RESEARCH MATERIAL No.291

The 11th S&T Foresight: S&T Foresight 2019

Society in 2040 through the Development of S&T

– Conceptual scenario –

June 2020

Science and Technology Foresight Center
National Institute of Science and Technology Policy

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Summary

1. Background and Objectives

National Institute of Science and Technology Policy (NISTEP) has been conducting "Science and Technology Foresight" every five years since 1971. Since the Science and Technology Basic Law was established in 1995, the study has been conducted according to the formulation schedule of the Science, Technology, and Innovation Basic Plans. Since around the year 2000, back casting or seeking for solution to social challenges has become the mainstream attitude toward science and technology policymaking. To meet requirements from policymakers, there was a change in the study framework from technology or seeds driven approach, where they consider the future of society based on science and technology developments, to society or needs driven approach, where they discuss the better society before identifying relevant scientific and technological issues.

"The 11th Science and Technology Foresight: S&T Foresight 2019" (hereinafter referred to as the 11th Foresight) conducted an examination into science and technology development and the desired society in the future, aiming to provide fundamental information that contributes to the discussion of science, technology, and innovation policies including the 6th Science, Technology, and Innovation Basic Plan.

The structure of the 11th Foresight is outlined in Figure 1. In consideration of the increased complexity of the relationship between technology and society, the study is promoted from the dual viewpoints of science and technology, and society. It is configured to examine "future of society" and "future of science and technology" separately before integrated discussion of both futures for "future images of society brought about by the development of science and technology."

The study of "scenario" aims to create future images of society brought about by the development of science and technology. Based on the future of science and technology (702 science and technology topics) and the future of society (fifty images of society) obtained so far, a framework of the conceptual scenario was established consisting of (1) Target images of society (a vision of the society we wish to create), (2) relevant science and technology (the science and technology relevant for this, and (3) societal issues for discussion (points to be noted in the relationship between science and technology and society). We attempted to draw how the development of science and technology contributes to the realization of a desired society from the citizens' points of view.

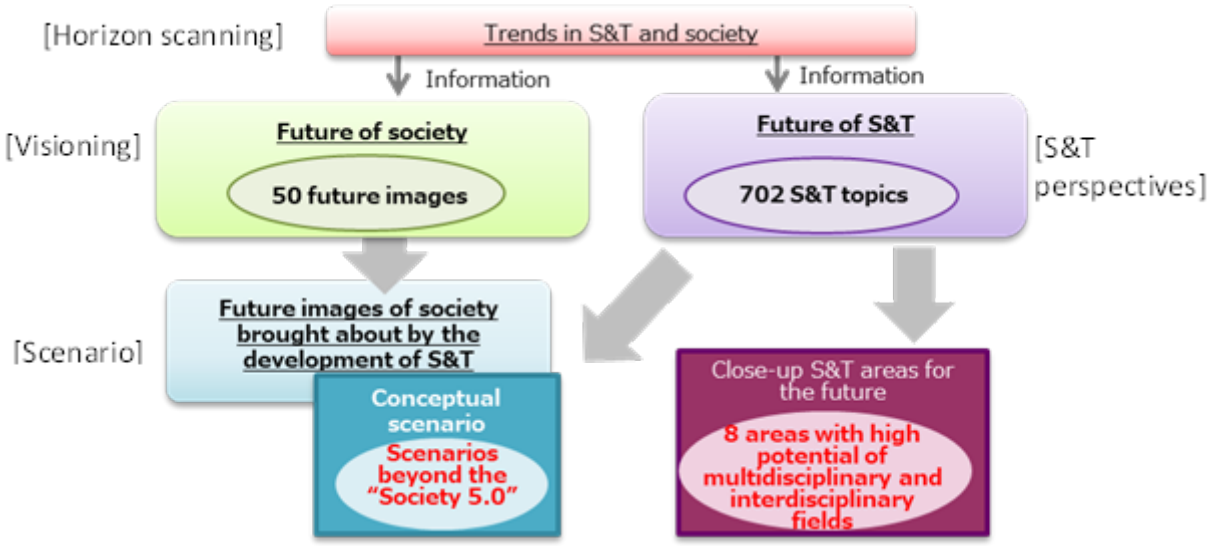

Figure 1. Structure of the 11th S&T Foresight

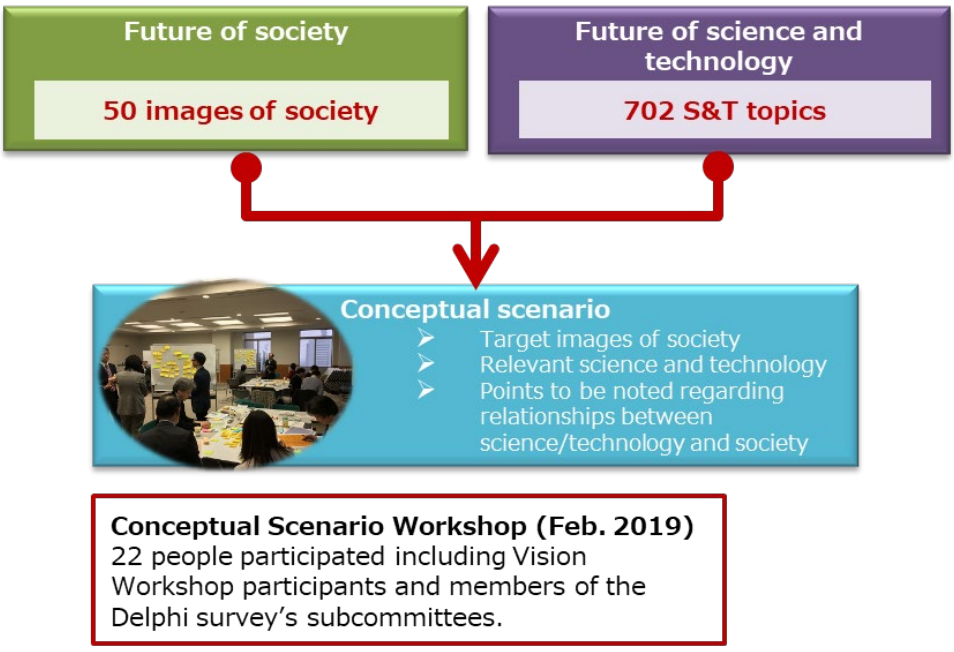

Figure 2. Structure of the scenario building

2. Method

The flow of the study is shown in Figure 3. First, two axes, the axes of individual/society and intangible/tangible, were established as shown in Figure 4. Fifty images of society obtained in “Visioning” were classified and organized into four quadrants.

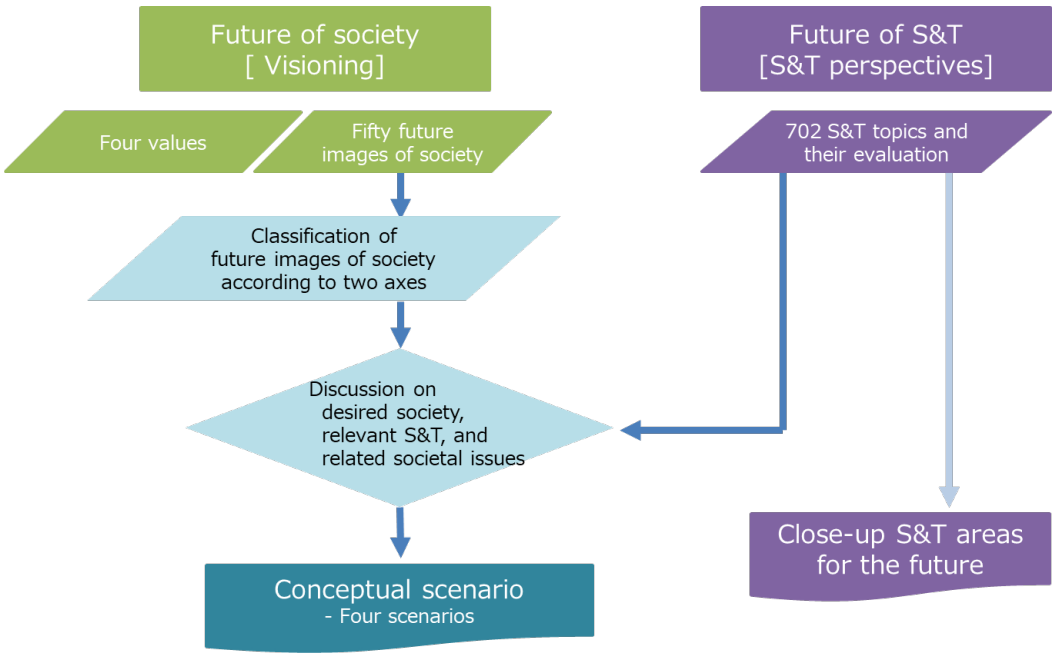

Figure 3. Flow of the study

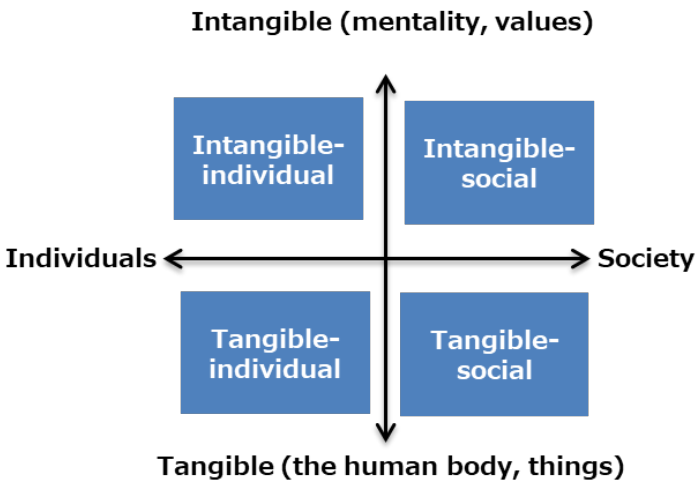

Figure 4. Prepared axes of the scenario

The individual/society axis is established because changes in the state of the individual and the state of society were mentioned in the examination of “future of society”. The intangible/tangible axis is set on the assumption that the presence of intangible things will increase with the progress of “Society 5.0” initiative that has been promoted in the period of the 5th Science, Technology, and Innovation Basic Plan. The individual & intangible quadrant includes values and perceptions, the individual & tangible quadrant includes artificial body parts and health, the society & intangible quadrant includes data, virtual reality, institutions and systems, and the society & tangible quadrant includes equipment, facilities, and resources.

Next, a scenario workshop was held to discuss the issues in each quadrant from two directions: the scientific and technological point of view and the societal point of view. We sketch out a desired society based on the assumption that a wide range of science and technology will progress from the scientific and technological standpoint, and we sketch out a desired society and extract the science and technology that contribute to its realization from the societal standpoint. Four scenarios with desired society and relevant science and technology topics (hereinafter referred to as S&T topics) were created by integrating discussions from two directions (Figure 5). In addition, interviews with experts were conducted to summarize the points to be considered in the relationship between science, technology, and society. Finally, the results of the previous studies were compiled into the conceptual scenario.

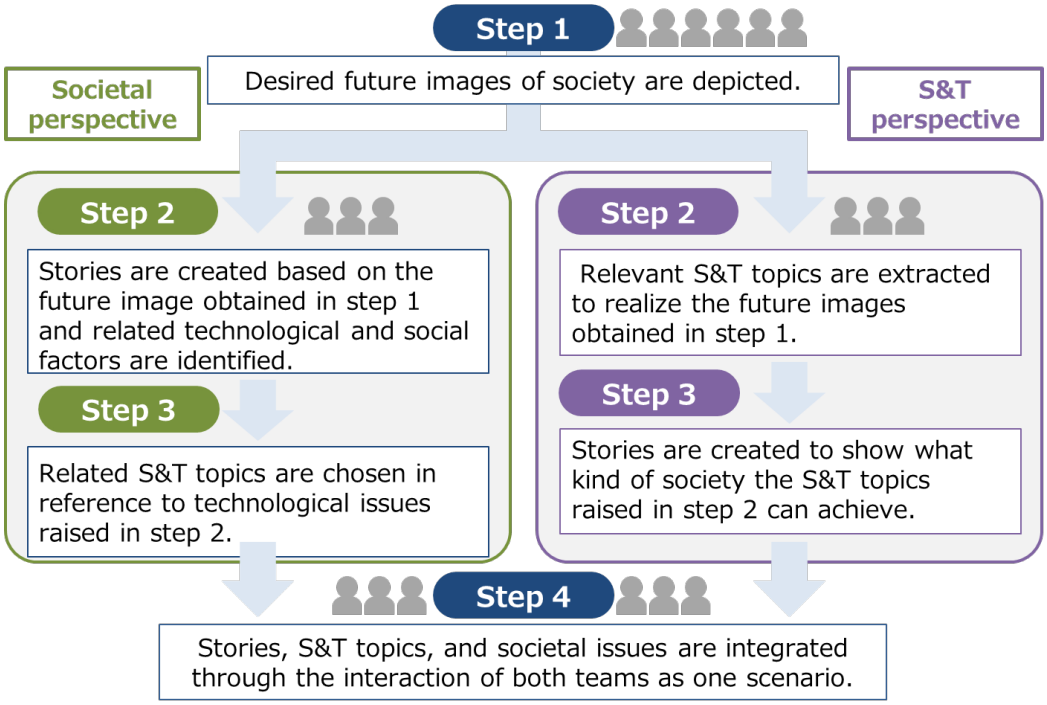

Figure 5. Discussion procedure at the scenario workshop

3. Results

As a result of the study, the following four scenarios with the target images of society to be realized by the year 2040 and relevant technological/societal issues were created. The outline is shown in Figure 6.

"Society of coexistence, rethinking what it means to be human and recognizing diversity"

This refers to a society where mutual understanding is promoted by sharing feelings and experiences through various means of communication, and where people live together while respecting each other's differences. Relevant scientific and technological issues include technology to support community formation, technology for normalization in daily life, and communication support technology.

"Flexible society in which the real and the virtual are harmonized"

This refers to a society where data and knowledge are accumulated, shared, and utilized, and value is created by freely using virtual and real spaces to solve various problems and flexibly respond to rapid changes. Relevant scientific and technological issues include next-generation technologies of telepresence, security, automated driving, AI technology, and interface.

"Society that enhances individuality through fusing the maintenance/recovery of human functions with digital assistance"

This refers to a society where human mental and physical functions are expanded by science and technology, and each person acquires a new "individuality" by expanding their range of activities and their capacities through health management and maintenance according to individual characteristics. Relevant scientific and technological issues include technologies of pathological monitoring, the digitization of jobs, and technology to enhance skills and physical functions.

"Society in which personal customization and general optimization coexist, allowing individuals to have unique lifestyles"

This refers to a sustainable society where a new equilibrium point is found for partial and total optimization, and resources are appropriately allocated and circulated though individuals make their preferred choices without stress and act unintentionally. The related sciences and technologies include technologies of next-generation energy, next-generation infrastructure, global monitoring and sensing, digital manufacturing, and recycling of resources.

When these were compiled, the following vision emerged: humans seek a better way of life in a society; the society provides an environment where diverse people are loosely connected and coexist; and science and technology accompany people gently and support their activities and the society." Therefore, this summed up the society of 2040 as "**Flexible society brought about by reviving and rethinking humanity**" (Figure 7).

Looking at the relationship between science & technology and society, 470 out of 702 S&T topics were associated with the target images of society. More S&T topics were related to the target images of society through discussion from the societal point of view than from the scientific and technological point of view. Especially S&T topics in the fields which seem easy to imagine benefits in our daily lives such as health and environment were shown more often than those in basic fields from the societal perspective. To be specific, more than 60% of S&T topics in the fields of health, medicine, and life sciences; agriculture, forestry, fisheries, food, and biotechnology; environment, resources, and energy are regarded relevant. On the other hand, around 20-50% of S&T topics in each field were related to the target images of society equally through the discussion from scientific and technological perspective.

As for the points to be noted in the relationship between science, technology, and society, the followings were indicated: addressing ethical, legal, and social issues is essential for science and technology to contribute to the realization of a desired society; and forming a social consensus through discussions among various stakeholders is necessary, including experts in the humanities and social sciences.

This study was conducted before the global outbreak of the novel coronavirus infection. However, the "Flexible society brought about by reviving and rethinking humanity" depicted here includes many elements of digital transformation, expected to accelerate in the future and is considered to be a meaningful vision of the society that we should aim for in the age of living with the risk of infectious diseases. Coping flexibly with drastic changes in the future, continuous examination about science, technology, society, and relations among them is required.

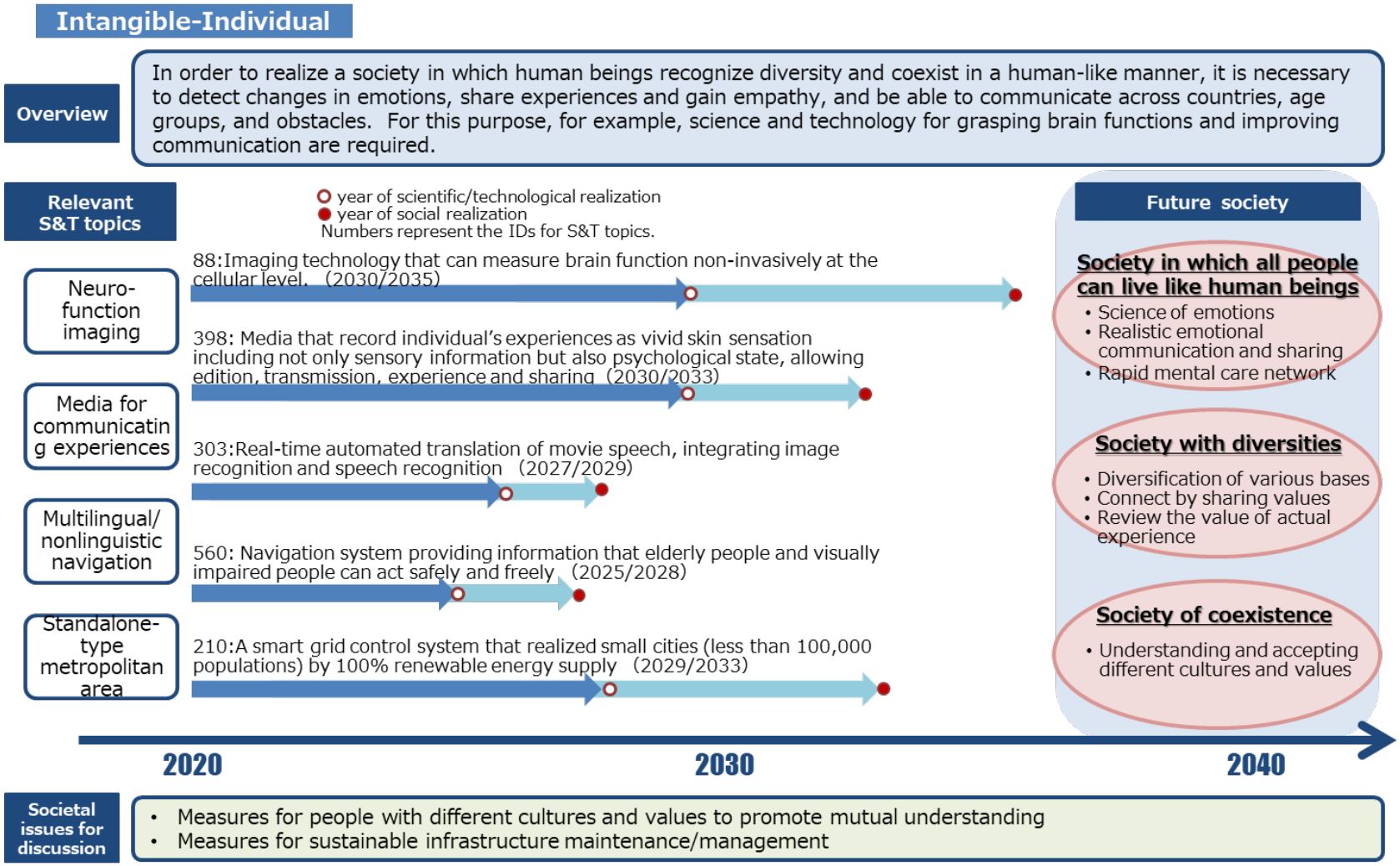

Figure 6-a. Scenario A: Society of coexistence, rethinking what it means to be human and recognizing diversity

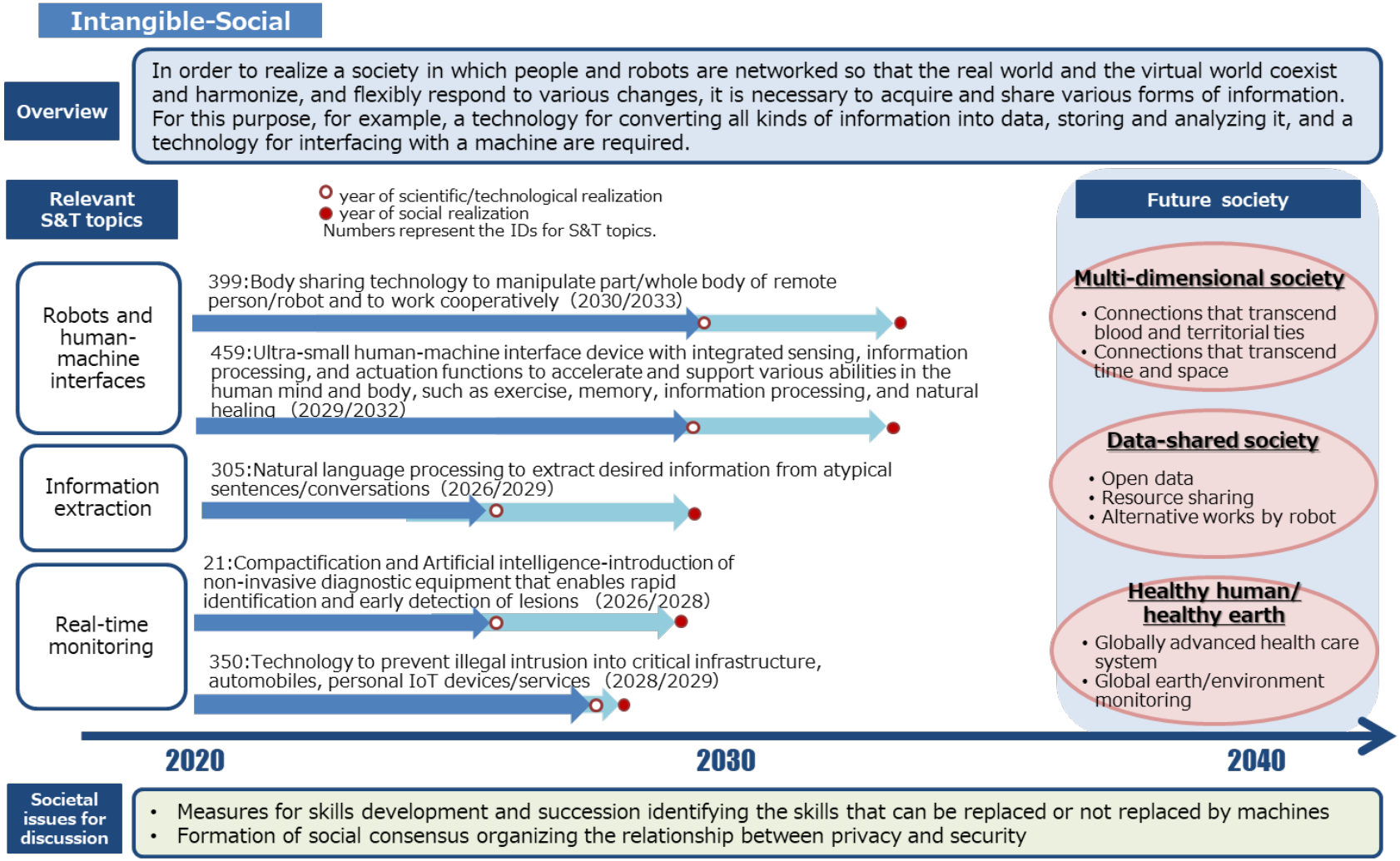

Figure 6-b. Scenario B: Flexible society in which the real and the virtual are harmonized

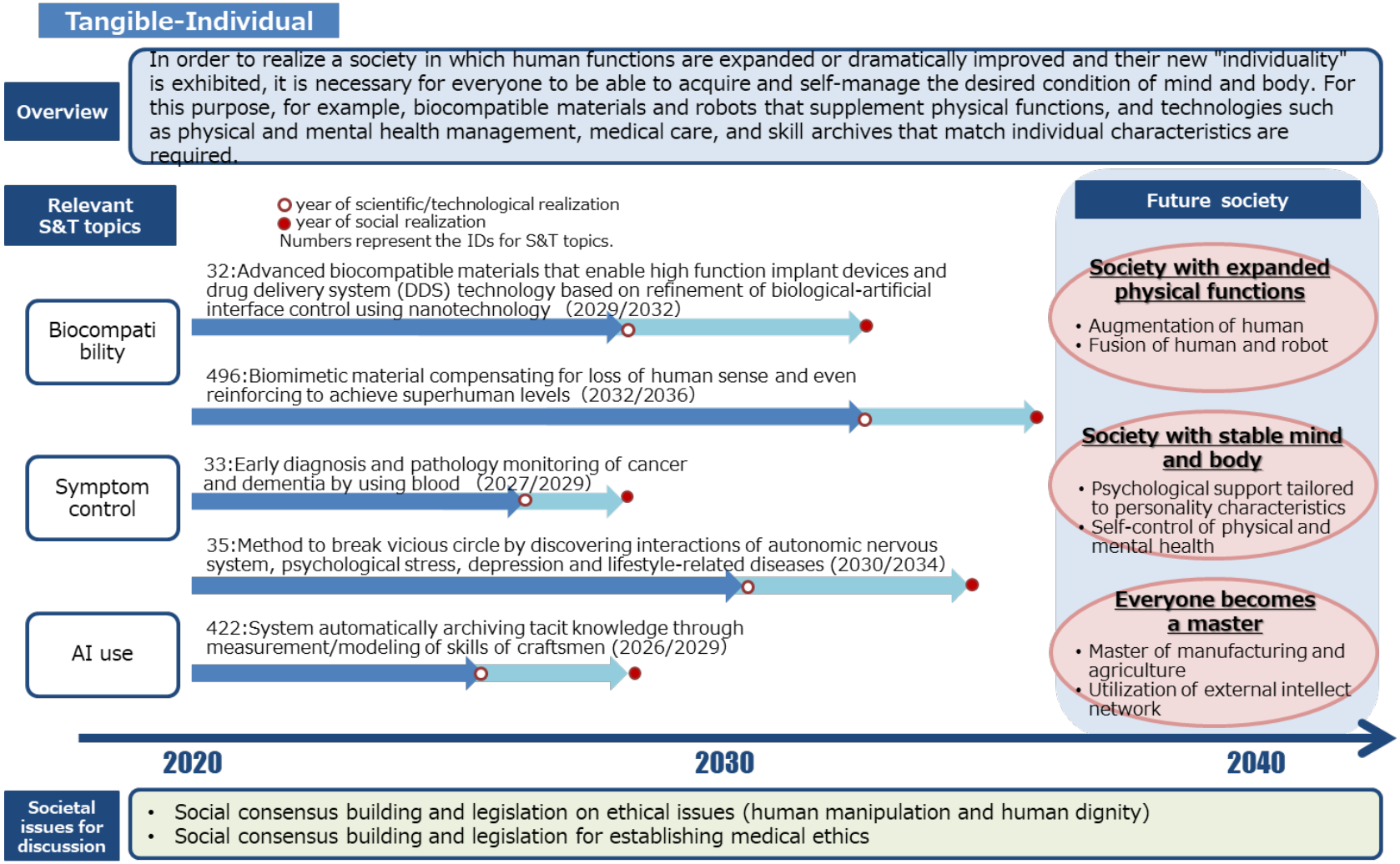

Figure 6-c. Scenario C: Society that enhances individuality through fusing the maintenance/recovery of human functions with digital assistance

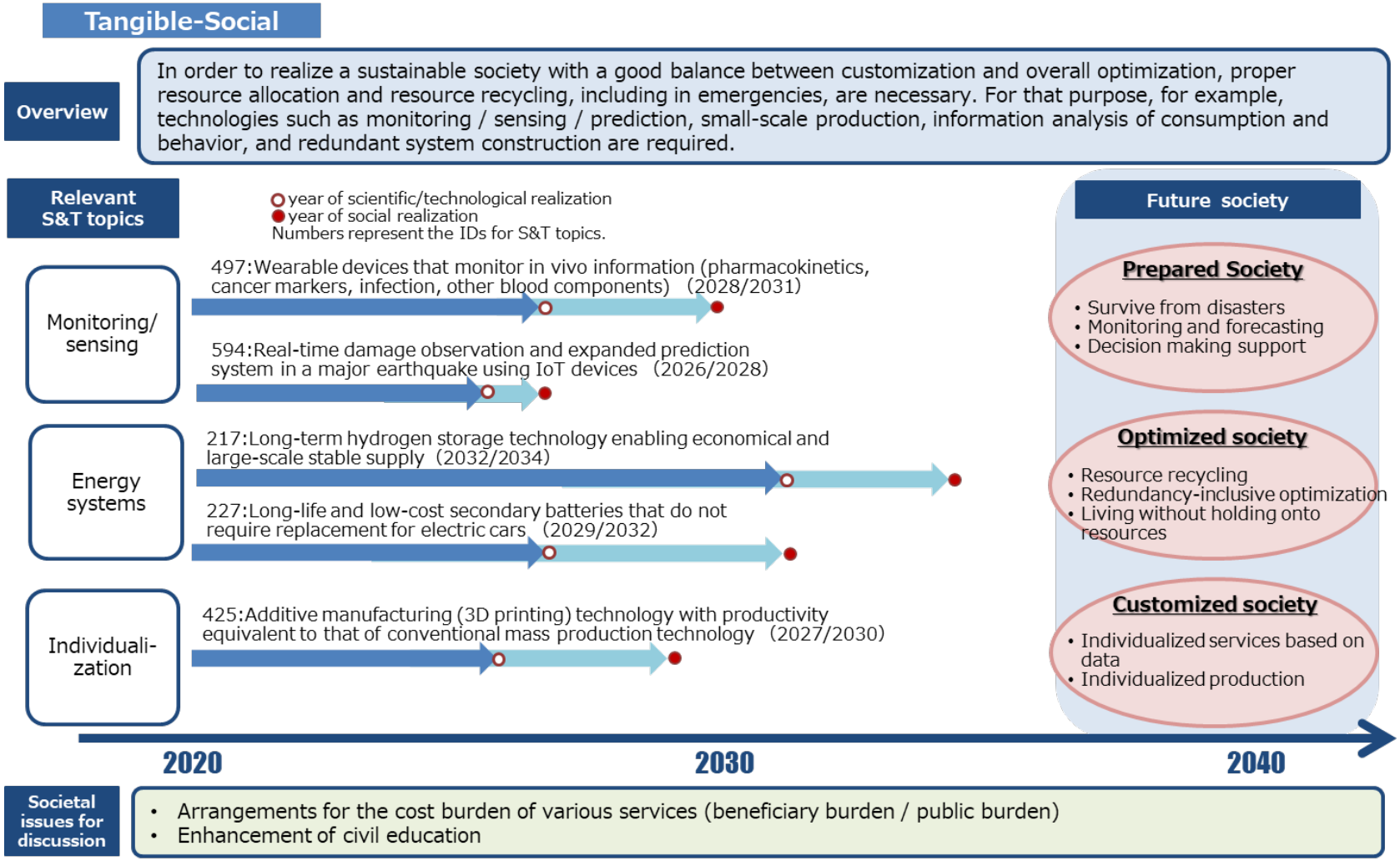

Figure 6-d. Scenario D: Society in which personal customization and general optimization coexist, allowing individuals to have unique lifestyles

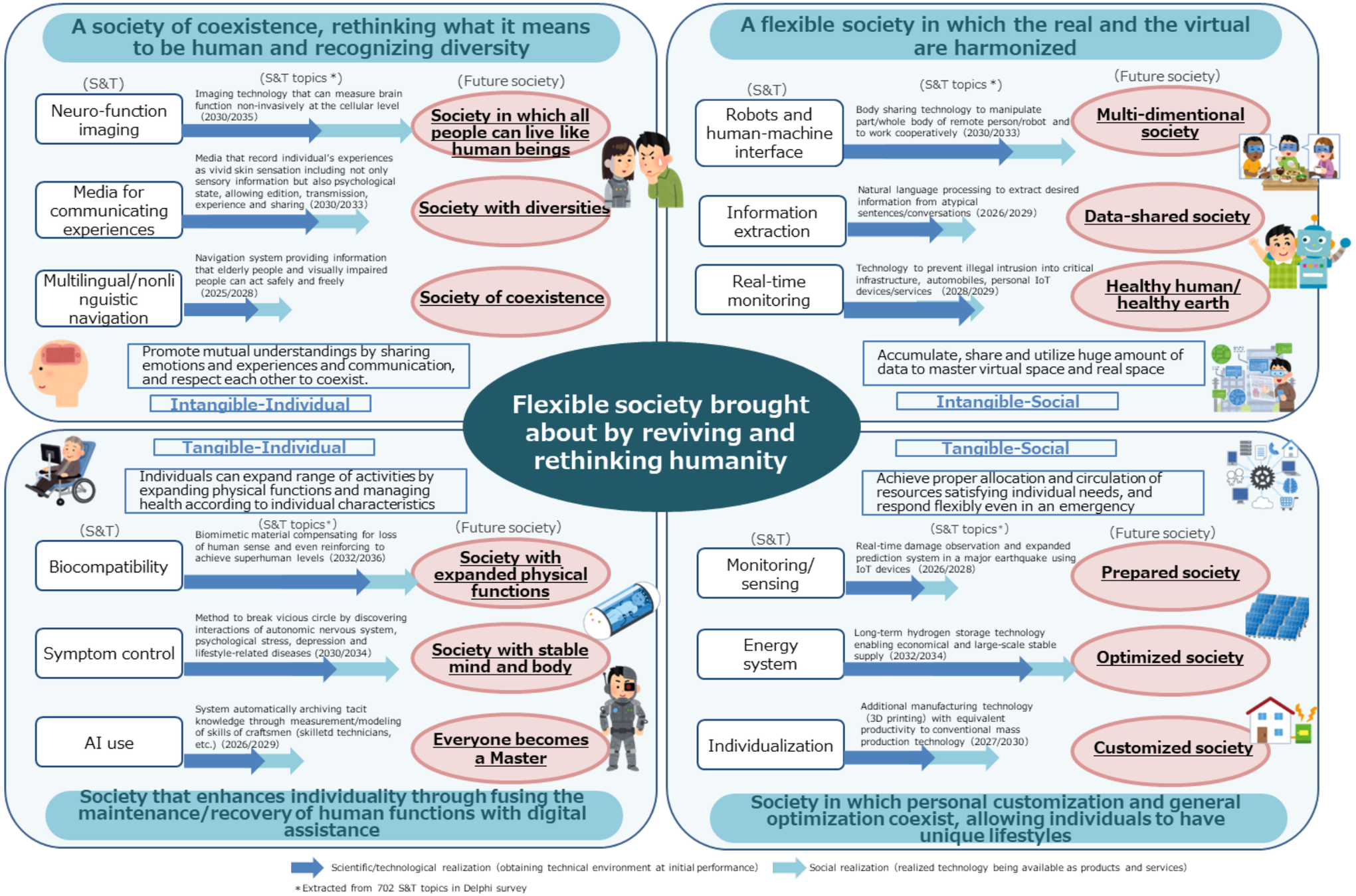

Figure 7. Conceptual scenario

[The 11th S&T Foresight: S&T Foresight 2019 series]

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Delphi Survey, Research Material No.292, June 2020, NISTEP
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Scenario:

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