Moonshot R&D MILLENNIA* Program

*Multifaceted investigation challenge for new normal initiatives program

Initiative Report on Enabling Factors in the Pursuit of Self-actualization for Humanity

July 2021

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I. Concept

1. Proposed MS goal

1.1 Proposed MS goal title

Realization of a prosperous and equitable society that all individuals can pursue diverse self-actualization by 2050.

1.2 Vision for 2050 society

Figure 1: 10 billion people, 10 billion ways to achieve self-actualization
By 2050, living, working, learning, and pursuit of leisure in a world with mechanisms that promote the implementation of both happiness and health (an Enabling World) will be the global standard, and everyone will be able to focus on becoming the person they want to be.

To overcome the societal challenges of modern society, to rebuild a sustainable planet, and to achieve good lives for people, we will create a time and space that optimizes the combination of enabling factors (a concept that integrates the academic disciplines among happiness, health and medicine) and realize a prosperous and equitable society where all individuals can pursue various forms of self-actualization by 205. This requires designing a human-centric global environment that ensures diverse self-actualization in the face of the dramatic population aging, environmental crisis, and hate/inequity that have spurred societal changes in such a short period of time. An effective strategy would be to create a society that fulfills well-being organically as a result of maximizing people's diverse self-actualization through the implementation of intricate mechanisms that drive happiness and health of humanity (**Figure 1**).

This report hereby proposes the “Enabling Factor” as a means to enhance happiness and health. Enabling Factors are defined by social, environmental, and economic factors, which are closely linked to the goals promoted as the Sustainable Development Goals. Identification and effective combination of Enabling Factors will inform how one’s highly variable well-being can be defined. The concept of Enabling Factors will bring an overarching value into politics, education, law, economy, labor, health care, and welfare. As a first experimental model, we aim to develop the "Enabling City (EC)", a core integrated research and development goal that adopts combinatorial Enabling Factors at a functional level. To this end, we will build partnership models for the execution of Enabling Factors into evidence-based, collaborative urban planning that engages all associated policymakers, stakeholders, and residents by bringing innovations into the local governance structure. Proof-of-concept of the Enabling City being established, the Enabling Factors will be valued throughout all the activities that deliver on its social, environmental, and economic goals.

By 2050, living, working, learning, and pursuit of leisure in a world with Enabling Factors will become the global standard in environments around the world, and will create a world where everyone will be content and happy regardless of their health status, pursuing personalized ways for self-actualization. Enabling World will bring the self-actualization of 10 billion people in 10 billion different ways through the realization of human well-being, giving rise to the genesis of a socially equitable economically prosperous, and environmentally sustainable planet.

Glossary

Enabling Factor

Embodied factors that enhance a person's well-being and health, which can include all factors related to society, economy, and environment, and can take on various forms such as products, services, systems, and spaces. (See Figure 8 and Supplementary Table)

Well-being

A personalized state of being health and happiness. The optimal condition can be defined at the individual level through a combination of desired enabling factors.

Equitable Human Well-being

Everyone is happy by their own measure, independent of their health status.

Self-actualization

Human life acquired through life-time exposure or selection of the enabling factors that make oneself happy and healthy. A state in which enables one to do what one wants and pursue who one wants to be.

Enabling City

An urban model built by a large-scale implementation of enabling factors. Evidence-based collaborative planning of enabling a city that will prioritize the voice of local residents and stakeholders by forming a unique partnership model.

Enabling World

A mission to be realized by 2050. A socially equitable economically prosperous and environmentally sustainable planet, in which the concept of the Enabling Factor is implemented throughout all the disciplines, including politics, law, economics, labor, education, medical care, and welfare.

Self-actualization for humanity

A vision to be attained by 2050, in which all the estimated 10 billion people in the world population in 2050 will be able to pursue self-actualization in 10 billion different way, resulting in the state of well-being for humanity.

2. Targets

We set out the following targets to achieve the MS goal " Realization of a prosperous and equitable society that all individuals can pursue diverse self-actualization by 2050."

FY 2050: 10 billion people, 10 billion ways of self-actualization in the world

> Living, working, learning, and pursuit of leisure in a world with Enabling Factors will have become the global standard. Everyone will be content and happy regardless of their health status and will be self-aware and ready to focus on achieving self-actualization. As the Equitable Human Well-being crystalizes, sustainability will be ensured, and a symbiotic relationship – Circular Well-being – amongst humans, organisms, and the planet will be established.

FY 2040: 3 billion people, 3 billion ways of self-actualization in the world

> The concept of Enabling Factors will have been valued in the norms of all activities, including politics, law, economics, labor, education, health care, and welfare. It will drive Enabling Factors to be assigned to all activities of people. This means not only the international development of Enabling Cities, but also the creation of global Enabling Treaties, Enabling Laws, Enabling Management, Enabling Education, Enabling Investment, Enabling Industry, etc.

FY 2030: 10 million people, 10 million ways of self-actualization in Japan and beyond

> The conceptual basis for Enabling Factors that enhance both happiness and health will be established, and each city will be able to generate a score, based on the degree of implementation. This will stimulate urban development based on the concept of Enabling Cities, and accelerate joint research between industries, governments, academia, and private sectors. Moreover, the valuation of the cities where people desire to live and work will be completely transformed, and large-scale migration and mobility of people will begin.

3. Background

3.1 Why now?

[Integral perspective]

Why self-actualization for all humanity now?

With the resolution of wars and conflicts, the development of the international economy, and the improvement of the legal, social, and health care and welfare environments, the world currently works towards a socially equitable environment for living, and there is a trend to focus increasingly on self-actualization. However, this positive progress in the social environment is producing a new set of challenges impinging on humanity, which could be called "modern diseases". For example, with the advancement of digital technology, it is increasingly obvious that a global negative spiral in which innovations in the field of communications created to help people fulfill their own desire for self-actualization, are creating new inequities.[1] Tech giants such as GAFAM (Google, Apple, Facebook, Amazon, and Microsoft) have rapidly changed the way people live and communicate. This has created a dilemma in which homogeneous communities have become more united, while heterogeneity between people belonging to different communities has become more emphasized. The recent COVID-19 pandemic has rapidly accelerated this change, leading to deepening divisions amongst groups, leading to hatred, and even violence, in many places (**Figure 2**). One way to bridge these divides and create a new social consensus is through Diversity, Equity, Inclusion (DEI) based movements, such as LGBTQIA (*i.e.*, lesbian, gay, bisexual, transgender, queer, intersex, and asexual). The understanding of this concept in Japan is, however, less developed than that of the international community, indicating an underlying cultural foundation that makes it difficult to tolerate heterogeneity. In the area of urban development, based on the logic of convenience, the pursuit of profit and equalization, cities with a high degree of homogeneity have been constructed from a macroscopic perspective; and as a result, an environment has been created that marginalizes sub-populations. The frustration and hatred caused by the imbalance and inequality resulting from such a misalignment of values are directed at other individuals, through various media sources. The phenomenon of a return to harmonization, to art and culture, and to protection of the marginalized may be seen as a social expression to resist these trends.

Figure 2: Hyper-communication society
With the development of technology, human society has become more complex and sophisticated, and new barriers have emerged in our daily lives, such as discrimination, environmental problems, and social networking fatigue.

To solve the completely new global-scale social issues that confront us today, we assume that an external environment in which each individual can focus on the pursuit of his or her own values might be a causal treatment, rather than a symptomatic treatment, an approach aimed at

eliminating the issues themselves. In other words, based on the premise that new values and heterogeneity continue to emerge, we consider that the most drastic solution would be to implement conditions in society that would allow all people to fulfil their desire for self-actualization from their own standpoint; that is, "self-actualization for all humanity". To achieve this goal, we concluded that it is essential for all human beings to reach a state of well-being (a situation in which they can focus on self-actualization without social, environmental, or economic barriers). It is necessary to incorporate the realization of a Good Life into the goal, beyond the conventional goal of Good Health through prevention and treatment of diseases (**Figure 3**). If everyone can create a happy and healthy situation and achieve a society with self-actualization, there would be tolerance toward diversity, promotion of mutual aid, and a society where no one is left behind.

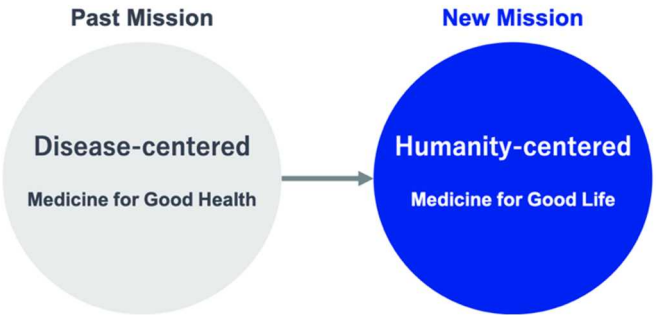

Figure 3: Transformation of Mission
Remove not only illnesses, but also the physical, mental, and social barriers that prevent self-actualization.

[Social perspective]

A. International agenda of social issues

In this age of the Anthropocene, a vicious circle has emerged in which human economic activities are destroying the planet, and the destruction of the global environment itself cannot be ignored if the well-being of each individual is to be reached. To build a future of humanity, the Sustainable Development Goals (SDGs), unanimously adopted at the UN Summit in 2015, consist of 17 goals and 169 targets that are to be achieved by 2030. To date, the SDGs have been referred to as important social guidelines for balancing sustainability and economic activities. Many of these SDGs overlap with the Millennium Development Goals (MDGs), which had been in discussion since 2000. There is still a view that many of the SDGs will be difficult to achieve.[2,3] For example, the "blue economy" associated with Goal 14 has been increasingly used in various ocean sector and development frameworks, but it is noted that achieving sustainability and economic growth requires a focus on social equity, which has been neglected in debates. In a recent paper, Cisneros-Montemayor *et al*. argue that in a development which is often shaped by the goals of both the private sector and funding agencies focus primarily on economic growth, the "blue economy" should include ensuring human rights, access to resources, and equitable distribution of benefits and costs, and it is extremely important to address socially inequitable issues.[4]

We believe sustainable development needs to be reaffirmed as a human-centric development goal, with a shared understanding that it is for the benefit of humanity. Therefore, we consider solving international social issues such as those outlined in the SDGs is limited to ensuring that each citizen enjoys a prosperous life. We believe that a virtuous circle will be created in which people in diverse communities will embody self-actualization in their own way through living a happy and healthy life, thereby embodying sustainability in a way that is localized and specific to each community. Hence, it is necessary to clarify how the SDGs will contribute to the health and

happiness of each person and achieve "no one left behind" sense of well-being. From this perspective, we consider it would be useful to formulate the concept of Enabling Factors, which are social, environmental, and economic factors that contribute to the well-being of all humankind (Figure 4).

Figure 4: The tide of self-actualization for all humankind creates a cycle that creates a sustainable world

B. Urbanization in the world and Japan's megacities

The world's urban population has grown exponentially from 751 million in 1950 to 4.2 billion in 2018, with 55% of the world's population living in urban areas.[5] The urban population is expected to continue to grow, reaching 68%, or approximately 6-7 billion people by 2050.[6] Given this exponential growth, it would be optimal to consider a city as an interface with humans.[7] Currently, the most urbanized regions are North America (82% urbanization rate in 2018), Latin America and the Caribbean (81%), Europe (74%), and Oceania (68%).[8,9] Interestingly, the Tokyo-Yokohama metropolitan area, with 37 million people, is the largest city in the world, and its size is outstanding even when compared to cities in Organization for Economic Co-operation and Development (OECD) countries (**Figure 5**). In addition, 43 megacities are projected to exist in the world by 2030, and most of them in low- and middle-income countries. Demonstrating a role model for sustainable urban development in Japan's metropolitan areas is key to the world's sustainable development and is an extremely high social demand.


世界の大都市圏ランキング（2015年）

順位	都市圏名	国	人口（万人）	面積(km2)	人口密度	備考
1	東京-横浜	日本	3,783	8,547	4,400	OECD加盟国
2	ジャカルタ	インドネシア	3,054	3,225	9,500	
3	デリー	インド	2,500	2,072	12,100	
4	マニラ	フィリピン	2,412	1,580	15,300	
5	ソウル-仁川	韓国	2348	2,266	10,400	OECD加盟国
6	上海	中国	2,342	3,820	6,100	
7	カラチ	パキスタン	2,212	945	23,400	
8	北京	中国	2,101	3,820	5,500	
9	ニューヨーク	米国	2,063	11,642	1,800	OECD加盟国
10	広州-仏山	中国	2,060	3,432	6,000	
11	サンパウロ	ブラジル	2,037	2,707	7,500	
12	メキシコシティー	メキシコ	2,006	2,072	9,700	OECD加盟国
13	ムンバイ（ボンベイ）	インド	1,771	546	32,400	
14	大阪-神戸-京都	日本	1,744	3,212	5,400	OECD加盟国
15	モスクワ	ロシア	1,617	4,662	3,500	
16	ダッカ	バングラデシュ	1,567	360	43,500	
17	カイロ	エジプト	1,560	1,761	8,900	
18	ロサンゼルス	米国	1,506	6,299	2,400	OECD加盟国
19	バンコク	タイ	1,500	2,590	5,800	
20	カルカッタ	インド	1,467	1,204	12,200	
21	ブエノスアイレス	アルゼンチン	1,412	2,681	5,300	
22	テヘラン	イラン	1,353	1,489	9,100	
23	イスタンブール	トルコ	1,329	1,360	9,800	OECD加盟国
24	ラゴス	ナイジェリア	1,312	907	14,500	
25	深セン	中国	1,206	1,748	6,900	
26	リオデジャネイロ	ブラジル	1,173	2,020	5,800	
27	キンシャサ	コンゴ民主共和国	1,159	583	19,900	
28	天津	中国	1,092	2,007	5,400	
29	パリ	フランス	1,086	2,845	3,800	OECD加盟国
30	リマ	ペルー	1075	919	11,700	

（資料）Demographia World Urban Areas: 11th Annual Edition 2015.01

Figure 5: Overview of the world's major metropolitan areas (Top 30)
Tokyo and Yokohama (metropolitan areas) are the

[Scientific and technological perspective]

A. Human well-being research

To realize human well-being, which is the overarching goal of the Moonshot R&D system, it is important to clarify the components of human well-being and, in turn, to identify the essential social, environmental, and economic infrastructures. Conventional health care research has dualistically divided subjective well-being (subjective well-being, happiness, and flourishing) and objective well-being (objective well-being, health). Most of the studies considered them as separate goals.[10–17] For example, in the field of health care (objective well-being), the aim is to overcome intractable diseases based on more advanced medical technology, such as in the areas of cancer, genomics, and regenerative medicine; the number of relevant research papers has steadily increased, leading to the formation of multiple Moonshot goals (**Figure 6**).

On the other hand, as mentioned at the beginning of this report, people can increasingly focus on self-actualization, as the world currently works towards a socially equitable living environment. Consequently, there is an emergent situation where people can hope to be useful in achieving their own happiness and the happiness of their loved ones. With these changes in the social environment, international evaluation standards such as the World Happiness Report issued by the United Nations have been established, and in some countries, constitutions have been enacted. In the field of happiness (subjective well-being), the number of research papers has consistently increased in recent years, and this field is expanding as an academic discipline with more emphasis on spirituality and sociality. In particular, the research field aiming at well-being can be organized from two major perspectives. However, research and development, aiming to improve both happiness and health, which is the goal of the Enabling Factor, is still limited, and there are currently almost no published reports (**Figure 6**).

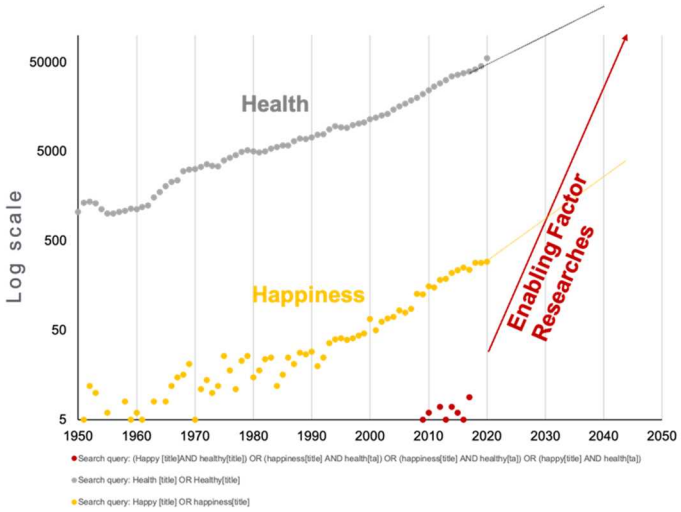

Figure 6: International trends in Enabling Factor-related papers
Health research and happiness research are increasing, but there is almost no enabling research that enhances both.

B. Enabling Factors research in response to changes in disease and social structures

Credited to the epoch-making advances in modern medicine, Japan and other high-income countries are transforming into super-aged societies at an unprecedented speed. This has created a situation which calls for more focused measures to deal with diseases and disabilities in daily life, and life events, such as pregnancy and aging that can handicap daily life, as well as newly emerged health issues as consequences of technological innovation. In just half a century,

medicine, which had developed over 2,500 years since the Hippocrates era, has not only changed into a qualitatively different type of "life-threatening disease", but has also transformed into a complex structure of "livelihood-threatening diseases". Previously, for example, in the case of infections, there was a clear cause in the form of microorganisms, and a clear objective could be set for each disease, as there was a prescribed method of dealing with each disease. Therefore, it was relatively easy to see the direction of solutions in cutting-edge medical research aimed at developing new treatments. On the other hand, for "livelihood-threatening diseases", the onset process is extremely long, and medical treatment is extremely limited in situations where life is at stake. Therefore, although there has been an increase in efforts to prevent these diseases based on methodologies such as preventive medicine, pre-disease medicine, and pre-emptive medicine, the results of these efforts have been limited. We believe that one of the common issues in these research and development efforts is that they used an approach based on the premise of "health". Although efforts to promote improvement of health condition are being recognized as important at an organizational level, the gap is that it is generally difficult for the people concerned to make it on their own, and it does not lead to proactive improvements.[18,19]

We are discovering the possibility of effectively improving these factors through "Enabling Factor research", which aims to improve health by deliberately taking an approach that assumes an improvement in happiness. For example, in 2009, a Volkswagen group conducted a social experiment called Fun Theory.[20] This experiment proved that it is possible to change people's health behavior using public spaces by designing policies that accommodate human enjoyment and happiness. There have been many similar efforts in Japan. For example, a research presents two types of enabling stairs in a train station; one to promote health (**Figure 7-1**) and the other to bring happiness (**Figure 7-2**).[21] The healthy stairs indicated the calories burned on the way up, whereas the happy stairs had a variety of art to enjoy on the way up. The results were overwhelmingly positive, with more people choosing the happy stairs, which suggests the "happiness-conducive information" such as exciting and "fun were more important to people than the "health-related information". Thus, addressing factors that are directly related to the root of people's emotional well-being is effective in promoting health. In other words, using "Happy" as an entry point and creating a pathway from "Happy" to "Healthy" is a form of Enabling Factor.

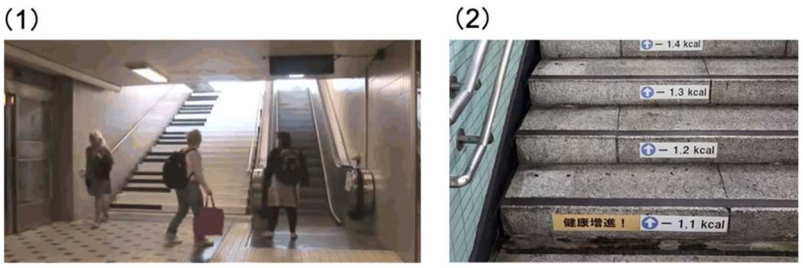

Figure 7: Experiment using stairs in a public space
(1) Enabling Pathway 1: Measures via Happiness
(2) Enabling Pathway 2: Measures via Health
It suggests people may act via Happiness.

Health Japan 21 is "a health policy that will serve as a guidepost for the new century, i.e., a national health promotion movement based on a new way of thinking to realize the health of each and every person living in Japan in the 21st century."[22] As exemplified by this policy, health issues such as lifestyle-related diseases in today's society are designed to set specific health-related goals, such as mortality, morbidity, lifestyle risk factors, etc., and to provide sufficient information so that each individual or the people around them who support them will make constant efforts. However, the question of how to achieve effective health remains unresolved. We should not focus on the health issue as a stand-alone problem to be solved. Rather, we propose a new hypothesis that health can be promoted through the process of pursuing happiness, or as an outcome of achieving it. In a society where such a concept is implemented, health issues will be solved in ways that were previously unimaginable (**Figure 8**).

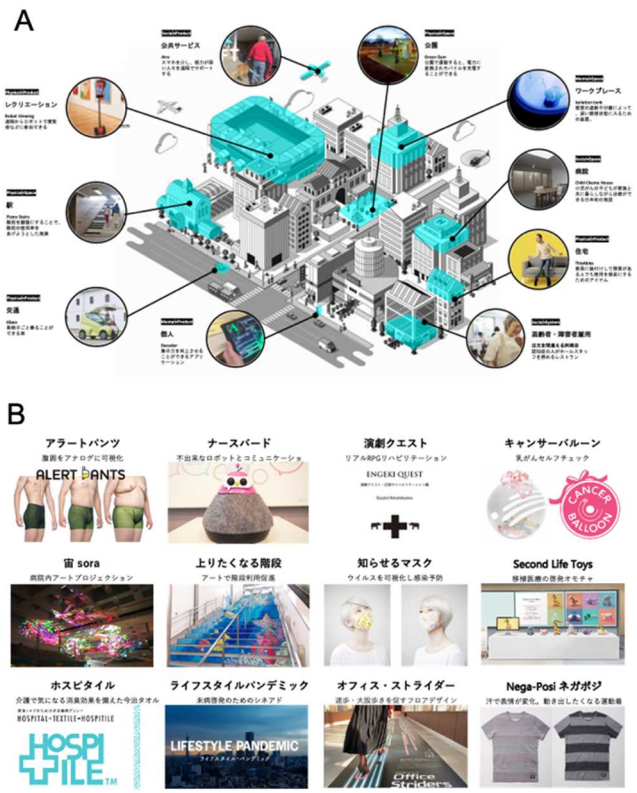

Figure 8: A Society in Pursuit of Happiness
A: Image of Enabling Factor Implementation
B: Measures implemented by the Communication Design Center, Advanced Medical Research Center, Yokohama City University

3.2 Social significance

In the Moonshot goal, we will build a theoretical foundation for the concept of Enabling Factors that encourage people's well-being. Consequently, social, environmental, and economic factors that contribute to human well-being will be discovered and developed one after another, incorporated into every aspect of life, and envisioned a future in which they will be implemented in society. Using the Enabling City as an empirical model as a theme, we will strengthen the means of implementing the Enabling Factors required in various aspects and build a partnership model for value co-creation.

In future, if the Enabling Factor can be horizontally deployed in every corner of society such as politics, law, economy, labor, education, health care and welfare, and the well-being of all humankind can be realized, we will be able to create a society where no one is left behind and self-actualization is possible. In other words, happiness and health are organically realized at the individual level, and when human beings are fulfilled, a society that can accept diversity would be built. There will be a tidal wave that creates a world in which economic activity is active while the sustainable environmental design is installed, and the creation of a circle in which the social issues facing the planet are resolved autonomously, meaning the achievement of Circular Well-being. (**Figure 9**).

Figure 9 : Circular Well-being

3.3 Action outline

In order to formulate the concept of Enabling Factors that enhance both happiness and health, and to work as a norm for all activities such as politics, law, economy, labor, education, health care and welfare, we set out an integrated goal of Enabling City and plan for social implementation. Enabling Cities are an interface with people with the capability to encourage well-being for everyone. Since synergies must be generated to lead to sustainable development, in addition to the mechanism of partnerships across various sectors (e.g., industry, government, academia, and other public and private sectors), we make full use of rapidly advancing digital technology. However, it is necessary to create a system to maximize real-time and agile properties and not leave people's voices behind.

Efforts for social implementation are the key in order to achieve the social vision we are aiming for, in addition to the theory construction and development research of the Enabling Factor. Therefore, by focusing on cities in the efforts for social implementation in this proposal, we will discuss what kind of efforts are needed for people in what sector(s) other than researchers. As a city is a complex structure consisting of the most diverse stakeholders, it would be relatively easy to transfer to other fields by making it possible to define the state of relevant local governance.

For example, the stakeholders in a city are diverse, such as the municipality under its jurisdiction, the countries that support it, developers such as general contractors, residents, workers, visitors, and tenant companies and retailers who use the city. The government is promoting the creation of an environment at the national level where private businesses can easily enter by deregulation such as the introduction of the Park PFI system due to the revision of the City Park Law. When implementing the Enabling Factor, it is important to position the Enabling City being an extension of this effort, and proceed with discussions on the revision of the Road Law and Road Traffic Law and the relaxation of road structure ordinances. As this proposal also includes elements aimed at improving health, it is necessary to organize a study group that brings together relevant ministries and agencies such as the Ministry of Health, Labor and Welfare, the Ministry of the Environment, the Ministry of Land, Infrastructure, Transport and Tourism, and the Ministry of Economy, Trade and Industry.

Municipalities and developers, businesses that provide services, and users (citizens) are members of Enabling City. Innovations in local governance, described elsewhere in this report, will be needed. It is required to establish the contents and methods of passing information owned by each, and to build an architecture including incentive design for each.

Moreover, for the self-propelled operation of Enabling City, the division of functions of think tank-like organization, fund function, and content service provider will be the engine. Since it is indispensable to promote the involvement of private companies that provide content services of the Enabling Factor, new ways of securing funds and investing (fund function) to improve the entry environment including, for example, Happiness Impact Bond, which will be detailed in section 5. ELSI.)

Furthermore, it is necessary to update the conventional urban design concept by adding the viewpoint of Enabling Factor and build a prototype of an innovative urban development method. For that purpose, after selecting a model city, a general incorporated association with a think tank function that is responsible for research and development of know-how for Enabling City, sharing of information and know-how between areas, creation of indicators, promotion activities, etc.

By having this think tank organization and an organization with a fund function, it will be possible to expand the concept of Enabling Factor to all aspects such as politics, law, economy, labor, education, health care and welfare, etc.

4. Benefits for industry and society

Starting with the Enabling City, in a world where the identified Enabling Factors are substituted and embedded into every corner of the environment and life, the social and industrial structure will be renewed. For example, if generosity (donation, angel investment, volunteering, etc.), which is currently suggested as an Enabling Factor through a preliminary validation study, is proven to increase health and happiness, the city will be filled with devices that facilitate generosity (**Figure 8**). Moreover, if the context and significance of consumer behavior are expanded, and consumer goods that have been considered to fulfil immediate needs are found to be effective tools for Enabling Factors, the nature of the market may be fundamentally changed.

In response to the formation of such a new market, there would be the creation of a series of enabling industries.

It has also been suggested that efforts to solve social issues such as the SDGs (including the promotion of clean energy, conservation of marine and soil resources, measures to combat global warming, peace and justice, and the realization of diversity) will contribute to the happiness of at least some people. Furthermore, if we can ensure that self-actualization is achieved through Enabling Factors, these will no longer be the object of endurance or effort, and the actions taken by people to achieve their happiness will naturally contribute to the construction of a sustainable world; thus, a world with a new circle will emerge.

II. Analysis

1. Essential scientific/social components

In approaching the realization of human well-being, we define Enabling Factors as factors that enhance both subjective well-being (hereinafter referred to as "Happiness") and objective well-being (hereinafter referred to as "Health"). On the other hand, we believe that Enabling Factors can be roughly categorized into two types based on their mechanisms of action (**Figure 10**). (1) **Happiness-driven Health Act**: Enabling pathway 1, and (2) **Health-driven Happiness Act**: Enabling pathway 2. The latter mainly includes advanced research and development in the fields of medicine, dentistry, and pharmacology (Moonshot goal 2), preventive medicine, health and welfare measures for disabled and older people (Moonshot goal 7), and health and sanitation measures for emerging and re-emerging infectious diseases. We will deepen our analysis of domestic and international trends in the former (1), given that it has not yet been addressed.

An important aspect of the science of Enabling Factors is how we conceptualize “happiness”. The definition of happiness has been a center of debate since time immemorial.[23] Even today, academic definitions of happiness are not uniform. There is a general understanding that the meaning, perception, and form of happiness varies amongst individuals, cultures, and societies.[24]

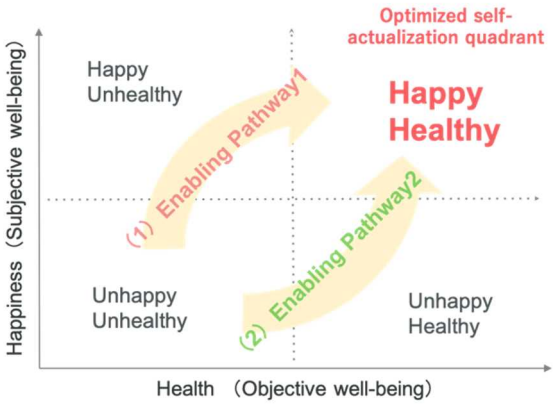

Figure 10: Two mechanisms of action of Enabling Factors
Enabling Factors can be separated from economic, social, and environmental factors, but they can also be divided into two broad categories based on their mechanisms of action.
(1) Enabling Pathway 1: Happiness-driven Health Act
(2) Enabling Pathway 2: Health-driven Happiness Act (Health via Happiness)

In recent years, however, international organizations such as the United Nations (UN) and the OECD have been actively attempting to depict the state of societies and countries in terms of happiness through the creation of happiness indices, to highlight what Gross domestic product (GDP) figures have overlooked.[25] One can say that the measurement of happiness has taken precedence over the definition of happiness. The best-known example of measuring happiness is the World Happiness Report, which the Sustainable Development Solutions Network (SDSN), a UN research organization, began compiling, analyzing, and publishing in 2012. The report publishes the results of polls asking thousands of people in more than 150 countries and regions to rate their happiness on 11 levels, with “10” being the highest level and “0” being the lowest. The average score for the past three years is ranked and published.[26] The Cabinet Office in Japan also decided to establish indicators of “people's happiness” and “people’s satisfaction and quality of life”.[27,28] Cabinet Office launched the development of a dashboard of indicators concerning “people’s satisfaction and quality of life”.[25]

Subjective well-being, which directly asks people how they subjectively evaluate their lives and how satisfied they are with their lives, is currently becoming a mainstream, rather than measuring happiness itself. The mainstream of measurement is subjective well-being. In this case, the Satisfaction with Life Scale (SWLS) developed by Ed Diener, known as the "father of happiness studies", is widely used as a comprehensive index of subjective well-being.[15] Questions have arisen concerning the validity of the SWLS, as it was developed mainly in Europe and North America, and there are cultural differences as to how people perceive happiness, and how they rate the items in the questionnaire. However, the accumulation of evidence, mainly from studies in psychology and economics, has led to the creation of a scale of subjective well-being and related concepts that is reliable to some extent.[30]

What we perceive as the biggest gap in happiness studies is neither the establishment of a definition of happiness nor the creation of an appropriate index for the evaluation of subjective satisfaction, but the fact that the measured happiness values do not provide insights into recommendations on future improvement. In other words, the findings from the measurement of happiness are not granular enough to identify the best way to intervene at a country, region, or individual level. Most importantly, it is not clear whether these results can truly realize happiness for each individual. Maeno Takashi, one of Japan's leading experts on happiness, believes that the SWLS alone cannot help us analyze the diversity of happiness amongst people. He therefore developed his own scale and succeeded in grouping and aggregating the psychological factors that categorize the various forms of happiness of people into four types. By identifying which of the four factors is lacking, the results of happiness analysis can be put into practice. One can say that this is a groundbreaking attempt to conduct happiness realization research which leaves no one behind.[31]

Our proposed concept of Enabling Factors focuses on designing environments that can enhance both people's happiness and health. Meno’s four factors (i.e., self-actualization and growth, connectedness and gratitude, foresight and optimism, and independence and one’s own pace) are determined according to the mental characteristics of happiness, as aforementioned. To add more practicality to these factors, for example, for those who lack the mental factors of "connectedness and gratitude," it is necessary to design an environment that enables the mental factors of "connectedness and gratitude" (tools that make it easier for people to connect, and an environment that makes donations more accessible). Only through the identification of the Enabling Factors, which are the environmental designs necessary to achieve the four mental states of each individual, and through forming a logical path to implement the factors optimized for each individual, we will be able to draw a scenario for the realization of happiness and health for all humankind. In this respect, research on the discovery and development of Enabling Factors has the potential to push the practicality of happiness studies to a higher level.

Moreover, to confirm the effectiveness of the exploration of Enabling Factors, we focused on 37 OECD member states and analyzed the data with the aim of first closely examining trends in Enabling Factors in high-income countries with a view to future urban development. We plotted Life Expectancy on the horizontal axis as one of the data reflecting health (we have confirmed that there is a similar trend in Healthy Life Expectancy) and Life Satisfaction on the vertical axis as data reflecting happiness. The plot shows Japan is ranked at the bottom amongst the OECD countries in terms of happiness, but has the highest level of health in the world, and can be grouped as an Unhappy Healthy country. Furthermore, to identify factors related to the **Happiness-driven**

Act, we extracted items from World Bank data, World Happiness Report data, OECD data, etc. that showed a high correlation in the Happy Healthy group. We found that several selected factors have an important position within the MDGs/SDGs. For example, generosity, social support, gender equity, and corruption were found to be highly correlated. The importance of enhancing women's participation and fairness pertinent to SDG targets 5 and 16, and the fact that the goals set in Environmental, Social, and Governance (ESG) elements, which have become increasingly important as corporate management strategies in recent years, may function as **Happiness-driven Act** in the first place.

In addition, using highly granular data that can be evaluated at the city level, we re-analyzed survey data on happiness and consumption in Japan aiming to identify factors that could become the **Happiness-driven Act** from the consumer perspective. Specifically, we evaluated the individual data from the 2020 Cabinet Office Survey on Satisfaction and Quality of Life[25] and the consumption expenditure data from the 2012 Japan Statistical Yearbook, Statistics Bureau, Ministry of Internal Affairs and Communications.[32] Consequently, as shown in **Figure 11.B**, it became clear that there is a large variability in the level of happiness amongst cities, and that there is no obvious correlation between the size and location of cities, suggesting the existence of unique factors. In recent years, the findings arising from happiness studies have suggested that spending on non-essential goods such as clothing and leisure experiences (non-essential spending) leads to higher levels of happiness, compared to spending on essential goods such as housing and cars (essential spending).[33] Therefore, we conducted an analysis of consumption by expense item as a factor that defines the city-specific Happiness-driven Act. As shown in **Figure 11.C**, there is a high correlation between non-essential spending on clothing and footwear, health care, education, entertainment, and food.

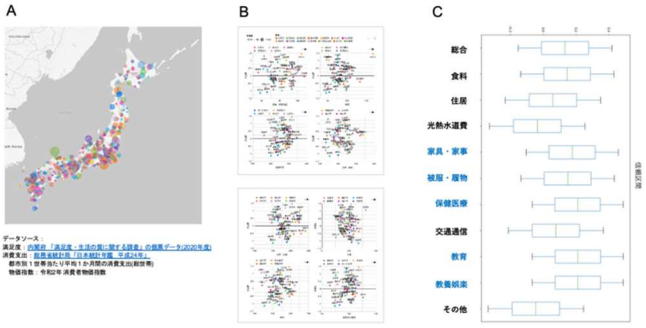

Figure 11: Consumption and experience-related behaviors can enable people's lives and satisfaction
A: Happiness mapping in each city
B: Spending by category and happiness in each city
C: Contribution as an Enabling Factor

In future, to stimulate Enabling Factor research focusing on the Happiness-driven Act, which has not yet been fully developed, it would be effective to build a value base such as Happiness Life Expectancy, in addition to Healthy Life Expectancy, to measure its effect more directly. In addition, research and development based on the discovery and implementation of Enabling Factors will become more active. We believe that the health promotion effects (e.g., primary, secondary, and tertiary prevention of diseases and extension of Healthy Life Expectancy) brought about by “Happiness-driven Health Act”-oriented interventions should be crystallized by new research in future.

Based on the results of domestic and international analysis on Enabling Factors, we identified seven key points:

1. Japan's level of happiness is remarkably low, making it ideal for verifying the effects of the Happiness-driven Act.
2. While both subjective and objective indicators for health are well developed, evaluation systems for happiness are scarce and subjective.
3. For the research and development of the Happiness-driven Act, it is effective to establish an evaluation system such as Happiness Life expectancy in addition to Healthy Life Expectancy.
4. Many of the factors related to the Happiness-driven Act are positioned as targets to be achieved in the SDGs and ESG.
5. The results of domestic city-by-city evaluations suggest that designing measures through consumption, such as non-essential spending, will promote the Happiness-driven Act.
6. By considering the interaction between the goals in the social issues faced by the SDGs, etc., it is suggested that factors that enhance sustainability may contribute to the realization of people's health and happiness.
7. There are few examples of implementation of Enabling Factors for the Happiness-driven Act, and quantitative verification of the effect of improving health outcomes is needed.

2. Science and technology map (R&D Overview)

In the Moonshot goal, we aim: "**To deliver Enabling Factors that enrich the lives of all people, everywhere in the world, and to contribute to sustainable development through these efforts.”** To achieve this goal, the following three R&Ds must be addressed.

1. Establish Enabling Factor Theory

We will build a theoretical foundation to define a completely new conceptual system of Enabling Factors. Together with experts in public health, happiness and health studies, data science, and other fields, we will review conventional well-being and attempt to redefine the various ways of well-being of individuals by combining aspects of Enabling Factors.

Example of R&D items:
Discovery of Enabling Factors; Defining Happy Life Expectancy; Correlation analysis between well-being and Happy Life Expectancy; Development of enabling scores by city / country; and Development of effect prediction method.

2. Research and Development of Enabling Factors

Although there are some international examples of what could be called Enabling Factors, there is still an overwhelming lack of examples. We will select an area of intervention from the social, environmental, and economic fields, and repeat small-scale demonstrations in collaboration with creators, experts in each field, and public institutions such as local governments.

Examples of R&D items:
Development of Enabling Factors; Achieving POC (Proof of Concept) through small-scale social experiment; and Cost effectiveness analysis.

3. Societal Implementation of Combinatorial Enabling Factors

We will develop a methodology for introducing multiple and convergent Enabling Factors at the macro level and build the foundation of a partnership model for social implementation that can be implemented in any city. We will conduct research and development on co-creation infrastructure to ensure the enhancement of the value of Enabling Factors, such as grand design with local governments, institutional and organizational design that encourages the participation of the private sector, collaboration with neighborhood associations and councils responsible for city management, and digital mechanisms that incorporate the voices of citizens.

Example of R&D items:
Construction and operation of agile urban development management corporation;
Systematization of enabling incentives; and Development of digital poll system.

3. R&D trends and Japan’s position internationally

1. Establish Enabling Factor Theory

To date, there has been no research that attempts to conceptualize the Enabling Factors themselves. There have been studies in the past to define happiness, health, and wellbeing, which are important in considering the Enabling Factors. International trends in happiness include the aforementioned Satisfaction with Life Scale (SWLS)[34], which directly asks about subjective satisfaction with life and living, and emotional well-being, which asks about short-term emotional happiness and enjoyment with eight items each for positive and negative emotions.[35] In addition, based on the concept of subjective health[36] there are indices for subjectively assessing one's own health status rather than medical health status, and health indices that capture the overall health status that cannot be expressed by objective indices such as mortality rate and prevalence rate. In recent years, research on the relationship between subjective health and objective medical health has become more active.[37]

As a pioneering example in Japan, Maeno *et al*. at Keio University developed a 16-item questionnaire for Japanese people that reflects the results of factor analysis of happiness.[34] With the advantage of having a universal health insurance system, there is an extremely rich collection of data on public health and health statistics, even internationally. For example, (1) premature life expectancy index (an index that indicates how much healthy life expectancy is lost due to death caused by disease or injury, using healthy life expectancy as a standard), (2) disability index (an index that quantifies the impairment of healthy life expectancy due to various limitations in daily life that do not lead to death. Indicators of disability include the bedridden rate, intellectual, mental, physical, masticatory, visual, and hearing disabilities), and (3) a comprehensive index of early-life disability (an integration of the indicators in 1 and 2 above. Disability adjusted life years (DALY) and Disease free life expectancy (DFLE)), (4) QOL indicators (QOL indicators are indicators of quality of life even when no disability appears in daily life. (4) QOL indicators (which evaluate whether a person is living a daily life that is worth living and allows him/her to achieve self-fulfillment, even if there is no disability in daily life). It includes indicators that quantitatively evaluate the status of Quality of Life.[38] In addition, since it is expected that the values of happiness and health will differ greatly from person to person, the emphasis will shift to research on factors that change these values and their causality, such as Enabling Factors, in addition to research on evaluating the happiness and health of individuals, as has been done so far. By shifting our focus to research on Enabling Factors, we can expect to develop countermeasures that will directly lead to the resolution of various well-being issues that we face today. As research on Enabling Factors is promoted, it will be necessary to efficiently assess the degree of Happy-Healthy. In doing so, it will be important to conduct surveys on the level of happiness and health, taking into account the uniqueness of Japan, as the cultural characteristics of the people are important when analyzing them.

It will also be important to gain recognition in the international community by devising an optimal analysis method for the results obtained. For example, indices that focus on health and well-being, such as the Walkable Score, Livability Index, and Healthy Street Index, have gained international recognition, and some of them have come to be reflected in real estate prices and influence the actual architectural design process in the form of WELL certification, etc. [39–50] (**Table 2**). From this perspective, it is necessary to develop an enabling score that is easy for people to understand and highly visible. In the construction of The Enabling City, an integrated empirical model, it is desirable to utilize a number of Enabling Factors in collaboration with stakeholders. Japan has a number of high-growth industry sectors, such as the arts, entertainment, sports, and creative

industries, and by designing an urban development model with these industries at its core, it is expected that a highly competitive international city model will be established at an early stage.

Name	Entity	Outline
Global Power City Index, GPCI	Mori Memorial Foundation Institute for Urban Strategies	The Global Power City Index (GPCI) is a ranking of the world's major cities based on a multifaceted evaluation of their "comprehensive power" in the six areas of economy, research and development, culture and exchange, residence, environment, and transportation and access.
Japan Power Cities	Mori Memorial Foundation Institute for Urban Strategies	Six areas (economy/business, research/development, culture/interaction, lifestyle/living, environment, and transportation/access) are defined as the elements that constitute the power of each city in Japan, and 26 groups of indicators that are the main elements of these areas are selected and evaluated.
Sensuous City	Next HOME'S Research Institute, Inc	Proposed as a new measure of a city's true attractiveness, the Sensuous City Index ranks the attractiveness of major cities across Japan based on unique perspectives such as "Is there romance?
The Healthy Liveable Cities Liveability Index	Australian Urban Observatory	An independently developed index that measures and quantifies the social determinants of livability and health. It is already being used in many Australian policies.
Liveable Well-Being City	Smart City Institute, Inc.	A Japanese version of the Liveability Index is under development, following the concept of the Liveability Index described above. It aims to measure and quantify the level of happiness, life satisfaction and health of each city, and has the greatest synergy with this proposal. Under development. On the other hand, we believe that the relationship between happiness and health is insufficiently clarified due to the lack of the concept of enabler factors.
Livability Index	AARP Public Policy Institute	Developed as a web-based tool to measure the livability of a community. Users can search the index by address, zip code, or community to find an overall livability score and scores for each of the seven major livability categories: housing, neighborhood, transportation, environment, health, engagement, and opportunity.
Healthy Streets Index	Lucy Saunders	The Healthy Streets Index expresses the contribution of streets to improving health based on 10 indicators, including the availability of places to stop and rest, ease of crossing the street, ease of walking and biking, and noise. It is particularly excellent in the area of visualization.
Health and Wellness City Index	Smart Wellness City	Based on data on the risk of being bedridden, the physical and mental condition of residents, and the liveliness of the city, this index is calculated as SWC values (3-step rating). Mainly used to evaluate municipal policies.
Walk Score	Walk Score	A visualization of the walkability of a given area for users who want to select a place to live. A list of properties is displayed according to the user's preference. The data used is also used by leading researchers in the fields of urban planning, real estate, and public health.
Walkability Index	Chihiro Shimizu (Center for Spatial Information Science, University of Tokyo and Nihon University), Nikken Sekkei,	The Walkability Index is an index that indicates the location environment of real estate (the degree of enrichment of surrounding urban amenities) from the perspective of livability, with reference to the Walk Score described above, in order to propose a new way of evaluating real estate value. The index, which is being developed for urbanized areas nationwide, links real estate with data on amenities accessible on foot (supermarkets, convenience stores, parks, restaurants, cafes, etc.) and scores the degree of fulfillment on a 100-point scale based on the number of locations in the vicinity for each amenity category.
WELL Building Standard	Green Building Japan (GBJ)	GBJ is a performance evaluation system for built environments that focuses on people's health and wellness. It has an index consisting of 10 concepts (air, water, food, light, movement, thermal comfort, sound, materials, mind, and community) to support and improve human health through better buildings.

Table 1: Preceding cases of city evaluation indexes and scores

2. Research and development of Enabling Factors

We believe the Enabling Factors that are important for this R&D can be categorized, based on the perspectives of economy, society, and environment, as shown in the Table 3 below.

Table 2: Classification of Enabling Factors

Economic viability

Non-essential spending: Spending on clothes, beauty products, hobbies, unplanned expenses, service experience, entertainment and leisure, etc. (*Essential spending that is essential for living, such as owning a house or a car, does not improve Happiness.[25])
Employment/Productivity/Creativity: Creating employment opportunities, improving work performance, leisure time, and dual career opportunities etc.

Social equity and capital

Generosity: donation/volunteering, investment opportunities, helping others, etc.[51–53]

Connectivity/Cooperativity/Collaborative: community, cross-disciplinary co-creation, etc.[54]

Equity/Justice: Improving credibility, diversity, and sustainability in organizations (ESG investment), etc.[55]

Environmental capacity

Sustainability: Greening, water conservation, environmental protection, heat island prevention, CO_2 concentration, etc.[56]

Walkability: Walkability, safety and security, creation of attraction, greening, transportation network, etc.

Since the candidates of Enabling Factors have been suggested to be effective mainly as increasing happiness, they are likely to be factors that can be classified as Enabling pathway 1. In addition, adults with high subjective well-being have significantly higher life expectancy and lower risk of death than adults with low subjective well-being. Taking into account the results of these studies[57,58], we believe that further epidemiological and clinical studies to determine whether or not the above candidate groups function as Enabling Factors has potential to reveal new findings and thus will be of considerable value.

One characteristic of Enabling Factor research is that technological fields such as the creative arts and media industries can contribute to its implementation. For example, games such as Pokémon Go and Dragon Quest Walk, which spread from Japan to the rest of the world, have greatly promoted the behavioral change goal of increasing walking, which many public policies have failed to achieve.[59–61]

It is important to take such behaviors into consideration in academic studies of improving health in the pursuit of happiness for human well-being. In other words, a wide range of disciplines will constitute the foundation of sciences, including not only medicine, dentistry, pharmacology, and paramedicine, but also humanities and other fields that may seem unrelated at first glance.

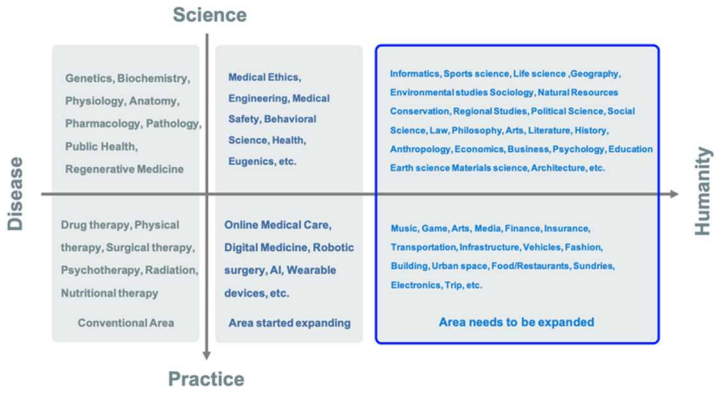

Figure 12: Expansion of the Enabling Factor Discipline
We will introduce disciplines that assist in self-actualization in a broader range of areas related to life in general into the enabling factor research.

One of the pioneering efforts to incorporate Enabling Factors into the city and people's living space was made by Takebe *et al.* at Yokohama City University, who developed a practical theory called "Street Medical" that has received worldwide reputation.[21,62] The Enabling Factor in this report is the point of contact with people through the social and environmental economical settings, or in marketing terms, the "touch point". In addition, we have established an educational system for working people called the "Street Medical School" and have continued over the years to nurture researchers, business people, and young artists who can be the leaders of "Street Medical".

The launching and promotion of Enabling Factor research using urban development as an interface is a fusion of multiple fields. This includes the medical, dental, and pharmaceutical fields and well-being studies mediated by urban engineering and planning. By extension, this encompasses all fields related to social, environmental, and economic factors in Enabling Factor discovery research (sociology, economics, law, forestry/fisheries, technology, engineering, etc.), all fields related to urban implementation research (art, design, affective engineering, media informatics, etc.), and all fields related to the redefinition of well-being (political science and economics, psychology, philosophy, public health, statistics, etc.). Thus, it will be a highly integrated, super-interdisciplinary center. It is a unique attempt to bring together diverse and varied researchers in Japan to pool their wisdom for the improvement of the well-being and health of all humankind.

3. Societal Implementation of Combinatorial Enabling Factors

To achieve self-actualization for all humanity, it is necessary to implement elemental technologies related to Enabling Factors, which are developed individually, into all aspects of future society, including politics, law, economics, labor, education, medicine, and welfare. To achieve this, it is necessary to make full use of digital technology, with top-down presentation of optimal concepts (so-called "grand design") and bottom-up collaborative decision-making (so-called "collective decision-making") as the two wheels, for realizing the Enabling World. In addition, it is important to achieve innovation from a governance perspective by fully utilizing digital technology. It is necessary to design incentives that are more in line with the different perspectives of industry, government, academia, other public and private sectors, and funding bodies, and to develop methods to capture the expression of intentions, while at the same time establishing a practical model that enables today's management to make strong, effective, decisions in line with the grand design. From this point of view, it is important to narrow down the focus of the project by selecting a target where sufficient participation of industry,

government, academia, and other public and private sectors can be expected without loss of the development targets.

Therefore, we set out "Enabling Cities", which Japan is already developing as a national strategy, as one of the cross-cutting goals in this proposal. Shirasaka *et al*. at Keio University pointed out that the super city concept which Japan is specifically focusing on, has two important governance issues. The first is to create a holistic concept. Even though the concept is to reflect a wide variety of opinions with residents as the main actors, there are many actors and interests involved in a city. Secondly, the study points out that each element should be connected digitally to create a systematic inter-operability mechanism that includes human systems other than technology. The study states the importance of creating a foundation that provides new value to citizens through a connected society and the use of data. Thus, Shirasaka *et al.* states that for urban development, it is necessary to establish appropriate Key Performance Indicators (KPIs) while managing the various stakeholders and the voices of citizens.

In terms of agile collective decision-making, there are elements to be learned from Taiwan's case study on COVID-19. Audrey Tan, Taiwan's Minister without Portfolio of Digital Affairs, has set "Fast", "Fair", and "Fun" as the keywords for the suppression of COVID-19, and has launched a series of new policies through mechanisms such as digital polls. According to Ms. Tan, it is important to make democratic decisions that lead people to happiness. For example, when making public policies or democratic decisions in a group, it is necessary to listen to the voices of various people and reflect them in the policies, but no matter how good the decision makers are, if they do not have experience and understanding of diversity, they will not be able to recognize the voices of some people or minorities. Ms. Tan pointed out the importance of listening to the voices of all people in the process of consolidating public opinion, expanding possibilities, and enhancing people's health and happiness [Audrey Tan (Digital Minister, Minister without Portfolio, Taiwanese Government), Millenia Program Special Seminar, June 8, 2021). To create a post-COVID-19 social environment, this is a good example of how innovation through the crossover of the concept of Enabling Factors and digital technology will be important for collective decision-making in future.

One of the R&D and social trends related to our Moonshot goal is the smart city concept that is being developed around the world. The Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) defines a smart city as "a sustainable city or district where management (planning, maintenance, management, and operation) is carried out to optimize the entire city by utilizing ICT and other new technologies to address the various problems facing the city".[63] According to Nomura Research Institute, "a variety of data such as environmental data, equipment operation data, consumer attributes, behavior data, etc. is collected and integrated through sensors spread throughout the city and analyzed by AI; and if necessary, it aims to optimize urban infrastructure, facilities, and operational work, and improve convenience and comfort for companies and consumers by remote controlling of equipment through actuators, etc".[64]

Why are so many countries, municipalities, and companies focusing on smart cities? As aforementioned, the rapid concentration of population in cities is considered to be the reason.[65] Energy consumption by cities is reported to be responsible for 60% to 70% of greenhouse gas emissions, and efficient energy use in urban areas is an urgent need.[66] The concentration of population in urban areas is reported to be the cause of problems, such as increased traffic congestion, air pollution, crime, and environmental degradation.[67] In an attempt to address these problems, the smart city concept has been promoted around the world, as shown in Figure 13.[66] The reason why the smart city concept has gained currency in Japan is due to the awareness of issues typical to Japan, such as the declining birthrate and aging population, the current stagnation of the tourism industry (COVID-19), and natural disasters.

Amid these global trends, Japan has begun to steer its smart city concept as a national project, the Super City concept. On May 27, 2020, the Diet passed a bill to partially amend the National Strategic Special Zones Act or the "Super City Bill". This Bill is designed to realize the "Super City Concept", promoted by the government. Reflecting on cases of smart cities around the world, this Super City initiative features the use of data, digital technology, and human-centered design to facilitate decision-making not only by governments, but also by residents, businesses, and other city stakeholders. This takes the democratization of urban development a step further, with some cities being positioned in the latest generation of smart cities, defined by Deloitte Consulting LLP as Inclusive Smart City[68], inviting residents to collaborate on solutions to local problems by providing them with the necessary resources, skills, and knowledge.

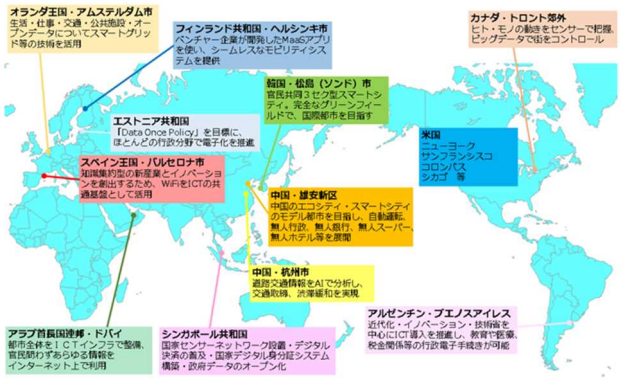

Figure 13: Latest trends in smart city development in recent years

The most important difference between this project and the smart city project is that "the data linkage infrastructure development project will be the core of the project. Since the project requires the coordination of data from multiple services, the existence or non-existence of this data coordination infrastructure will be one of the criteria for determining whether a city is a Super City or not."[66] This is a development policy with the so-called "city OS" technology at its core. To build a logical system for improving Happiness Health through the implementation of Enabling Factors toward the realization of the Moonshot goal of Enabling Cities, it would be extremely beneficial to have a data linkage infrastructure in place for each city, which could lead to synergies. In this way, Japan will be able to demonstrate its advantage to the rest of the world.

The Smart Wellness City project[69], which is an initiative with an idea similar to Enabling City, was already in existence in Japan. In 2009, the heads of local governments across the country who support the idea of Smart Wellness Cities voluntarily gathered to form the Smart Wellness Leaders Study Group[69] which aims to make "wellness" (i.e., the ability of each individual to lead a safe, secure, and affluent life with good health and a sense of purpose) the core of future urban development policies. The goal is to create a city where all citizens can participate in the prevention of lifestyle-related diseases and bedridden, breaking away from traditional policies in which only health-conscious people are involved. To achieve this goal, the city has been promoting healthy city planning policies, which have been proven to improve the health of citizens based on scientific evidence, through collaboration among local governments. This initiative, with "health and happiness" as its key concept, is an example of urban development based on the aforementioned "Health-driven Happiness Act" concept. Although it is different from the concept of the "Happiness-driven Health Act" that we expect to be effective, this initiative, which started with the creation of a study group for a single purpose with the participation of heads of local governments from all over Japan, can be said to have been the foundation for the realization of an Enabling City. This is one of Japan's strengths in the realization of this Moonshot goal. The following table shows the differences between the Enabling City concept and other city concepts to clarify the issues. The Enabling Cities concept is considered a highly competitive urban concept with goals that are unparalleled in the world, in addition to being a legitimate successor to Japan's original city concept.

III. Plan for Realization

1. Area and field of challenging R&D, research subject for realization of the Goals

[Area and field of challenging R&D]

To achieve self-actualization for all humanity, elemental technologies related to the Enabling Factor must be implemented in all aspects of society, including politics, law, economics, labor, education, health care and welfare, in future. To achieve this, we consider that it is important to select a target area where sufficient participation of industry, government, academia, other public and private sectors, and funding bodies can be expected, and to narrow down the focus of the development, without dispersing the development targets, in the name of realizing an Enabling World. To solve these problems, we decided to set the realization of an "Enabling City (EC)" as one of the cross-cutting goals in this proposal. To achieve this goal, we believe that the following three interdisciplinary research objectives will be necessary.

Objective 1: Establish Enabling Factor Theory

Objective 2: Research and Development of Enabling Factors

Objective 3: Societal Implementation of Combinatorial Enabling Factors

We believe that the key is to intentionally maximize the synergistic effects of research and development by increasing the coordination and interlocking of these three goals as much as possible. Therefore, based on the premise of the realization of the "Enabling City (EC)", which is an integrated demonstration model, we will ensure that the demonstrations of Objectives 1-3 are organic and linked to social implementation, and aim to materialize the realization of the moonshot in 2050.

First, the relationship between the three objectives, the research fields and technology groups associated with each, and their hierarchical structure are shown in **Figure 14**.

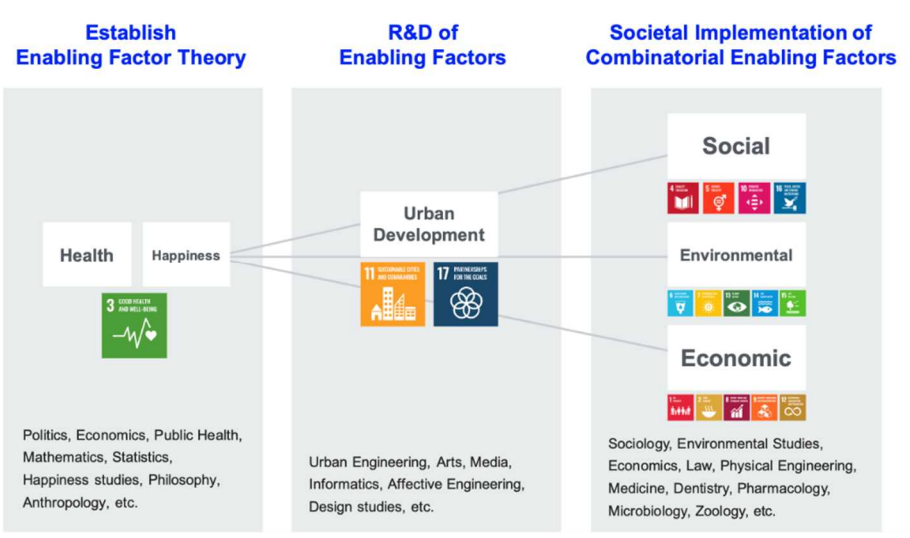

Figure 14: Three goals and their relationship in social implementation of Enabling Factors.

Based on this, we propose the following scenario for the realization of our social vision. In the early phase, it is assumed that the seeds are not fully manifested due to the small portfolio for embodying the Enabling Factor. Therefore, in the initial stage, we will focus on the development and small-scale implementation of specific cases classified into product, service, and spaces, equipped with the Enabling Factor function, and further disseminate them to society. By doing so, we will focus on disseminating the value of the concept of Enabling Factor (see EC Therapeutics and Table 1). While we will build a cyclical R&D scheme, called the Enabling City cycle (EC cycle), gather sustainable and diverse cases. This will be done when the theory construction that enables the measurement of the utility and effect of the Enabling Factor has progressed, such as the aforementioned "Happy Life Expectancy". In EC cycle, we will search for candidate factors for the Enabling Factors through questionnaire surveys, open data analysis, or integration of these. From among the countless candidate factors discovered, we will focus on factors for which we have a strong hypothesis that can be theoretically constructed based on simulations, etc., and by implementing the products and services in real environments through feasibility tests, the effectiveness of these interventions in improving people's happiness and health will be verified through prospective tests using the effectiveness verification method to be developed in parallel. Once Proof of Concept (POC) has been obtained in a narrow sense, we will optimize the horizontal deployment scheme considering regional differences and cultural differences while utilizing tools such as digital twins. Thus, we will expand the use of the Enabling Factor to areas other than those where the demonstration field was set, and strengthen the evidence of its effectiveness.

Innovation policies in the local governance system rooted in the local community are indispensable to firmly implement the Enabling City. This means that it is important to identify a wide variety of urban constituents (stakeholders) over time, examine how each member from each sector of industry, government, public, academia, and private work together, and what and how much resources and information they transfer to each other. Based on this, we aim to achieve governance innovation by establishing the necessary organizations, etc. In this sense, we will promote efforts to increase the acceptance of the people by designing incentives that make full use of special zones and digital currencies when implementing Enabling Factors for stakeholders such as local governments, residents, workers, visitors, and companies. In addition, by establishing a score model and certification system that evaluate them based on certain criteria, we will foster a momentum to increase our commitment to the EC concept. This will create a flow toward self-propelled development by encouraging the participation of private funds and private businesses.

Furthermore, for Enabling City to respond to all humankind, it is necessary to improve real-time and agility to the utmost limit and to establish a system in which all voices are accounted for. In other words, it is important to keep in mind those who do not respond to the identified enabling factors or who do not prefer the embodied items. To be inclusive, it will be necessary to develop as many Enabling Factors as possible to personalize them by ensuring the diversity of their combinations. Furthermore, even if governance with diverse stakeholders is oriented, there will be people who will not or cannot participate in the consensus building process in the first place. Therefore, we need to build a system for promoting joint manifestation of intention, participation, and decision, such as digital poll, and research and develop a mechanism that can pick up the voices and opinions of even a few people. By doing so, we will create a well-being society where no one is left behind. To realize these, we will select the target model city or area and conduct research and development to establish a partnership to ensure the quality and spread of the concept of Enabling Factor.

Based on the aforementioned scenarios, if a proof of concept in a broad sense starting from the Enabling City is achieved and the outcome of self-actualization of local residents is proved, expanding the Enabling Factor to all activities, such as politics, law, economy, labor, education,

medical care and welfare, etc, will become an organic trend, and in future, social implementation on a global scale, that is, the achievement of the Enabling World will be achieved.

Research subject for the realization of MS Goal

To realize the three goals of this Moonshot, we decided that it would be effective to proceed with research and development by setting the development of Enabling Cities as a core goal.

Objective 1: Establish Enabling Factor Theory and Objective 2: Research and Development of Enabling Factors

To carry out goals 1 and 2, it would be effective to extrapolate the SOAP (Subject, Object, Assessment, and Plan) method, which is based on a problem-oriented system used in the medical to the city-level analysis. By the extrapolation of SOAP (Subject (chief complaint), Object (examination and inspection), Assessment (diagnosis and evaluation), and Plan (treatment)) method, we firmly believe this would effectively define the following four levels of actions and set them as R&D tasks (**Figure 15**).

Figure 15: Sustainable Development Model with Enabling City Cycle

A. **EC Chief Complaint**: Develop an evaluation system to identify enabling issues to be confronted by each city → **Objective 1**

B. **EC Diagnostics**: Development of environmental diagnostic tools to address data collected from sensors and other devices embedded in cities → **Objective 1 and 2**

C. **EC Analytics**: Develop a prediction system to infer and simulate the factors that are causing obstacles based on the results of diagnosis → **Objective 1, 2**

D. **EC Therapeutics**: Develop therapeutic tools to implement and evaluate ideas for interventions in cities → **Objective 2**

By repeating this Enabling City circle, we believe that the city will gradually evolve into an Enabling City. The following sections provide details of the research questions for each action.

A. EC Chief Complaint: Develop an evaluation system for Objective 1

First, the EC Chief Complaint (evaluation system development) will take advantage of the recent acceleration of digital transformation and use open data to determine the level of health and happiness in each city. These can be quantified, for example, by referring to publicly available statistics on health data on residents, environmental assessment data, and various economic indicators. However, to build a more effective evaluation system, there is the issue of uneven layers and granularity of open data resources. For example, in terms of data units, there are variations as follows: "All real estate transaction prices are open to the public at the address"; "Some police and public safety-related data are not open to the public at the address"; "The minimum size for the national census and economic census is the fifth mesh (250m)"; "The

mainstream data is available by prefecture, but some data is at the city, ward, and village scale". Furthermore, the frequency of data collection is also varied: "Air pollution data is collected every hour. For other environmental data, the most frequent data are collected every month, while the least frequent data are collected every five years", and "population and economic dynamics data such as RESAS are updated relatively quickly". As a result, data can be lost by heterogenous unit and frequency.

To overcome these issues, it is necessary to identify a myriad of Enabling Factors in the Objective 1 phase, identify measurable factors amongst them, and develop an integrated data analysis system that does not rely solely on existing open data. Once measurable Enabling Factors have been developed, it will be necessary to revise the indicators and scales used in current happiness surveys. Through the identification of other indicators that are significantly correlated with subjective life satisfaction, subjective assessments in the form of questionnaires, and establishing them as surrogate markers, it is possible to develop an evaluation system that is close to real-time.

Figure 16: Prototype of Happy-Unhappy Map in Kannai and Kannai-surburb area, Yokohama
A, Places to feel Happy
B, Places to feel Unhappy

We will develop detailed tools to automatically retrieve, update, and analyze the fundamental data of each city from Google Maps and open data sources by utilizing web programming tools such as crawling and scraping (**Figure 16**). Research and development should be promoted by integrating statistical and analytical technologies, public health and health sciences, environmental assessment technologies, social capital analysis, database technologies, software development, image processing technologies, web programming technologies such as crawling and scraping, and text mining technologies for social networking service (SNS), etc.

B. EC Diagnostics: Develop urban diagnosis tools for Objective 1 and 2

In addition to the information obtained by the EC Chief Complaint, the EC Diagnostics (diagnostic tool development) will collect data derived from sensors that visualize the state of Enabling Factors and from urban infrastructure to allow us to conduct more specific and detailed analysis and diagnosis of the city. For example, by analyzing the walking patterns and walking speed of residents based on satellite images, we can derive the age population and health level of the area, investigate the effects of differences in consumption behavior on happiness and health. In this initiative, we will develop a new method for EC diagnostics that do not thoroughly rely upon human data. In addition, this initiative proposes the establishment of non-human biological sensing (organismal): Organismal Environmental Sensing technology as a new method that does not rely on human data for EC diagnostics (**Figure 17**). For example, crow tracking can be used to monitor urban sanitation[70], microbial monitoring in wastewater treatment plants can be applied to SARS-CoV-2 surveillance, ant bio-dynamics can serve as an indicator of thermal and

environmental change[71], and soil animals can be used as indicator organisms for environmental diagnosis.[72] The diversity of birds in a region is linked to the level of human happiness.[73] However, in addition to the extremely poor development status of these sensing technologies, the discussion on how the data should be utilized from the perspective of urban development is less matured.

It is also necessary to evaluate the environment including the time axis. Plants are the foundation of the ecosystem, and plants that grow in green spaces are selected by vegetation transition and natural selection, making them suitable for understanding the long-term environment. In particular, wood plants have long been planted; hence, it is possible to learn the long-term

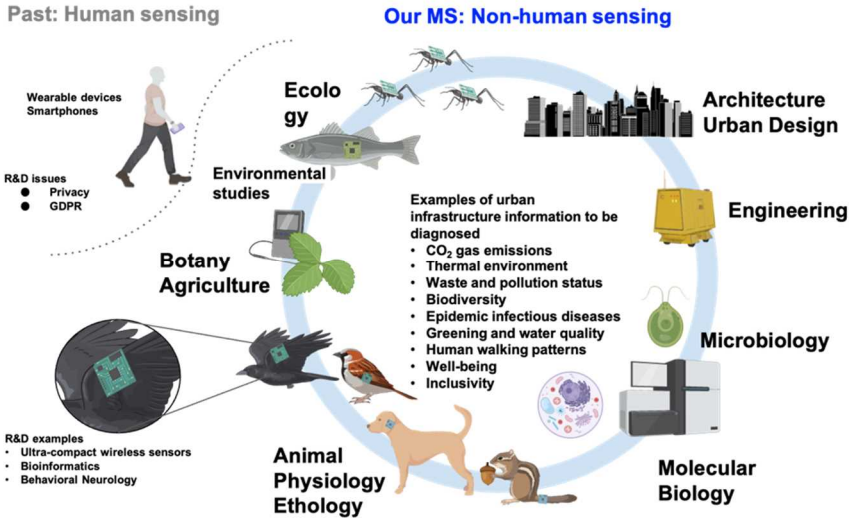

Figure 17: Urban infrastructure diagnosis based on the development of new sensing targets.

characteristics of the land.

Active data collection and exploratory research via non-human organisms, i.e., animals, insects, microorganisms, etc., is considered to have the potential to become a world pioneer as inter-disciplinary research of the life science field and urban development, in which Japan has maintained its significance (**Figure 17**, right). Furthermore, through the establishment of the new research field of robotic monitoring (in which robots parade around the city and inside buildings to collect detailed environmental data), we can address the problem of inconsistent units and frequency of environmental data resources as described in the previous section (**Figure 17**).

Although it is not considered to be the main development target, it is necessary to pay close attention to trends in human sensing. It was announced last year that Sidewalk Labs, a subsidiary of Alphabet, the parent company of Google, had abandoned its plan to build a smart city on the coast of Toronto, Canada. The reason for the project not being realized was linked to people's strong sense of avoidance as urban planning was based on the premise of collecting personal data. In response to this trend, the EU has recently raised an issue of personally identifiable information on the Web (IP addresses, cookies, etc.), and has begun to develop laws and regulations, i.e., the General Data Protection Regulation (EU GDPR) (**Figure 19, left**). However, the feasibility of tracking and tracing human movement is still arguable. In future, competition for sensing using various gadgets such as rings and watches, as well as smartphones, is expected to intensify, so we will utilize existing devices for this research as appropriate according to the latest trends.

Image processing techniques, statistical and analytical techniques, microeconomics, molecular and cellular biology, microbiology, agricultural chemistry, plant science, bioinformatics, ecology, animal physiology, animal behavior, environmental assessment techniques, engineering, happiness studies, and public health and health sciences must all be mobilized.

C. EC Analytics: Develop an urban forecasting system for Objective 1, 2

There are two major bottlenecks that cannot be overlooked in the field of urban development: the first is the problem of the irreversibility of urban development, a project that is physical, large in scale, and requires consensus building with complex stakeholders such as landowners. In Japan, it is said to take several years of coordination time and at least JPY 50 million to conduct a demonstration experiment for five days on a single street (from the interview conducted by the research team). The second is the issue of the "area" as a development unit. When developing an area, a developer usually conducts a complete survey within that area. There will be a development where there is no damage in the landscape or the image of the city, but it is impossible to know how it affects existing buildings and spaces within a certain area.

Figure 18: Image of a digital twin.
Digital twin technology can be used to simulate which Enabling Factors are more effective in virtual space.

Here, the development of a digital twin city becomes important. In recent years, with the rapid progress of digitalization, digital twins and 3D city models have been built in cities around the world as part of efforts related to urban DX (**Figure 18**). The term "digital twin" refers to the cycle of creating a city in a virtual space from real city data and then feeding back the simulation results to the real city. Previously, there have been attempts to gain a bird's eye view of real space, but recently, various information has been added to the 2D map information and based on satellite images, the information has been expressed in 3D (3D city model). Additionally, there have been attempts to visualize the activities that take place in the city and the environmental information surrounding the city, and there is a movement to gain a bird's eye view of all the information in the city. The digital twin can be divided into four levels. The highest level, Level 4, are movements in the city measured in complete real-time, and automated driving systems are fully functional. At present, even the most advanced level is considered to be Level 2 and 3, as in Singapore.

The use of digital twins as a tool for urban management has begun to be tested. There are, however, still few examples of digital twins being implemented in actual cities. Since the target range is vast (city level), the current situation is that the purpose and creation of the target differ greatly depending on each case. Additionally, it is not sufficient to recreate a city in a virtual space. A city has value only when people use it. When collecting people’s opinions, it is recommended to use the Contingent Valuation Method (CVM) for environmental assessments, and clarify the level of value to the public. By incorporating the voices of these users into the digital twin, a new

human-centered digital twin development will be realized. In addition, the concept of "Metaverse", which refers to the virtual space on the Internet, which has been expected to take the game to a new stage, has been incorporated into the digital twins of the city, and the invoking factors have been studded. It will also be possible to simulate how innumerable avatars in the virtual space world will achieve life satisfaction and health improvement.

Furthermore, urban infrastructure information (urban OS) is also being collected with a variety of data, each in an appropriate manner. At present, various attempts to integrate data are being made in the form of technology demonstrations, but essentially, the data for integration should be selected based on the assumed level of use. In future, the use of digital twins in cities will become increasingly important, but there is currently a strong element of technical verification, and this has not yet led to the construction of use cases, which is the main topic of discussion. To achieve this Moonshot goal, it would be extremely effective for Japan to lead the world in the development of digital twins in an Enabling City, where the use cases are clear. To do so, it is important to show what is causing the problem in a specific place and the direction of improvement measures and analyze the cost-effectiveness so that the following action, the "treatment" plan of the city, can be given concrete suggestions. It will be necessary to promote research and development using database technology, VR technology, AR technology, 3D technology, and statistical/analytical technology based on digital transformation (DX) technology.

By identifying causes of the problem in a specific place, the clarification of the direction of improvement measures, and conducting analysis of cost-effectiveness, concrete suggestions can be made for subsequent action, that is the "treatment" plan of the city. It is necessary to promote research and development that makes full use of database technology, VR technology, AR technology, 3D technology, statistics / analysis technology, etc. based on DX (digital transformation) technology.

D. EC Therapeutics: Develop design tools for Objective 2

Since the groups of factors discovered in the development of Enabling Factors are items that have been identified through statistics and analysis, the question arises as to what will happen when they are placed in a real environment, and whether the intended results can be obtained. That is, if we were to borrow the frame of medical research, especially drug development, we would develop Enabling Factors as basic research, simulate the effects of these factors in pre-clinical tests, and then demonstrate the strong hypotheses that are screened out in clinical tests (trials) as EC Therapeutics.

Here, EC Therapeutics planning and development will be conducted and implemented in cities in the estimated area based on EC Analytics (prediction system). The research and development required for this can be divided into two main categories. The first is the development of the embodiment of Enabling Factors. The Enabling Factors *per se* are a list of things that should happen, such as people's behavior, things to be installed in the environment, etc. Therefore, when implementing these in a city, it is necessary to start with the planning of what kind of space, product, or service to put into, and then to make them into a form that attracts people. The second is a validation study to obtain Proof of Concept (POC) by using embodied Enabling Factors in a real environment. As aforementioned, it is expected that the Enabling Factor candidates identified from questionnaires and open data analysis do not necessarily explain the causal relationship. It

is important to confirm the effectiveness of the Enabling Factors by employing a prospective study approach.

Furthermore, when planning, it is necessary to assess the acceptability of the products and services to be offered, especially the acceptability of price. Although Price Sensitivity Measurement (PSM) is widely used as a method of surveying price acceptance, it is merely a method of summarizing the cumulative response rate to questions, and it is desirable to develop a method that takes into account the characteristics of consumer thinking.

Research and development should be promoted in the super interdisciplinary fields which comprise the entertainment industry, including creative approaches (e.g., design, art, copywriting, etc.) and game development, as well as urban engineering, sensitivity engineering, behavioral economics, media informatics, art studies, and architecture. An important aspect of promoting social implementation is to establish a mechanism to perpetuate such efforts, especially a method to ensure that a reasonable profit is obtained. Consumers' sensitivity to price is relative and varies greatly depending on how it is presented and communicated.[74] There is therefore a need to develop methods of setting appropriate prices and ways of communication.

It can be predicted that the development of EC Therapeutics and the verification of its effectiveness, especially in the case of spatial interventions, will begin at the planning stage for area development, will take time to construct, and will also require a certain amount of time to verify its effectiveness. In order to make it possible to efficiently implement the development of embodied enabling factors, we have collected case studies of initiatives that include elements of enabling factors. Here, we mainly focused on cases by creators. This is because the ideas of creators have a stance of pursuing people's happiness incorporated into them beforehand. Our most important hypothesis is that the happy element is essential for the realization of health, but their ideas are studded with the elements of attractive and fun in order to appeal to people's curiosity. We have collected more than 200 examples from all over the world and examined how to classify what each case is trying to solve and in what way, and prepared the format shown in Table 4 for plotting. In this classification, the vertical axis is set to Social, Mental, or Physical as the target to be solved, and the horizontal axis is set to Product, System, or Space, and the visibility of where each case is positioned in the nine quadrants is increased. We proposed a mapping method that is beneficial for assembling R&D areas by clarifying the development areas so that appropriate therapies can be immediately extracted by increasing the visibility of each case in the nine quadrants.

In addition, in order to effectively promote discussions with various sectors such as stakeholders, the classification is divided into Macro (entire city and public spaces), Meso (urban city blocks), and Micro (inside buildings and rooms) so as to accommodate the scale of the ground plane of the city. Based on these databases, it is necessary to continue and expand the accumulation of precedent cases of EC therapeutics methodologies to promote the participation of the entertainment and creative industries, in which Japan is internationally competitive.

Objective 3: Societal Implementation of Combinatorial Enabling Factors (see section 5. ElSI)

In the name of the creation of an Enabling World, it is important to achieve innovation from the governance perspective, taking into account both the top-down presentation of optimal concepts (so-called "grand design") and the bottom-up realization of collaborative decision-making (so-

called "collective decision-making"). It is important to achieve innovation from the governance perspective by making full use of digital technology. In particular, the Enabling City is likely to be a completely different urban design concept, and will require an extremely challenging management approach, as it will require pursuing a vision that transcends the boundaries between highly public areas, such as roads, stations, and parks, and areas created by private entities. Therefore, it will require extremely difficult management. Therefore, it is necessary to convert the existing legal system, social system, and urban space into a new legal system and social system step by step to apply it in reality. In addition, digital twins, etc., enable meta-level zoning at a new layer (persona of people and companies, scenes and sequences of urban experience, travel load, environmental DNA, etc.) other than physical zoning. It is necessary to develop a method to guide the optimization of the entire city by organically linking site level and partial space optimization with various interacting elements. In order to achieve this goal, we need to develop a method to guide the optimization of the entire city by organically linking the optimization of the space with various interacting elements. While the conventional design theory of static and quantitative planning of the urban environment, such as form, function, and scale, is the foundation, we need to sublimate this theory to a dynamic and qualitative urban design theory, an ecological urban design and management. Furthermore, it is necessary to construct a collaborative decision-making method to capture the will of all local residents, and a mechanism to reflect the will of the people in real time.

Therefore, the following research and development goals are set out to achieve local governance innovation for the social implementation of enabling cities.

A. Establishment of an enabling management system[75]

- Establish a flexible corporation that links industry, government, academia, public and private sectors, and set up effective areas.
- Design a system that assumes patterns ranging from small and medium-sized cities and regions working together with residents and local businesses to national strategic special zones that enhance international competitiveness.
- Design of EC cycle management that comprehensively evaluates and supports measures to improve the economy, society, and the environment through the use of cutting-edge technologies.

B. Design of an enabling incentive system

- Provide a mechanism to support urban facilities (hardware) and measures (software) with a new perspective to improve the health and well-being of residents and all workers.
- Integrated support for projects and measures proposed by the public and private sectors, linked with deregulation, subsidies, and tax incentives by the government from private funds
- Construction of an urban system with employee participation and profit sharing among residents, companies, and workers.

C. Development of enabling poll (collaborative decision-making) methods

- Development of decision-making participation methods for residents using digital technology
- A mechanism to visualize EC initiatives with quantitative, transparent, and constant information by utilizing cutting-edge technologies such as 5G, big data, and AI for urban facilities and measures that contribute to health and happiness.
- Digitization of the "citizens report" (citizens report), an expression of local residents' opinions that supports EC, contact and exchange with expert views

In order to make the comprehensive introduction of enabling factors self-propelled, it is essential to guarantee sustainable development after that, while using the research budget in Moonshot projects until 2030 as a catalyst. In other words, it is necessary to build an investment environment where funds are invested in EC development and business on an appropriate scale, and to build a business environment for advanced initiatives through deregulation, including special zones. Investments can range from start-ups and new business launches to large-scale real estate development. ESG investments have been attracting attention in recent years; in a survey of investment management organizations by the Ministry of Economy, Trade and Industry (METI) conducted in 2019, about 98% of respondents used ESG information in their investment decisions.[76] This trend is expected to accelerate further, and investment in enabling city realizations will be one of the main menu items.

It is also necessary to proactively introduce innovations in business schemes that are being implemented in various fields around the world. For example, there is a scheme called Social Impact Bond (SIB)[77] that has begun to be introduced in Japan. It is a performance-based public project implementation mechanism in which performance targets are set in advance and success fees are paid to the investors who provided the project funds when the targets are achieved. The Cabinet Office has also set up a portal site[78] for the performance-based private sector outsourcing system and is promoting its spread. At present, however, most of the projects are related to the Enabling Pathway 2 of the Health-driven Happiness Act, such as health promotion. If research and development progress in future and the results related to the Enabling Pathway 1 of the Happiness-driven Health Act can be quantitatively evaluated, the potential of SIB projects will expand further. We have named this the "Happiness Impact Bond (HIB)" and believe that it is possible to formulate the concept.

While using these soft mechanisms as a starting point, it will be important to work closely with the government. The key will be to establish an Enabling City Promotion Entity and realize integrated management based on a specific district or city as a model through public-private partnerships. This kind of public-private partnership will solve the problem of financial difficulties in local governments and open up the possibility of private sector service businesses of various sizes.

Based on the above, we will update the conventional concept of urban design in terms of enabling factors, and construct a prototype of an innovative urban development method that will generate explosive acceleration by 2030 while utilizing Moonshot projects. Specifically, after selecting a model city, an Enabling City Promotion Organization (initially envisioned as a general incorporated association) will be established, and research and development will be carried out under the following scheme. If we can implement it in all aspects such as politics, law, economy, labor, education, health care and welfare, which are our future goals, this will be a breakthrough in the world (**Figure 19**).

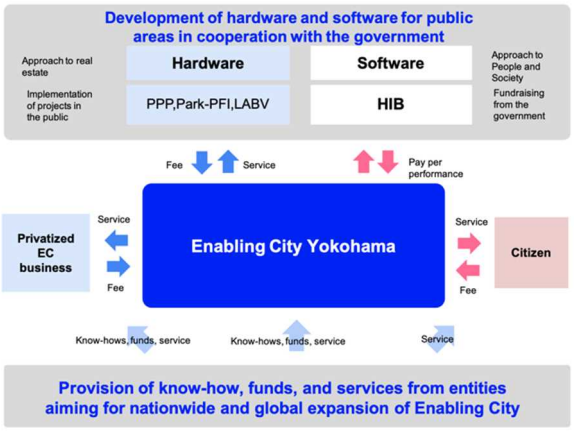

Figure 19: Enabling City Area Development Project Scheme
PPP: Public-Private Partnership. A public-private partnership project.
Park-PFI: Among PFI projects, this refers to PFI projects related to parks.
LABV: Abbreviation for Local Asset backed Vehicle.
SIB: Abbreviation for Social Impact Bond. SIB: Social Impact Bond: A performance-based private sector contract that evaluates the results of public works projects and links payment to the results.

2. Direction of R&D for realization of Goals

(1) Specific goals that should be achieved and are achievable (milestones)

FY 2050: 10 billion people, 10 billion ways of self-actualization

FY 2040: 3 billion people, 3 billion ways of self-actualization in the world

FY 2030: 10 million people, 10 million ways of self-actualization in Japan and beyond

(2) Specific R&D themes that should be addressed to achieve the milestones

FY 2050: Realization of an Enabling World

FY 2040: Operation of Enabling City in 30 domestic and overseas cities

FY 2030: Theory, evaluation, and implementation of Enabling Factor

(3) Effects of the achievement of the milestones on society

FY 2050: Achievement of Equitable and Global Human Well-being and meeting the Sustainable Development Goals

FY 2040: International expansion of Enabling City and substitution of Enabling Factor in various livelihood scenes

FY 2030: Proof of Concept for local impact of Enabling Cities on society, environment, and economy

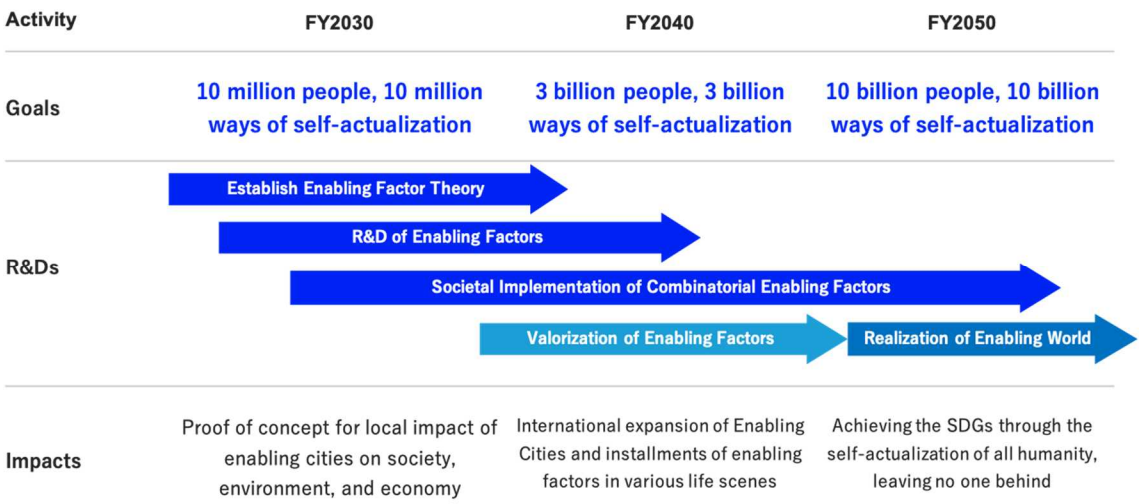

Figure 20: Flow chart to achieve the three goals

3. International collaboration

The mission of this initiative is to create a society where no one is left behind and self-actualization is possible through the realization of Equitable and Sustainable Human Well-being by defining a new axis of the urban concept called "Enabling City" and creating a new value system that can be accepted by the international community. For this reason, we believe that international collaboration is essential.

As for the case of seeking the relationship between environment and health, the European group's research has made remarkable progress. The UK Biobank, a long-term large-scale biobank started in the UK in 2006, has been established to investigate the effects of genetic predisposition and various environmental exposures (nutrition, lifestyle, medication, etc.) on disease.[79–81] For example, several large-scale analyses of the parameters of health-related factors influenced by built-in environment have been reported. The relationship between the density of nearby exercise facilities and BMI and body fat percentage, and the relationship between greenery in houses and mental health, especially depression, are typical examples.[82,83] The Healthy Street Index[84], which has been implemented in a street near London, visualizes the contribution of streets to health based on ten indicators, including the number of places to stop and rest, ease of crossing the street, ease of walking and bicycling, noise, and amount of shade. Furthermore, the Enabling Factors proposed by this research team can be used as an exemplary case in the development of an enabling map that visualizes the scoring of each coordinate by incorporating location information.

Furthermore, the UK and other countries have begun to set global sustainability as a central agenda in urban development and try to incorporate it into management.[85] In fact, an organization called The City Leadership Lab[86] has been established mainly at universities in London to analyze the correlation between global sustainability and urban development, and a movement is emerging to cut through policy making and cross-sectoral innovation creation from the perspective of sustainability. Such a movement seems to have norms that this Goal 3 should learn from, and synergy effects can be expected through international joint research. In fact, our team has established a collaborative system with Prof Julie McCann and her group at Imperial College London, who have been invited as an Expert Panel in The City Leadership Lab. She is an outstanding researcher who is particularly skilled in the field of built-in environments and the construction of sensors and computing systems that can be integrated into the natural world, and we believe that she will be able to provide extremely important suggestions for the development of EC Diagnostics, one of the development goals of this initiative.

Whereas, research on the relationship between social and economic factors and health, such as social capital and health capital, is rapidly increasing, especially in Europe and the United States, compared to Japan. For example, the accumulation of international socio-economic data as represented by the Gallup database and the World Bank database has led to extremely active research in the United States.

In fact, we have obtained preliminary knowledge of international trends in enabling factors focusing on social, economic, and environmental factors by conducting joint research with a team of public health experts, including Dr Yusuke Tsugawa and his colleagues at UCLA. Specifically, we used data from Organization for Economic Cooperation and Development (OECD) member countries in order to conduct an analysis of enabling factors in developed countries. Data from 35 countries for the period 2010-2017 were used, excluding Colombia (joined in 2020), Costa Rica (joined in 2021), and Lithuania (joined in 2017), which joined after 2018 for data availability reasons. We downloaded data on candidate variables for the enabling factor from the OECD, WHR, Work Bank Group, and United Nations websites, excluded duplicate variables, selected those with more than 200 observations between 2008 and 2017, and excluded variables for which there were not enough observations in each OECD country. The final analysis was conducted by

excluding variables for which there were not enough observations in each OECD country. As a result of compositing the scores obtained, calculating the scores by country, and mapping them to the life satisfaction scores, we found that the values of life satisfaction in 2017 did not necessarily agree with each other. Interestingly, the evaluation of each representative country suggests that the weight of economic, social, and environmental factors may be different. Thus, by analyzing the variations in the enabling factors that have been strengthening in each country over the recent decade, we have succeeded in finding the basis for a score model of the situation in each country.

The results of these analyses do not, at this point, indicate a causal relationship that promotes well-being. In other words, it is unclear whether the improvement of these enabling factors can increase life satisfaction. However, it is expected that the Moonshot Project will be able to suggest factors that differ from country to country, including the acquisition of additional data that is currently lacking, by examining prospective studies, including those in non-OECD countries. In the future, we expect to use these joint research as a starting point to discover enabling factors that differ from country to country and city to city, and to optimize the scoring method.

4. Interdisciplinary cooperation

Since the Enabling City is an interface to enhance both people's happiness and health, which in turn leads to sustainable development, the collaboration and integration of diverse actors is essential. For example, in the field of science and technology, a super interdisciplinary field will be formed, consisting of urban engineering researchers, happiness researchers, animal behaviorists, medical researchers, and economists. In the industrial world, there will be new initiatives to improve the happiness and health of seafarers through collaboration between marine transportation companies and retailers to implement Enabling Factors. Moreover, Japan is said to excel at element technologies and matching technologies, but weak in applied research and development. In this context, clarifying goals such as the development of products and services to enhance happiness will create a new form of industry-academia collaboration. In this EC development, where no one can lead with absolute authority, as opposed to a medical device development case that a doctor takes the initiative, it will be possible to build a horizontal relationship across stakeholders, and this could become a new foundation for innovation. In the public sector, it is necessary to develop laws, design systems, and make policy recommendations that will support the realization and promotion of Enabling Cities, transcending the boundaries between ministries and jurisdictions.

[List of Stakeholders for the realization of Enabling Cities].

Science and Technology field

> Statistics and analysis technology, public health and health sciences, microeconomics, environmental assessment technology, social capital analysis, database technology, software development, image processing technology, web programming technology such as crawling and scraping, text mining technology for SNS, etc.
>
> Microbiology, bioinformatics, ecology, animal behavior, behavioral neuroscience, sensing technology, sensor device development, happiness studies, positive psychology, urban engineering, sensitivity engineering, behavioral economics, media informatics, art studies, architecture, VR technology, AR technology, 3D technology.

Industry Field

Real estate companies, construction companies, artists, creators, microbiology and other subcontract testing companies, environmental assessment companies, telecommunications companies, systems companies, display companies, resort development companies, marine transportation companies, data analysis companies, game companies, insurance companies, business companies, medical equipment and health-related companies, venture capital companies, railroad companies, retail stores, think tanks, consulting companies

Public Sector

Cabinet Office, Ministry of Health, Labor and Welfare, Ministry of the Environment, Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Economy, Trade, and Industry, Ministry of Agriculture, Forestry and Fisheries, Ministry of Internal Affairs and Communications, prefectures, municipalities

Citizens

Downtowns, neighborhood associations, landowners, residents, workers, travelers

Organizations/ groups expected to be established to promote the realization

Organizations (i.e. general incorporated associations) responsible for certification, education and dissemination, trademark and license management related to Enabling Cities; venture companies responsible for the implementation of Enabling Cities; and academic society management organizations related to Enabling Cities.

Furthermore, the valorization and dissemination of Enabling Factors will become more important to achieve self-actualization of all humanity. Therefore, starting from urban development, there is a need to transfer the value of the Enabling Factors to all items. Concepts such as enabling treaties and enabling laws, enabling management (as in health management), and enabling products (as in eco-products) will be circulated to enhance both happiness and health. Education on the importance of Enabling Factors can be expected to become part of the compulsory education curriculum (**Figure 21**).

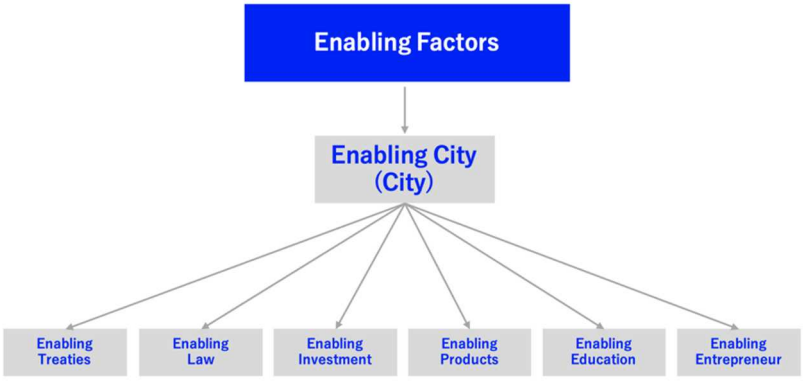

Figure 21: Expansion of the concept of Enabling Factors, starting from urban development

5. ELSI (Ethical, Legal, and Social Issues)

[Ethical issues and how to solve]

As part of the smart city concept that is becoming popular, the world's most advanced cities are using sensors to trace the movements of people. In Japan, large-scale demonstrations are underway in Aizu, Kashiwa, and Susono, and overseas in Barcelona. On the other hand, it was announced last year that Sidewalk Labs, a subsidiary of Alphabet, the parent company of Google, had abandoned its plan to build a smart city on the coast of Toronto, Canada. The reason for this was the social issue that the project was not realized due to people's strong sense of avoidance to be sensed when urban planning on the premise of acquiring personal data. In response to this trend, overseas, the EU has been considering the issue of personally identifiable information (IP addresses, cookies, etc.) on the Web for several years, and the EU has begun to establish laws and regulations called GDPR (EU General Data Protection Regulation). This research team proposes a new method of non-human sensing that takes as little human data as possible. It is a very effective way to prevent the establishment of an unnecessary surveillance society to see the state of the city.

[Legal issues and how to solve]

A. Human rights

When the enabling factor is identified, it will be necessary to deepen the discussion on the so-called "new human rights" in addition to the basic human rights (equality, liberty, social rights, suffrage, and the right to claim) stipulated in the Constitution. The term "new human rights" refers to rights that are not explicitly stipulated in the constitutional provisions for guaranteeing individual rights, but are claimed to be guaranteed as human rights under the constitution, a concept that has emerged mainly due to urbanization. In other words, they are rights such as the right to privacy, the right to sunshine, and the right to the environment, which are designed to deal with the new issues that have arisen as a result of the concentration of the people in urban areas after a certain level of the right to life has been guaranteed through economic development.

In an Enabling City, we consider that discussions should be activated to deepen the conceptualization of environmental rights, which is the right to live in a favorable environment based on the right to pursue happiness under Article 13 of the Japanese Constitution, in particular, and to position the enjoyment of environmental factors that enable people's self-realization as a human right under the Constitution.

B. Urban development regulations

In the implementation phase of EC therapeutics related to urban development, urban spaces and the human behavioral changes will be promoted. Therefore, the legal system related to public space or space with public character becomes an issue.

In recent years, there has been a trend in urban planning-related legislation to encourage the participation of the private sector through deregulation, such as the introduction of the Park PFI system through the revision of the Urban Park Law, and the establishment of a system for designating roads that promote pedestrian convenience through the revision of the Road Law. In addition, revisions to the Urban Redevelopment Special Measures Law (September 2020), such as the Machinaka Walkable Promotion Project, and the Road Law (November 2020), such as the system for designating pedestrian-friendly roads (a.k.a. "hokomichi"), are helping to support this trend.

Whereas, in order to realize the principles of these legal amendments, it is necessary to review the operational rules for public space management formulated by local governments, which are the actual administrators of public spaces, to set policies for cross-sectional utilization that go beyond the realm of parks, roads, and private sites, and to build consensus among citizens and related businesses. Currently, there is a movement to redistribute road space in European and American cities, such as the Plaza Program in New York and the Superblock in Barcelona. In response to this, Japan's Road Law, Road Traffic Law, and other related laws and regulations need to be further revised. For example, in the Hokomichi system, road occupancy standards have been relaxed (e.g., exclusion of no-room standards) to achieve higher profitability. However, further relaxation of the road structure ordinance will be required in order to create a dwelling space in the road and create a lively atmosphere linked to the low-rise facilities on the private land side.

In promoting the design of urban environments based on Enabling Factors, the participation of the private sector will be accelerated from the early planning and conceptual stages. It is also necessary to maintain and expand the utility of the urban environment through the continuous involvement of the private sector throughout the life cycle of the urban environment and its components. Therefore, it is necessary to properly evaluate the contribution of the private sector to the public, and to develop contractual arrangements between the public and private sectors, local agreements, and financial support measures.

Since the existing legal system related to urban development is based on modern technology, problem recognition, and solution methods, it is necessary to take care that ideas and development are not constrained from the EC development stage or from the conceptualization stage. Urban development laws and regulations are part of the overall system, and they must be designed to dynamically generate the optimal way of being, including this system, and to contain the system to be optimized.

C. Pharmaceutical and Medical Device

When urban enablers are defined and implemented, if they are products or services that also contribute to health and have efficacy, there will be a need to consider the relationship with the Pharmaceutical and Medical Device Act. It is thought that if the implementation form is in a space, it may deviate from the definition of a medical device under the current PMD Act, so adjustments to labeling and advocacy will be necessary. Furthermore, in the case of facility-based interventions to enable in urban spaces, like the current "passive smoking prevention" provision in the Health Promotion Law, the facility's responsibility for enabling interventions will be written in. In addition, if enabling interventions such as environmental improvements are made at the level of large spaces, it will be necessary to go into environmental impact

assessment (commonly known as environmental assessment law), and there may be a need to revise the Urban Green Space Law and Urban Park Law.

This means that the process of spreading and developing enabling cities will require the development of laws that transcend the boundaries of ministries such as the Ministry of Health, Labor and Welfare, the Ministry of the Environment, and the Ministry of Land, Infrastructure, Transport and Tourism. Whereas, the industrial sector, which is promoting the Enabling Cities, can find a clue to the solution by forming an industry organization such as a general incorporated association, summarizing the industry's views in a written opinion, and forming an entity to engage in dialogue with each ministry.

D. Protection of Personal Information

In an enabling city, digital transformation is necessary to build an information environment in the city that includes virtual space. In other words, a digital twin environment will be constructed to monitor the actual use of the space and provide information at the same time. In doing so, it will be necessary to develop a legal system for the management and ownership of information based on the concept of DFFT (Data Free Flow with Trust), as well as a legal system for the protection of personal information. In the Super City Bill (Revised National Strategic Special Zones Act), which has been discussed in recent years, the principle is that the local government designated as the zone should hold a referendum to obtain support for the concept. By setting up the system so that a platform for smooth consensus building, such as an enabling poll, is available, the participation of residents in urban development will also flourish. For example, the digital platform "Decidim" is widely used, including for political participation, mainly in Europe, such as in the city of Barcelona, Spain, which is a leader in smart city initiatives. In Japan, the platform was already used in the Minato Mirai 21 district of Yokohama City (from December 2020 to March 2021).

[Social issues and how to solve]

A. New urban design concepts

In order to realize an Enabling City that functions as a field for the implementation of Enabling Factors, it will be necessary to update the concept of urban design. In the past, the fundamental concept of urban design was to devise and implement how to create an attractive appearance and shape and what functions to include in order to meet the demands of people and businesses, focusing on the purpose of accumulating businesses and people and establishing residents. This has been the fundamental philosophy of urban design. Of course, this conventional basic design will continue to be important in future, but in the world where Enabling Cities have been created, there is a need for a dynamic and qualitative theory of urban design that covers the contribution of the city to the happiness and health of its people, human flow and logistics, the scale of the transferable population, the activities of individuals and corporations, and the linkage and interaction of urban functions. The concept of ecological urban design and management will become more common.

In conventional urban design, the area to be developed is limited, and it is sufficient to ensure partial optimization that targets only that development area.

However, in future, it will be more ever than necessary to consider how the development of the area under one's jurisdiction affects the people who use other areas, and from a more macroscopic perspective, how it affects the environment as a whole in order to ensure consistency with the overall optimization.

B. Scheme Concept for the Development of Enabling Cities

As mentioned above, it is highly likely that Enabling Cities will be a completely different urban design concept. In order to apply these concepts in reality, it will be necessary to change the existing urban development scheme. In the start-up phase, it is important to inject research funds from the government as a catalyst for new research and development, but to sublimate this project into a sustainable form, we assume that it will be effective to build an implementation system with the following business scheme (**Figure 22**).

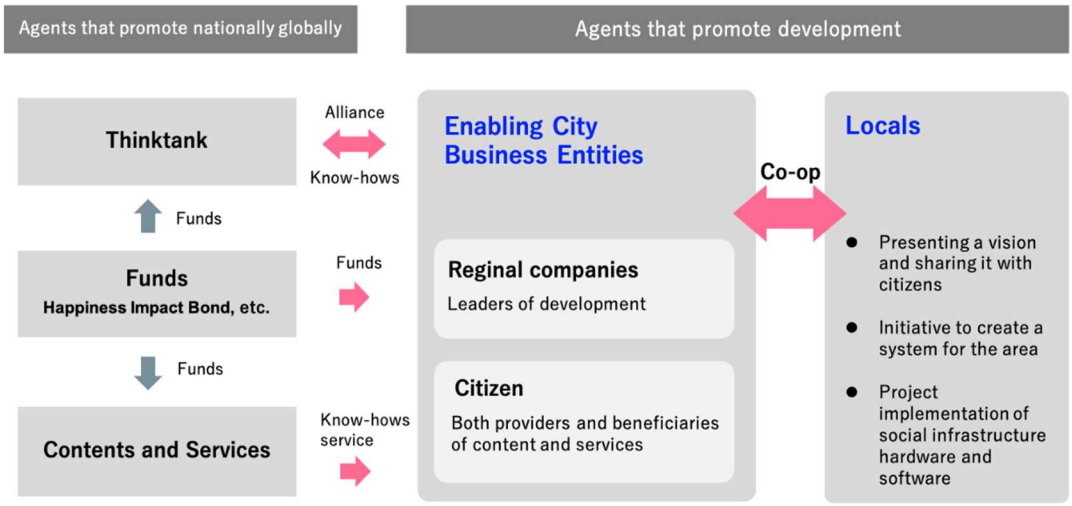

Figure 22: Enabling City area development
Form alliances with local governments, organizations, and other entities in the area where the project is to be developed, create a promotion entity for the area, and develop the project in each area.

First, it is necessary to establish a main organization that will serve as a base for the nationwide and global expansion of the Enabling Cities. This will consist of think-tank organizations, fund functions, and content service providers, each of which will play a critical role in the implementation of the Enabling City. The think-tank-like organization will have a public character, such as a general incorporated association, and will be responsible for research and development of know-how, sharing of information and know-how among areas, creation of indicators, and promotional activities. The fund function is to create a new type of investment (Happiness Impact Bond, to be described later) in businesses that contribute to the realization of an Enabling City as an extension of ESG investment, with the cooperation of finance support companies and investors. It will be responsible for investing in like-minded business entities and start-up companies throughout Japan and in each area. The content and service providers will be start-up companies that provide the content and services necessary to develop the businesses of

the Enabling City, new businesses such as companies and NPOs, and entities in partnership with multiple companies.

While these three organizations and functions will be in constant operation, it will be necessary to establish an Enabling City Area Promotion Body (general incorporated association) for each area, which will be composed of local companies, activity groups, and other business leaders and citizens, with a view to making it an urban renewal promotion corporation. It will be necessary to establish an Enabling City Area Promotion Body (general incorporated association) composed of local companies, activity groups, and other business development leaders and citizens with an eye to the future. This entity will need to take the lead in forming close partnerships with the local governments that have jurisdiction over the area to realize the project.

In particular, a new fund called Happiness Impact Bond requires explanation. It is expected that the implementation of the Enabling Factor will not necessarily lead directly to profit for the developer or business, and it is highly likely that they will face the problem of who will bear the additional cost. Therefore, we consider that there is a need to utilize the mechanism of Social Impact Bond, which is a performance-based public enterprise that sets a performance target and pays a success fee to the investor who provided the project funds when the target is achieved. If the results of the project can be measured numerically in terms of how much it has contributed to the improvement of people's happiness and health according to the progress of the study on the Enabling Factor, it is possible to use the Green Bond[87] scheme that has already been implemented in Japan as an example. As the concept of the Enabling Factor itself is a theme that is likely to be accepted by many people as a social issue, it is considered to be a sufficiently viable mechanism.

Furthermore, in order to realize the Enabling City concept, it would be effective to utilize deregulation systems such as the "Enabling City Special Zones". The call for applications for the designation of super city-type national strategic special zones closed on April 16, 2021, and has been very active, receiving applications from a total of 31 local governments.[88] Looking at the proposal materials, we can see that some of them already incorporate the concepts of happiness and health. In this context, it is not impossible that the phrase "contributing to the Enabling City concept" will be inserted in the second and third phases of the super city-type national strategic special zones.

In the past, incentives such as relaxed floor-area ratios have been given to districts with high economic value and communicative power, such as national strategic special zones, in order to improve the urban environment. In this case, conditions have been placed on the development of transportation networks, the provision of open space, the establishment of facilities that contribute to the community, and greenery standards. In addition to these conditions, funding for the social implementation of Enabling Factors could be added to the menu.

The areas where such floor-area ratios can be used as an incentive are limited to Tokyo and other large cities. In order to implement the Enabling Factors, it will be necessary to implement initiatives that have a ripple effect on all areas outside the area. This includes private real estate development projects, the use of parks and other public real estate, and the combination of real estate projects and projects such as Social Impact Bonds and Happiness Impact Bonds that measure results and pay for those results. To design such a system, it is necessary to accumulate basic knowledge to verify the effectiveness of factors.

Furthermore, most cities in Japan are facing the problems of a declining population, low birthrate, and aging society. In these areas, it is unlikely that the volume deregulation system will be able to function effectively. In these areas, for the purpose of implementing Enabling Factors, it is necessary to have a mechanism to attract private sector activities and investments by limiting the districts and relaxing various regulations regarding the management of road space and public space and the construction of digital twin environments. Although partial deregulation such as the designated manager system and Park PFI has been progressing so far, it has been limited to deregulation of individual optimal solutions. The key here is to realize integrated management at the district or city level through public-private partnerships. Such public-private partnerships will solve the problem of financial difficulties in local governments and open up the possibility of private sector service businesses of all sizes.

In this way, the implementation process of the Enabling City will bring about a new kind of collaboration between industry, government, academia, other public and private sectors, and funding bodies.

IV. Conclusion

This study proposes the realization of a prosperous and equitable society that all individuals can pursue diverse self-actualization by 2050. For all human beings to achieve self-actualization, people must achieve Equitable Human Well-being in their own right and on their terms. To achieve Equitable Human Well-being, it is suggested that Enabling Factors that enhance both subjective well-being and objective well-being are effective. A survey of existing national and international data showed that many of the Enabling Factors are linked to SDGs that are pertinent to social, environmental, and economic elements. Furthermore, the mechanism of action of the Enabling Factors can be broadly categorized into the Happiness-driven Health Act and the Health-driven Happiness Act. In conventional R&D related to health care, the global trend has been to develop a Health-driven Happiness Act. However, it has been experimentally shown that the Happiness-driven Health Act is effective in changing people's behavior. In pursuit of these Enabling Factors, Japan is reported to hold both a social agenda (ranking amongst the world's most unhappy countries) and a technological infrastructure (high-quality creative industries that contribute to happiness improvement) that provide globally appropriate grounds to test the Enabling City concept. While indicators related to health are substantial both subjectively and objectively, many evaluation systems for happiness are subjective; therefore, it is important to develop indicators such as Happiness Life Expectancy.

In this report, with the three pillars of (1) Establishment of Enabling Factor theory; (2) Research and development of Enabling Factors; and (3) Societal implementation of combinatorial Enabling Factors, we propose to develop the Enabling Factor into various aspects. Living, working, learning, and pursuit of leisure in a world with Enabling Factors will become the global standard, and everyone will be content and happy regardless of their health status and will be self-aware of achieving self-actualization. The creation of a society that can focus on this has been set out as the Moonshot goal in this proposal. By setting urban development as a core development goal, we will redefine the ideal partnership that will reflect all the voices of multiple stakeholders and diverse local residents and build a successful model for social implementation.

Starting with the valorization of Enabling Cities around the world, Equitable Well-being will be realized through the implementation of Enabling Factors that enrich the lives of all people everywhere. When all human beings with well-being can focus on self-actualization, social, environmental, and economic activities will be aimed at achieving an affluent life, and a global virtuous circle for sustainable development will be realized. It is highly expected that the Moonshot research and development will be the starting point for the creation of a truly self-actualizing world (an Enabling World).

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