



COI-NEXT KAWASAKI

# CHANGE

Center of Healthy longevity And Nursing innovation with Global Ecosystem

# About Project CHANGE

As the birthrate declines and the population ages, the number of people requiring nursing care per person in the working population in Japan continues to increase year by year, and if this trend continues, it is statistically predicted that by 2040 the burden will be 1.5 times the current level. It has long been said that in order to slow this upward trend, it is necessary to extend healthy life expectancy, the period during which people can lead autonomous lives by slowing the aging process. However, the reality is that there is still no effective solution. Therefore, we have conducted interviews with people in various fields and researched what is effective for extending healthy life expectancy. As a result, the field of home health care nursing emerged as one that has not been addressed to a great extent. In hospitals, nurses stay with patients 24 hours a day to provide appropriate care, but this is not possible at home. To extend healthy life expectancy, it is necessary to improve the quality of care. Therefore, it is necessary to improve the care literacy of citizens and to provide nursing tools that anyone can easily use at home. We cannot have tools that can only be used by doctors and nurses," voiced by visiting nurses and doctors at core regional hospitals, a new direction was found for science and engineering researchers to move in. We therefore set forth a vision of a "resilient, healthy and long-lived society led by medical-engineering and nursing co-creation" as the center's vision, formulated four targets and five R&D themes, and applied for the "COI-NEXT" (Co-Creation Opportunity Formation Support Program) by the MEXT/JST, and our proposal was selected as the COI-NEXT Kawasaki City base "CHANGE". Resilient" is defined as a state being "flexible" and "recoverable" against illness, and the project aims to develop technology that systematically captures changes in physical condition as we age in our daily lives and restores them as needed. The proposal adopted this time seeks to enhance the care literacy of citizens and create tools and mechanisms that enable non-medical professionals, such as family members, to provide nursing care in the comfort of their homes. We will also begin research on the application of smart nanomachines, which are being studied in the concept of an in-body hospital\* that we aim to realize in 2045, to slow down the aging process. As its name implies, nursing has been based on "hand-to-eye protection" and has lagged behind other fields in terms of innovation in science and engineering, making it an area with high potential for creating new industries. Project CHANGE will consider how care should be provided in home healthcare, which is expected to increase in the future, from the viewpoint of science and engineering, and will develop tools and systems that enable anyone to look after those close to them and foster care literacy.

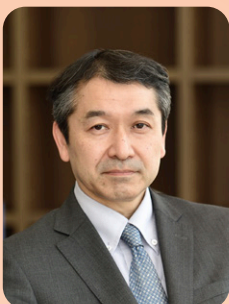
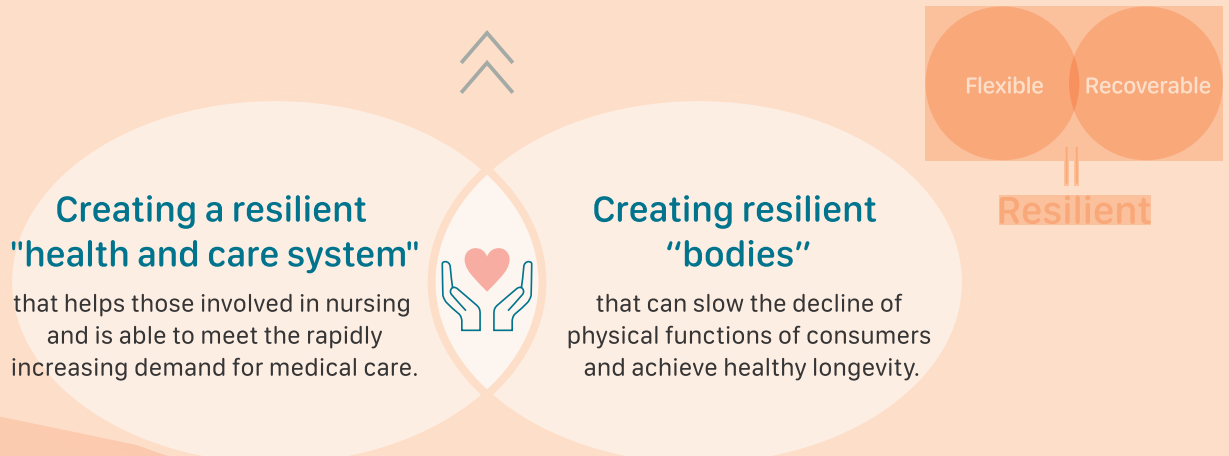


\*In-body hospital:  
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(kawasaki-net.ne.jp)

## Our Vision

**Resilient, healthy and long-lived society led by medical-engineering and nursing co-creation**

"Resilient" is defined as a state of being "flexible" and "recoverable" against illness.



Project Leader

**Prof. Takanori Ichiki**

iCONM Research Director  
Graduate School of Engineering,  
University of Tokyo

## Greeting by Project Leader

As Japan's birthrate declines and the population ages ahead of the rest of the world, more and more people will require long-term nursing care, leading to a shortage of medical infrastructure and medical personnel. We need to transition to a lifestyle and social system that does not place an undue burden on medical institutions. In home healthcare, nurses cannot stay with patients 24 hours a day as they can in hospitals. We need tools, systems, and knowledge that allow anyone to provide nursing care, not just doctors and nurses, but anyone who is close to the patient. In this project, we see the challenges of a society with longevity as a CHANCE to create new industries and businesses, and we are taking on the challenge of CHANGE to change people and society in order to realize flexible and strong medical and healthcare systems. Innovations that enable the reduction of the burden of nursing care and control of aging through cutting-edge technologies and systems. We will work with nursing care providers and citizens to achieve these goals, and look forward to your continued support of the CHANGE project.

## Current status and future issues of nursing

Nurses work in a wide range of health, medical, and welfare fields, and their basic duties are to attend to people with physical and mental health challenges and to support their lives from a nursing perspective. Nursing professionals always want to reduce patient suffering and contribute to the peace of mind of patients and their families, but the reality is that it is difficult to spend enough time with patients due to the daily routine of procedures, etc. In hospital wards, efforts are made to come in earlier than regular hours to assess the patients' situation. However, with the securing of nursing personnel becoming a serious issue, the future sustainability of the industry is in jeopardy if only human efforts are made, and innovative "environmental improvements" are desired. We are very grateful and have high expectations for researchers specializing in science and engineering to take on the task of improving nursing operations from a perspective that has never been seen before. Through this project, we would like to contribute to the improvement of nursing practice to provide the care that nurses desire and to prevent fatigue among nurses, as well as to disseminate nursing skills and knowledge that will enable anyone to look after the loved ones close to them.



KNA Homepage



Akie Hotta

Chairperson  
Kawasaki Nursing Association  
(KNA)

## Engineering Innovation for Nursing People(Kan-Min-Kogaku)



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The term "Kanmin Kogaku: Engineering Innovation for nursing people" was coined to mean not "nursing" to care for the sick, but "Kanmin" to care for people. This is an effort to reform the way nurses work by combining engineering theory and technology with nursing techniques that are mainly performed by human hands, and to realize a society where people can live with peace of mind (trademark registration obtained). As a result of a survey conducted by the Kawasaki Nursing Association, a great many issues and needs have already been delivered from the field of nursing practice, and these have been classified from an engineering perspective, and discussions have begun on systematic solutions. In the near future, it is expected that the research results generated from this process will be implemented in society, leading to product development and even industrialization in the nursing field, where there has been little innovation to date.



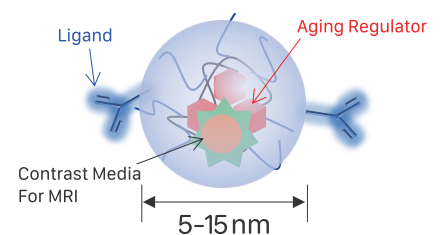
About Kanmin Kogaku

## Nano-DDS Technology and Aging Control

The nano-DDS technology developed in Project COINS\* is now being applied in Project CHANGE. It is now possible to deliver nanomachines loaded with anti-cancer drugs to the center of intractable cancers protected by a barrier called the stroma. Senescent cells have similar characteristics to cancer cells, such as having a mechanism to escape from immune cell attacks. In addition, they are known to release cytokines, which not only accelerate the aging of surrounding cells, but are also known to be involved in the development of cancer, diabetes, sarcopenia, and liver damage. Therefore, nanomachines that detect and eliminate senescent cells hidden in micro organs at an early stage will slow down the aging process and inhibit the onset of various diseases that impair healthy life span.



\*About Project COINS



Nanomachines with world smallest diameter eaching to microinflammation site

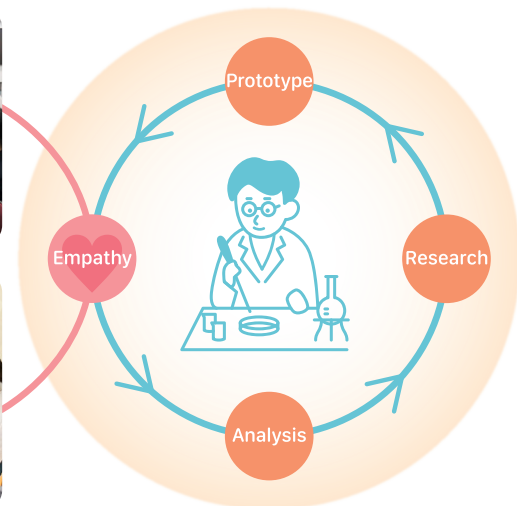
## Care-Literacy and "Place for Learning"

Literacy is the ability to understand and apply what is written in books or taught by others. Naturally, there are differences between medical professionals and researchers, and the general public in terms of professional medical and nursing knowledge. However, in order to look after the loved ones close to us, it is important to have some medical and nursing knowledge and know-how, and be able to use it when the need arises. This is because in a hospital, nurses can be there for patients 24 hours a day, but this is not possible at home. Therefore, Project CHANGE is trying to build a "learning place" as an opportunity for everyone to improve their care literacy (nursing literacy).



## Design Thinking and "Place for Empathy"

According to the International Mathematics and Science Education Trends Survey (TIMSS2019), 92% of elementary school students said that studying science is fun, while the figure drops to 70% for junior high school students. The international averages are 86% and 81% respectively, a gap not as large as in Japan. This also has an impact on their work ethic, with only 27% of junior high school students wanting to pursue a career in the sciences in the future (international average: 57%). The decline in science among children not only raises concerns about a future shortage of research personnel, but also leads to the problem of difficulty in forming the "empathy" with the public that is necessary to carry out a single research project. It is undesirable for research to proceed solely on the basis of the ideas and interests of researchers. It is also important to actively incorporate the voices of stakeholders involved in the research results, such as citizens and healthcare professionals, from the research in progress, in order to consider future social implementation. In this program as well, improving the care literacy of citizens is an important factor in forming a "place of empathy" necessary for creating innovation in the nursing field. In addition to taking the viewpoints of citizens and nursing professionals who will become future users of nursing care, this center will actively utilize the wealth of knowledge and experience accumulated in other fields of expertise, such as science and engineering researchers, to address nursing needs that have not been resolved up to now. In addition, since nursing is a very new field of study for science and engineering researchers, they have much to learn from nursing researchers and are much more likely to come up with new and innovative ideas.



Workshop with Future Opinion Board  
(High School Students and Young Nurses)

## Project Leader & Project sub-Leaders



Project sub-Leader (Diversity & Inclusion)  
**Makoto Shimazaki, Ph.D.**

Graduated from Tokyo University of Pharmacy and Life Sciences. He has spent his career in the research and communications of pharma industry, including as a VP. Since May 2019, he has been working at iCONM as Communications Manager.



Project Leader  
**Takanori Ichiki, Ph.D.**

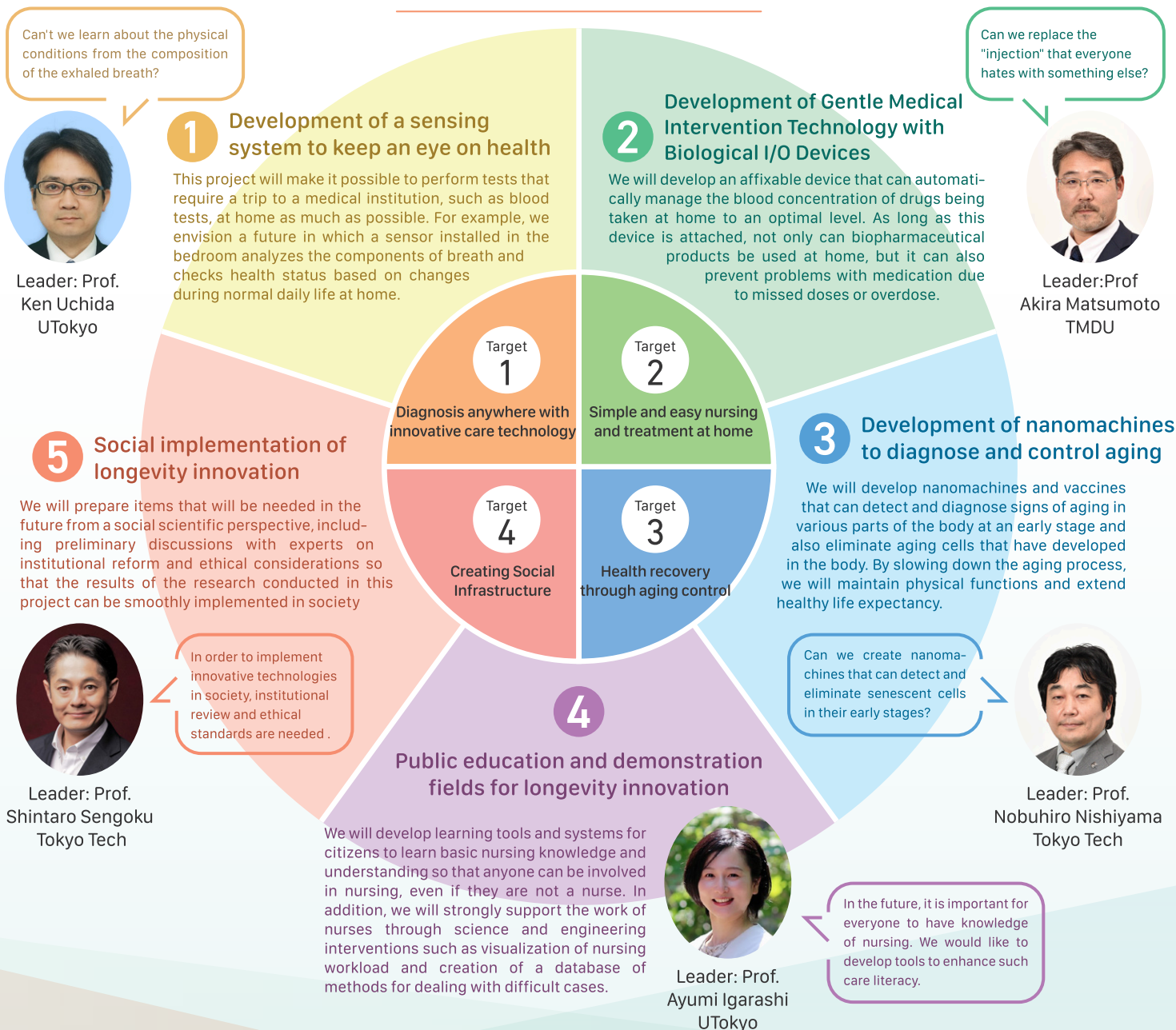
Graduated from the University of Tokyo. He has been working at iCONM as a principal scientist since 2015 and currently serves as the research director. He is also appointed as a professor at the University of Tokyo.



Project sub-Leader (Organization)  
**Koji Nagai, Ph.D.**

Graduated from Nagoya University. He spent his career in the research of a pharma industry, where he also served as a laboratory director. Since May 2019, he has been working at iCONM as Chief Coordinator for Research Promotion and his current position is Deputy Director.

## 5 Themes and Their Leaders





## Project **CHANGE** Launched!!

Center of Healthy longevity And Nursing innovation with Global Ecosystem

Kawasaki Institute of Industrial Promotion (KIIP) was selected as a COI-NEXT (Co-Creation Field, Full-Scale Type) project by MEXT/JST in FY2022. KIIP serves as the representative organization for the "Center for the Formation of a Global Ecosystem Leading to the Realization of a Resilient, Healthy and Long-Lived Society" (COI-NEXT Kawasaki), which started on October 25, 2022 under the name of Project CHANGE. By listening to the voices of not only medical professionals but also those who are involved in the practice of nursing and solving problems with the power of science and engineering, we aim to secure the future nursing workforce and establish a resilient and flexible society with a healthy longevity.

Based on the catchphrase of COI-NEXT: "Change People. Change Society. Change University.", we established our strategy as "C to G with Ts", which is **CHANGE** when the T is superimposed on the C of **CHNACE**.

We view social issues as a **CHNACE** to create innovation and industrialization, and we are committed to bringing **CHANGE** to society with our superior **T**echnology and **T**alent, as well as **T**olerability and **T**houghtfulness toward diversity.

\*Center of Healthy longevity And Nursing innovation with Global Ecosystem

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