Economic Research Institute of the Japan Society for the Promotion of Machine Industry FY2021 Research Project (21-2)

Research Project on the Market Development and Industrial Growth of Service Robots
"Proposals for Expanding the Robot Market in the Nursing and Care Sector"

Executive Summary

1. Objective of the Proposals

Almost ten years have passed since momentum was raised to introduce robots and robotics technologies in the nursing and care sector in Japan, facing a super-aging society toward resolving labor shortages of the sector. However, contrary to the initial expectations, the utilization of "care robots" is not spreading in the nursing and care sector except for some types. Thus, the original idea of having the widespread use of robots in the nursing and care sector play a part in the expansion of the service robot market still has not been realized.

As a matter of course, various efforts, including policy measures, have been made to expand the use of robots in the nursing and care sector. However, these efforts have not greatly contributed to the widespread use of service robots in the nursing and care sector and the expansion of the related robot market. On the contrary, if the current system continues, a certain sense of disillusionment with robots will arise in the nursing and care sector, and the future of robot use in the nursing and care sector may be even trivialized.

In these proposals, we discuss where the current problems and obstacles lie, and how the measures to utilize robots in the nursing and care sector should be relaunched. Although various attempts have been made for many years to promote the utilization of robots in the nursing and care sector, the limited expansion of the market implies that there are very complicatedly intertwined problems in which various stakeholders are involved. All of these problems cannot be resolved easily, or there is no "magic" that can be an almighty solution to all of them. In these proposals, we re-sorted the problems confronting the nursing and care sector from some aspects, and attempted to help remedy and resolve them.

2. About the Definitions of Robots

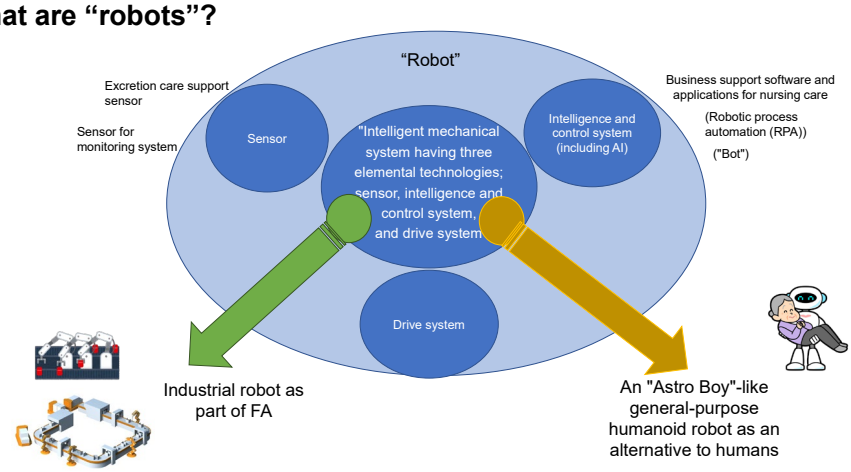
In these proposals, we do not strictly define the concept of "robots," but use the term "robots" mainly for robots having features as shown below:

<Robot>
✓ Apparatus or machine that is a system consisting of sensors, computers, and actuators and substitutes for the "physical elements" of a human being with a mass and a speed

<Service robot>
✓ Robot mainly used for a non-manufacturing business, especially services (for people)

In addition, we do not bother to draw a strict line between “robots” and “machines,” “devices,” “equipment,” “facilities,” “systems,” and so on used around robots and incorporating automation functions in part, with the differences between them kept in mind although, and focus mainly on apparatus and machines that substitute for the physical elements of a human being and have a mass and a speed as robots.
However, the " care robots" covered by the “development priority areas for care robots” defined by the Ministry of Health, Labour and Welfare and the Ministry of Economy, Trade and Industry include not only robots having a mass and a speed but also many devices equipped mainly with technology often called “digitization,” such as sensors and communication devices. In addition, rather than the development of "robots" themselves, focus has been placed mainly on the "utilization of advanced engineering technology" or the "use of robot technology" for apparatus and devices that are an extension of existing welfare apparatus. Thus, "automation," "sophistication (in engineering and technology)," and "intellectualization" are important factors for the "robots" covered by the "development priority areas for care robots," and what are the objects of these “sophistication” or “intellectualization” is not considered important.
Meanwhile, care workers feel it very strange that the “utilization of advanced/sophisticated engineering technology" or the "use of robot technology" for apparatus and devices that are an extension of existing welfare apparatus is called “robots.” “Robots” imaged in the nursing and care sector are general-purpose “care-performing robots” that will (almost) completely substitute for human beings. People naturally think that such “care-performing robots” will make up the shortage of nursing and care workers. Contrary to it, people are less aware that automating, sophisticating, and intellectualizing mechanical systems of existing welfare apparatus is “robots,” and this situation is the cause of not making firm the idea of directly linking this approach to making up the shortage of care workers.

Figure What are “robots”?



Note) Figure 2 (page 7) in the main text of the report.
Source) Service Robot Study Group

In these proposals, we do not place undue importance on general-purpose humanoid robots that will completely substitute for human beings but do not exist in reality. We will rather fully consider the meaning of the vague yet very strong demand for “care-performing robots” in this nursing and care sector. This is because latent needs for “robots” in the nursing and care sector exist there. It is also connected to defining “apparatus or machine

that substitutes for the ‘physical elements’ of a human being with a mass and a speed” as a “robot” in these proposals. And we consider the roles robots will play in “integrated services” to be created by service providers working together in the network of peripheral machines and mechanisms of such robots.

3. Proposals

Proposal 1: Stop discussion starting with "eliminating the shortage of care workers by introducing robots" in the nursing and care sector, radically rethink the way of utilizing robots, and re-explore the direction of market expansion in the nursing and care sector.

- As long as the current direction of introducing robots in the nursing and care sector is followed, the expansion of introducing robots and the realization of eliminating the shortage of care workers in the nursing and care sector by introducing robots will remain limited.
- Almost no “care robots,” or “care-performing robots,” exist. At present, there are significant technical constraints on the following:
  (1) Robots will perform a series of nursing work completely in place of and like human beings while making flexible adjustments.
  (2) Robots will efficiently perform physical work with human beings (“cooperation with human beings”), or directly exert the action of force on human beings through mechanical contact (“action toward human beings”)
- For this reason, robots having been developed are capable of substituting only single task or a part of series of work. Prioritizing the utilization of such robots as they are in the current flow of nursing and care may lead to a situation where care workers will be merely forced to deal with additional work and procedures in contradiction to the elimination of the shortage of care workers, and motivations to introduce robots will not arise.
- In consequence, in the current form of need-seed matching for robot development for the nursing and care sector could induce pursuit for a kind of partial and limited optimization, but overall optimization will not be aroused.
- The way of utilizing robots in the nursing and care sector, which is one of the typical personal services, should be fundamentally reconsidered, and the direction of market expansion should be re-explored.

Proposal 2: Reorganize needs from “care robots” to “care-assisting robots.” In addition, sort workplaces that will introduce “care-assisting robots” by type.

- Reorganize the robots being introduced in the nursing and care sector from “care (care-performing) robots,” which don’t exist in reality, into “care-assisting robots.”
- Do not persist in replacing and covering operations and work directly involved in care with robots, and actively promote the utilization of “care-assisting robots” in the indirect operations, and review the development coordination system and the assignment of roles.
- In this process, sort workplaces that will introduce care-assisting robots by type, because the nursing and care sector involves an extremely wide range of situations

- Compile information on the effects of robots that can be obtained in nursing and care workplaces by introducing robots into guidelines, and make them available for the robot developers before actual development starts.

Proposal 3: Improve overall operations of care workplaces with the utilization of DX, etc., and make an attempt to appropriately introduce robots in process of it. To this end, aim to introduce a "connoisseur" as a general producer and planner.

- In the nursing and care sector, it is necessary to first "streamline" and "improve" the entire flow of operations and work in care workplaces through DX, networking by ITC, and so on. As part of such overall operation improvement, robots should be appropriately utilized as operation-assisting apparatus.
- In order to comprehensively organize technology and information related to the different fields of DX and the utilization of robots and appropriately allocate them to the nursing and care sector, a "connoisseur" needs to be introduced as a general producer and planner.
- For such a "connoisseur" as a general producer and planner, very extensive knowledge, information, and network beyond conventional Industrial Engineers, robot SIers, etc. are required, and it is anticipated that it will be difficult for individuals to cover all of them. Thus, organizing a team to deal with them is conceivable.
- For discussing and determining how to develop "connoisseurs" as general producers and planners, interested parties in administrative bodies, the nursing and care sector, companies involved in DX, service robot-related industries, and so on must gather and go into a deeper discussion together about it.

Proposal 4: In preparation for an age when robots that will work in collaboration with human beings and robots that will make actions toward human beings, which will be realized in the future, will be introduced in the nursing and care sector, activate the development of such robots and, at the same time, prepare adequate systems, such as safety standards for such robots.

- The development of robots that will work in collaboration with human beings, and robots that will make actions toward human beings requires significant investments, and the likelihood that they will be developed for the nursing and care sector as the initial market is slim.
- However, there is an expectation that robots that will make action toward human beings will be developed in other sectors and then utilized in the nursing and care sector. It is therefore necessary to formulate a special scheme for activating the development of such robots.
- The formulation of such a scheme requires the establishment of criteria and standard for using and utilizing robots not only "safely" but also "securely" in the nursing and care sector.