Concept of Future Prototyping Methodology to Enhance Value Creation within Future Contexts

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Abstract

This is a position paper to show our research "Future Prototyping Methodology" to help to create knowledge in a future context. This methodology provides a platform to simulate discussions on future situations by utilizing a fiction story. Using this methodology, we create a model to externalize the process of people's thinking including implicit thought for the future. In well-being AI as an emerging research field, the proposed model would be useful to clarify requirements for further advancing well-being AI and show the future by analyzing people's needs for the future.

Introduction

This position paper presents the concept of "Future Prototyping Methodology," which aims to support knowledge creation in a future context. Assuming to hold a citizen workshop, the methodology provides a platform to simulate participants' discussion on future situations. Using this methodology, we create a model to explain the process of people's thinking. On proposing the methodology and the model, we focus on well-being as an inevitable factor for the discussion because it is an essential aspect of happiness for human beings. "Well-being" means "being well and doing well" or "living well itself is good (living a meaningful life)," which consists of *hedonia* and *eudaimonia* (Ryan, Huta & Deci 2008). According to Aristotle, the highest good is happiness (*eudaimonia*), which mentioned that being well is the same meaning as happiness (Nicomachian Ethics). We assume that "being well" means to consider social well-being for the succeeding generations as well as to seek current personal happiness. At some point, a person might change their thinking expanding to future and society. However, the process of how people's thinking on happiness or well-being changes has not been studied enough. Our methodology uses a story as one of the characteristics, which may cause the transformation of thinking.

Although there are many definitions of well-being, the scope of well-being in this paper covers a broad area, including social well-being for future generations and personal happiness for the present generation. Note that, in this paper, well-being and happiness are used interchangeably, including physical, mental, social happiness. The final goal of Future Prototyping Methodology is to create a new model by incorporating a time factor of future contexts into knowledge creation processes, through which we attempt to clarify the process of how participants change their thought when they discuss well-being in a future context.

In the AI (artificial intelligence) community, well-being AI is becoming an emerging research field to understand how AI-related technologies will affect our well-being and quality of life (Kido & Takadama 2018). Well-being AI refers to an AI research paradigm for promoting psychological well-being and maximizing human potential (Kido & Takadama 2018). At present, there are restriction rules on AI, such as Three Laws of Robotics. In order to encourage discussions on how AI research can contribute to well-being, it is necessary to understand people's well-being from multiple perspectives (*e.g.*, social well-being and personal well-being, future well-being and current well-being, etc.) based on human nature, which is sometimes paradoxical, complex and transformative. In the field of well-being AI, the proposed model is positioned as a tool to show the future to achieve well-being based on people's needs for the future.

The characteristic of the methodology is to utilize a fiction story in order to help the workshop participants to describe their future. The fiction story externalizes the participants' implicit thought to generate ideas of desirable

future situations based on their values and mental models, using such as metaphors (Halpern, Eschrich, & Sadowski 2018). Due to its narrative and explanatory nature, the fiction story is effective to notice themselves what they really think in their mind (Johnson 2011; Kohno & Johnson 2011). Implicit thought means descriptive tacit knowledge in a person's mind, such as mental models among two kinds of tacit knowledge. Tacit knowledge includes two meanings; one is undescriptive knowledge such as physical knowledge (e.g., how to ride a bike), and the other is implicit knowledge that can be describe, but not be externalized or unnoticed (Nonaka & Takeuchi, 1995).

The outputs of the workshop are a story describing a future and a future image, which realize metaknowledge of participants' thought. The outputs include the viewpoint of thinking about the future and the knowledge creation framework - a framework of thinking process - that individual will acquire when a person is located in a possible future. This metaknowledge is expressed by a future image illustrated, and a completed story.

From a practical viewpoint, our methodology would promote public engagement in the decision-making process to create a future of their community.

Overview of our Research

Firstly, we present our research question, and then explain the detailed process of the methodology.

Research Question

The participants prototype a future using the methodology in the workshop. There is a question as to whether personal well-being and social well-being are not always identical. However, there is also a question that the identicalness might be happened when people think the future context. It depends the situation whether the participants are egoistic or altruistic. We think, at some point, the participants change to be altruistic to think about the future by expanding their ranges of individual to the context they belong to – future. It does not mean altruistic, but the identical perspective of self and context. When the situation occurs, the participants start to think social well-being for the future. For example, in the case of community planning, residences initially think about the convenience only of themselves, but as parents want to remain the town's tradition and scenery for children, a future perspective will arise. However, there might be conflicts between convenience and conservation, so discussion arises to find their way. We will examine the process of thinking how they change their thoughts and why, and create a methodology of discussion platform. To examine the processes, we define the following research question:

MRQ (Major Research Question): Why people change their thinking for social well-being in the future?

To answer this question, we address the following subsidiary questions:

- What are critical factors to change participants' mindset to think about the future?
- What are critical factors to change participants' mindset to think about social well-being?
- What causes the participants create a good future?

Detail Flow of the Methodology

Figure 1 shows our research overview "Future Prototyping Methodology." The figure shows how to build the methodology and a new model. By repeating this cycle with trial & error, the methodology will have been brushed up and completed. As a result of the analysis during the methodology building, a new model of knowledge creation which incorporated a time factor of future context is proposed.

The detail steps are described below: (The numbers correspond to those in Figure 1.)

(1) As an input, three categories of data are prepared:
1. High level outline of a story,
2. Digital cards of future factors, such as future technology, economy, nature, social factors, etc., and time and avatars of future generations to simulate backcasting/forecasting thinking, which those are to create future contexts. Digital cards have real data and image data those will be parts of OUTPUT.
3. Actual data provided by government, such as white paper and RESAS (Regional Economy Society Analyzing System in Japan)

(2) As a process, experimental workshop is implemented.
1. Participants discuss their future using prototyping image and story to complete, which are offered as input.
2. During the workshop, data is collected for analysis to build a methodology and a model. The data are speech text, output text of the story, gaze and other biological data to understand participants' implicit thinking.

(3) Three outputs are created.
1. Digital image of future context
2. Completed future story
3. Graph generated by actual data as quantitative evidences.

(4) Analyze the data and evaluate the workshop. By doing this, clarify processes when people create knowledge within future contexts.
1. Examine correlation between input and output
2. Examine participation level of participants
3. Examine subjective thinking of participants

(5) The process of the cycle and a prototyping tool is completed.
(6) Using the newly created tool, the cycle is repeated with trial and error, and the tools are brushed up.
(7) Finally, the methodology is completed. The model is also proposed which clarifies the processes of creating knowledge in future context.

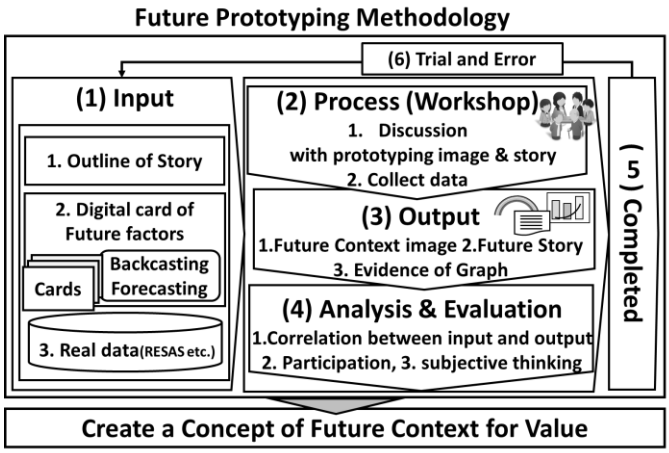

Figure 1. *Overview of Future Prototyping Methodology*

Prior Research

So far, Nishinaka and Shirahada have studied co-creative communication in a workshop in these couple of years which incorporates schemes promoting future oriented and innovative thinking. (Nishinaka, et al. 2017). The results of our research showed the mechanism to generate innovative idea in a team, however, detailed processes of perception encoding of considering future context nor the process of creating a mental image from the perception was not enough. Kishita have conducted empirical research on sustainable service systems in local governments by backcasting. In addition, Masuda's research is included to discuss future context. Finally, we adopted TSR theory to cover the research and the methodology to create knowledge in future contexts. The previous research is described below to clarify insufficient area and uniqueness of our research:

Well-being and Transformative Service Research

Transformative Service Research (TSR) centers on creating uplifting changes and improvements in the well-being of individuals, communities, and ecosystems (Anderson et al. 2013). It has been recognized as a research priority of service research and received attention from the service research community. The concept of well-being includes health status, hedonic values (such as a sense of happiness), and eudemonic values (capability development and utilization). On the basis of a survey on TSR literature up till 2017, Shirahada and Ho (2018) have categorizes TSR related studies into four segments by using two axes – 1) lack/shortage of resources / development of resources and 2) micro / meso and macro. In service research, a service is defined as the application of operant resources (knowledge and skills) for the benefit of another actor (Lusch and Vargo 2014), so it is important to think about the negative and positive impacts on such resources and the resource itself to find and solve well-being related service issues. The concept that this paper argues is about designing future by adding time scale and planning appropriate services to achieving human well-being.

Backcasting

With a drastic change in mind, backcasting is to first clarify desirable/undesirable future endpoints or visions, followed by describing transition paths to connect those endpoints and the present (Robinson 1990). The concept of backcasting is differentiated from forecasting in terms of the starting point; *i.e.*, backcasting starts from a vision whereas forecasting assumes possible futures from the present. There are many practices in backcasting focusing on, e.g., transportation system, energy system, and land use (Kishita et al. 2016).
However, from a methodological perspective, less support has been provided to conduct backcasting. In particular, it is not an easy task to come up with discontinuous changes from the present situation and context.

Future Design

First proposed by Saijo (2015), the concept of future design aims to transform society and people's attitudes for sustainability. The key idea is to create *imaginary future generations* to extract the voices of future generations because, in many cases, sustainability issues inherently encompass conflicts between future and present generations. One typical example is energy system design, where different generations will receive benefits and negative impacts caused by the usage of nuclear power. Assuming that workshop is held to discuss sustainable communities by involving stakeholders (*e.g.*, policy-makers in a local government and citizens), researchers attempt to understand the difference between the two generations. So far, a few case studies have been carried out for Japanese communities (Hara et al. 2015). Future design is complementary to backcasting because it enables to reflect the interest of future generations in the process of describing desirable visions. However, the question about how to facilitate the intergenerational dialog in future design workshops still remains unanswered. This is partly because, in this sort of workshop, there are implicit interactions among participants involved that needed to be examined further.

Context

The proposed methodology requires participants to discuss issues based on future and social context, In terms of Service-dominant(S-D) logic (Lusch and Vargo 2014), ``value arises through the use of offering in a particular context, in conjunction with resources provided by other service providers and this value unfolding extends over time with a consequence of continuing social and economic exchange, implicit contracts, and relational norms." Although the context in this proposed methodology is mainly based on S-D logic, other concepts are also required. In terms of Anthropology, Hall (1976) explains context as a function of communication to transmit meaning. The meaning is made of information and context. The low context communication has the higher percentage of information than the high context one, and vice versa. Besides, from a perspective in Context Aware Computing, Dey (2001) explains that context is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application.

Science Fiction Prototyping (SF Prototyping)

SF Prototyping is a tool using fiction as a way to imagine the future(https://csi.asu.edu/). (Johnson 2011). The methodology of this paper presents an overview story to the participants; however, our method focuses theoretical processes of participants thinking change to create a future by using a story, not focusing the SF story making itself.

Summary

This position paper introduced the concept of “Future Prototyping Methodology” and a model, which supports to create knowledge in a future context and promotes the participants’ thinking of considering social well-being as well as personal well-being by explaining academic background, characteristics and research method. We also proposed a model to clarify thinking process for the future when people seeking well-being, which will also be a requirement for well-being AI should aim.

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