and the decomposition of strategic projects' objectives in a more discrete way [*Min, Arkes,* 2011].

[2] See http://znatech.ru/ for more; last accessed on 18.01.2018.

[3] See https://www.lego.com/en-us/seriousplay/the-method for more; last accessed on 18.01.2018.

Group dynamics can increase individual cognitive biases that occur when people ponder the future. *Common knowledge* and *belief polarization* effects tend to emerge over the course of a Foresight session. The first essentially amounts to discussing information about the future that is known to most of the experts while disregarding the facts available only to some of the participants [*Gigone, Hastie,* 1993; *Straus et al.,* 2011]. Techniques designed to reduce peer pressure could help overcome this barrier, such as silent individual brainstorm sessions (when participants write down their ideas on cards); the nominal groups technique; brainwriting; debates; checking alternative hypotheses; microgroup discussions (comprising of two or three participants); adding "originality" criterion when ranking ideas; providing additional time to discuss relevant matters, etc.

The *belief polarization* effect essentially increases the negative consequences of experts' overconfidence: when analyzing possible development scenarios, groups tend to shift towards extreme estimates or towards the opinion that prevailed among the experts from the start. This effect usually happens to be more pronounced in homogeneous groups [*Sunstein,* 2009]: the shifting of expert assessments in such groups is further encouraged by their shared values. The so-called *technophile's bias* often emerges over the course of technology or corporate Foresight studies: experts oriented towards the future tend to overestimate the inevitability of changes and try to see trends even where there are not any [*Mack,* 2013]. Such "professional deformation" of futurists affects their forecasts especially strongly in "youth Foresight" sessions aimed at promoting innovative and high-technology entrepreneurship. To prevent belief polarization and technophile's bias of this kind, discussion groups should be diverse (in terms of the experts' specialization and experience); techniques such as "devil's advocate", and role allocation to analyze the future from different perspectives and points of views can also help.

The diversity of participants is a necessary condition of Foresight sessions' productivity. Involving representatives of various professional communities and partner organizations in shaping a desirable future not only helps to comprehensively analyze the changes but produces a positive *Medici effect* – the emergence of a long-term network for exchanging ideas, which facilitates innovation [*Johansson,* 2006; *Paliokaite,* 2010]. An example of such a community is IBM's HorizonWatch network comprising more than 1,900 managers and professionals from all company divisions and regional offices [*Chamberlin,* 2011]. To forecast the future, companies increasingly often employ "crowd wisdom" – they use crowdsourcing mechanisms to involve not just the company's clients and partners but also a broad range of persons not directly associated with it [*Gast, Zanini,* 2012]. Crowdsourcing allows to use diversity to one's advantage, but it is vulnerable to social influence. Crowdsourcing participants' knowledge of each other's opinions and judgements creates several negative effects: the diversity of ideas significantly diminishes if no adjustment is made to compensate for group assessment errors; accurate forecasts get pushed out to the periphery of the group discussion, which undermines external observers' and new participants' trust in the crowd; finally, when opinions and assessments voiced by the community are summarized and averaged out, the participants become more confident that the group decision is correct – though in reality it may not be so [*Lorenz et al.,* 2011; *Zhuravlev, Nestik,* 2016]. To minimize the impact of these effects on forecasting results, the participants of a crowdsourcing project can be divided into diverse discussion groups each comprising five to seven people, with access to averaged out assessments made by other groups but without a possibility of influencing their members. That is how an international Foresight project on the social consequences of technological development was organized on the Synmind virtual platform [Council for the Environment and Infrastructure, 2015].

Finally, over the course of Foresight sessions and afterwards, the group *self-fulfilling prophecies* effect can emerge. Essentially it means that publicly made predictions become a part of the situation whose development is being predicted and affect future developments [*Merton,* 1948]. Observing each other's statements and actions, the group members increasingly find confirmations of their expectations, and thus increasingly rely on them when they make decisions. This effect is further strengthened by social networks and readily available information about statements made and actions taken by participants and customers of the Foresight study as well as and stakeholders in the corporate future. In our opinion this effect should be purposefully used by involving decision makers in the expert groups and giving the participants a chance to forge a common vision of the future and steps to be jointly taken to make it happen.

Conclusions

Companies' increasingly common use of group forums for forecasting (such as Foresight sessions, prediction markets, crowdsourcing projects, etc.) determines the need to study socio-psychological mechanisms for constructing visions of the future. Several areas seem to be particularly promising in terms of the further analysis of socio-psychological factors affecting the productivity of corporate Foresight studies.

Firstly, specific features of group forecasting in various situations and areas of activity are worthy of attention. It seems that Foresight projects devoted to various crises, global or industry-specific risks on the one hand, and those focused on analyzing new markets or prospective technologies on the other, produce different psychological effects.

Secondly, corporate communities, norms, and rituals that are supposed to help Foresight studies' participants stay focused on the company's future and implement the obtained results, require further analysis. The issue of developing a future-oriented corporate culture that would encourage and increase sensitivity to weak signals of change cannot be successfully addressed without taking into account the socio-psychological mechanisms that shape groups' attitude towards the future and the way employees exchange knowledge [*Nestik,* 2014a].

Thirdly, psychological factors affecting the construction of the future in social networks and forums should also be studied, since Foresight projects are increasingly often implemented in the crowdsourcing or virtual expert group formats. International social network-based Foresight communities are actively developing, whose participants exchange information about signals of emerging radical changes (e.g., the European Foresight Platform[4], Strategic Foresight[5], Forecasting Net[6], The Futures Strategy Group[7], etc.). How do asynchronous communications, partial anonymity, disinhibition, low cohesion, diverse and variable compositions, blurred limits, gamification, and other specific features of virtual communities affect group forecasting? What effects does social media have on the participants of Foresight sessions? How should organizers and moderators take the emerging psychological effects into account?

Fourthly, we still know very little about the role collective memory plays in shaping visions of the future, while the effect the past has on forecasts was studied only at the individual level. Meanwhile, our studies show that employees' assessments of the corporate past do affect their attitude towards their common future [*Nestik,* 2014c]. Exactly how do specific aspects of corporate history manifest themselves over the course of Foresight studies, and how do they affect their results? How could one help participants consciously reconstruct their common past based on the results of their joint effort to analyze the future?

Fifthly, the objective of matching visions of the future that Foresight sessions' participants construct over different time horizons remains extremely relevant [*Das,* 2003], as does that of producing synergies between corporate and professional communities with different cultural and group norms (which affect their attitude towards the future).

Finally, developing socio-psychological techniques for managing the time perspective of group activities becomes increasingly relevant from theoretical and practical points of view alike, including changing the temporal orientation of Foresight sessions' participants depending on the current objective and balancing their common past, present, and future.

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[5] See http://www.strategicforesight.com/ for more; last accessed on 18.01.2018.

[6] See http://www.forecastingnet.com/ for more; last accessed on 18.01.2018.

[7] See https://www.futuresstrategygroup.com/ for more; last accessed on 18.01.2018.

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