Toward theory development in futures and foresight by drawing on design theory: A commentary on Fergnani and Chermack 2021

Yusuke Kishita¹ | Toshiki Kusaka¹ | Yuji Mizuno² | Yasushi Umeda¹

¹The University of Tokyo, Tokyo, Japan | ²The Institute of Applied Energy, Tokyo, Japan

Correspondence: Yusuke Kishita, The University of Tokyo, Tokyo, Japan. Email: kishita@pe.t.u-tokyo.ac.jp

Funding information
Japan Society for the Promotion of Science, Grant/Award Number: 18K18233, 19H04338 and 19KT0008

1 | INTRODUCTION

This commentary aims to discuss challenges and opportunities for theory development in the field of futures and foresight by drawing on design theory. The values of theorization are acknowledged by many scholars in the field. These would include promoting a common understanding of futures and foresight among researchers both within the community and across different communities, helping researchers and practitioners select appropriate futures and foresight methods to execute a project being addressed, and providing an educational and training foundation to equip people such as novices and students with futures and foresight methods and approaches in a more systematic manner.

To date, a number of methods are available in the field, such as scenarios, Delphi method, roadmapping, and backcasting (van der Duin, 2016; Glenn & Gordon, 2009; Popper, 2008). However, less attention has been paid to theory development because, historically, there is a tendency that higher priority is placed on practicality (e.g., engaging with projects to “change the world” as described in Fergnani & Chermack, 2021) rather than academic contributions (e.g., writing scientific papers). In an attempt to further stimulate discussions on this important topic, we raise some challenges to be considered and then suggest an approach to theory development in the field through the lens of design theory (Tomiyama et al., 2009).

2 | CHALLENGES

As Fergnani and Chermack (2021) pointed out, the field has not yet made enough efforts to develop theories for several reasons. While agreeing on such reasons raised there, we want to note three challenges that should be considered, which come from the key features of the field.

Firstly, it is not an easy task to test the validity of theory since the phenomenon of interest is about the future. Often, the community’s interests lie not in the accuracy of a prediction¹, but rather in causal relations about how a certain future (or possible futures) might happen from the present, as discussed in scenarios and scenario planning literature (Bradfield et al., 2005; Spaniol & Rowland, 2019). From the viewpoint of management and organization sciences, it is of particular importance “to distinguish predicting the future and predicting the outcomes of futures and foresight interventions and capabilities with scientific theory (Chermack, 2007).” When the main purpose is not to predict an accurate future, the phenomena we want to study may be relevant to either of the following questions:

I. How is knowledge about the future produced by researchers and practitioners by means of futures and foresight methods and practices? (i.e., process-oriented)

II. How do future and foresight methods, interventions, and capabilities influence organizational- and individual-level outcomes? (i.e., result-oriented)
To the best of our knowledge, both of these questions have not been sufficiently addressed in previous research. It should be noted that Fergnani and Chermack (2021) focused on (II), such as organizational-level learning effects by futures and foresight methods.

Secondly, the definitions of terminologies and how to use individual methods (e.g., scenarios) are less standardized or less commonly understood within the community partly because being “outliers” tends to be celebrated (Fergnani & Chermack, 2021). For example, there are diversified definitions of scenarios proposed by scholars (Spaniol & Rowland, 2019) as well as a variety of methods and techniques for developing scenarios, such as the $2 \times 2$ matrix method (Bradfield et al., 2005; Amer et al., 2013). As such, each researcher or practitioner uses their method based on their own definition and mental framework. In other words, a sort of “tacit knowledge” or unexplained knowledge is often used in the process of choosing, developing, and tailoring the method. This prevents other researchers and practitioners from deploying the method to a new project. Potential questions worth answering to tackle this challenge include how to choose the right method and how to develop or tailor the appropriate process to execute the project by using one or more methods.

Finally, the field is inherently of interdisciplinary or transdisciplinary nature, that is, a variety of knowledge across different disciplines (e.g., engineering, economics, psychology, and biology) is needed to address the problem being studied. It is thus a challenge to organize and manage collected knowledge in a way that is understandable for researchers, practitioners, and stakeholders involved.

### 3 | APPLYING DESIGN THEORY TO THEORY DEVELOPMENT IN THE FIELD

As one of approaches to addressing the three challenges presented in Section 2, we suggest applying design theory to developing a theory in the field because both of futures and foresight science and design research share strong interests in people’s creativity and thought processes. Our assumption here is that the main purpose is to better understand (I) in Section 2. In this regard, our approach and the Fergnani and Chermack’s (2021) are complementary with each other, where the targeted phenomena are different, that is, the former addresses (I) and the latter addresses (II).

Design theory is about how to understand and model design, while design methodologies are about how to design an artifact (Tomiyama et al., 2009). Whereas the natural sciences are concerned with how things are, design is concerned with how things ought to be, with devising artifacts to attain goals (Simon, 1996). In design theory, with the goal of understanding the designer’s thought process to create an artifact, two types of knowledge are studied, that is, knowledge about design object and knowledge about design process (see Figure 1). In general, the design process is not linear but goes through iterative steps to incrementally develop a design solution in a trial-and-error manner to meet the functional specifications or objective to be achieved.

---

**FIGURE 1** Generalized design process (Adapted from Takeda et al., 1990)

When analogical thinking is applied in the context of futures and foresight, an artifact or design object may refer to, for example, a scenario and roadmap, which are described using text, diagram, illustration, simulations, and so on. Taking scenarios as an example, documented scenarios describing what futures might look like are produced as a design solution through the scenario design process, which is usually very time consuming (e.g., months or a year). The process needs to be prepared by researchers and practitioners for which several options are possible; for example, they may develop their own process from scratch or they may tailor or just use an existing process developed by themselves or others. Related to the design object, some questions that may arise include: (a) what design object can be chosen in the project or exercise and (b) how the validity of the design object can be evaluated in terms of, for example, internal consistency, in an objective and scientific manner. As a concrete solution to deal with (b), we proposed a method for analyzing scenarios from the viewpoint of logicality using graph theory (Kishita et al., 2020).

The design process, in general, refers to the process describing how the design object (e.g., scenario) is created. It contains the designers’ logic or reasoning process when the design object is created. When focusing on futures and foresight, it should be noted that part of the designers’ thought and judgment is often described in the design object (e.g., scenario document), which means that the design object and design process are more or less interlinked. This is partly because people’s creativity and imagination are reflected when producing knowledge about the future. Some questions that may arise include: (i) how the process can be developed to address the problem of interest (e.g., using a $2 \times 2$ matrix to develop scenarios aiming to explore possible futures), which is related to the second challenge mentioned in Section 2, and (ii) how the logic or reasoning process can be represented and developed in such a way that researchers, practitioners, and stakeholders can easily understand them. The latter (ii) is related to the third challenge in Section 2. Since logics is about the theory of reasoning, one promising approach to deal with (ii) is employing logics where inference is classified into three types, that is, deduction, induction, and abduction. In particular, abduction is of importance to describe creative futures that may differ from the present to a large extent because it helps create new knowledge and expands the designers’ thought (Stanford Encyclopedia of Philosophy, 2011; Takeda et al., 1990).

As described above, the application of design theory will provide the opportunity to help formulate research questions to be tackled in developing a theory of futures and foresight. One potential advantage of using design theory is to increase the reusability of various knowledge generated during the design process, including the designers’ reasoning process, thereby leading to more efficient and effective design cycles in futures and foresight.
4  |  CONCLUDING REMARKS

We agree with Fergnani and Chermack (2021) that it is time to accelerate discussions on theory development in futures and foresight, aiming to bring about the bigger impact of the field in society. To this end, we presented some challenges to be considered and suggested using design theory as an approach to addressing them. As the scope of futures and foresight is vast, in this commentary, we narrowed it down to the area where the main question to be tackled is “How is knowledge about the future produced by researchers and practitioners by means of futures and foresight methods and practices?” Nevertheless, taking a divide-and-conquer approach seems a good option to start developing a theory in the field. Still, there is a long way for theory development in the field, but we believe that it would be meaningful to make available several alternative approaches, in addition to the one suggested by Fergnani and Chermack’s (2021) where management and organization sciences are centered on. More discussions with many researchers and practitioners would lead to formulating right questions through which some clues could be found for this very challenging and valuable topic.

ORCID
Yusuke Kishita  https://orcid.org/0000-0001-6773-8227

ENDNOTE
1 We acknowledge that forecasting is an important research topic in the field. Recently, the usage of artificial intelligence (AI), particularly machine learning, and big data is a promising approach to increasing the accuracy of a prediction. Nevertheless, it is not discussed further in this commentary assuming that the time horizon of interest is relatively longer where predicting an accurate future becomes much harder due to a high degree of uncertainty.

REFERENCES
Amer, M., Daim, T. U., & Jetter, A. (2013). A review of scenario planning. Futures, 46, 23–40.
Bradfield, R., Wright, G., Burt, G., Cairns, G., & van Der Heijden, K. (2005). The origins and evolution of scenario techniques in long range business planning. Futures, 37(8), 795–812.
Chermack, T. J. (2007). Disciplined imagination: Building scenarios and building theories. Futures, 39(1), 1–15.
Fergnani, A., & Chermack, T. (2021). The resistance to scientific theory in futures and foresight, and what to do about it. Futures and Foresight Science, https://doi.org/10.1002/ffo2.61.
Glenn, J. C., & Gordon, T. J. (2009). Futures research methodology version 3.0. The Millennium Project.
Kishita, Y., Mizuno, Y., Fukushige, S., & Umeda, Y. (2020). Scenario structuring methodology for computer-aided scenario design: An application to envisioning sustainable futures. Technological Forecasting and Social Change, 160, 120207.
Popper, R. (2008). How are foresight methods selected. Foresight, 10(6), 62–89.
Simon, H. A. (1996). The sciences of the artificial (3rd ed.). The MIT Press.
Spaniol, M. J., & Rowland, N. J. (2019). Defining scenario. Futures & Foresight Science, 1(1), e3.
Abduction (2011). https://plato.stanford.edu/entries/abduction/
Takeda, H., Veerkamp, P., & Yoshikawa, H. (1990). Modeling design process. AI Magazine, 11(4), 37–48.
Tomiyama, T., Gu, P., Jin, Y., Lutters, D., Kind, C. H., & Kimura, F. (2009). Design methodologies: Industrial and educational applications. CIRP Annals-Manufacturing Technology, 58(2), 543–565.
van der Duin, P. (2016). Introduction. In P. van der Duin (Ed.), Foresight in organizations: Methods and tools. Routledge.

How to cite this article: Kishita Y, Kusaka T, Mizuno Y, Umeda Y. Toward theory development in futures and foresight by drawing on design theory: A commentary on Fergnani and Chermack 2021. Futures & Foresight Sci. 2021:00:e91. https://doi.org/10.1002/ffo2.91