

Expanding Welfare Concept and Assistive Technology

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1. Introduction

The problem common to most countries in the world is that the population ratio of the elderly is increasing. The increase is by far the fastest in Japan. It is serious that the ratio of workable population to the whole is decreasing. It is more serious that the framework for the care or the thought of people can not follow the rapid change of population, producing confusions. Manpower is anyway insufficient, and new technologies to help are required.

2. Expanding concept of welfare

In Japan, the elderly above 65 will soon occupy 1/4 of the whole population. The situation is similar in many other countries. The elderly is no more a minority to be cared behind the scene. Rather, the elderly should positively activate and support the society. Otherwise, the country loses its energy.

The elderly in good health should continue to work or participate in social activity. The elderly with a physical problem should try to be self sustained to continue independent life. The elderly laying on bed should live positively, and the labor of the carer should be reduced. In any of those, help of technologies is needed, both physically as well as mentally.

The original concept of "welfare" is to assist those who are weak. Facing diversified elderly, however, it is difficult to decide who is weak. It is gradually recognized as the concept of welfare that not only the weak but also everybody should be happy. There will be a great demand to care the elderly, but we should not forget about the disabled

3. Characteristics of the elderly

Compared to the disabled, the elderly is less motivated to work for money or do something. A technology is not accepted unless it meets the user's own criterion for comfortability and usefulness. In order to be accepted, the machine should match the physiological and psychological characteristics of the user. There are general and individual characteristics of the elderly.

The interface is important, and the designer of the machine must have the knowledge of the general characteristics of the elderly. The knowledges of the vision, hearing, posture motion and thought process should be spread widely. I am leading for some years a project in the Human Quality of Life Research Center in Japan to construct a database for the characteristics of the elderly, which is already open to public.

In many respects, the capability of the elderly is not degraded, but the range of the condition for him to exhibit his capacity is narrow. It should also be noted that the elderly is diversified in the extent of health and the evaluation of usefulness. In other words, the machine must match the individual elderly, rather than to force him to handle the machine. The match implies the comfortability in use and the use of his ability.

Many insist that the elderly after ten years will be more machine preferred and will not refuse the machine. The machine-oriented user and a machine difficult to use, however, are quite different. We find that even a single switch at present is not designed for easy use of the elderly. Actually, We tried various improvements.

4. Technology for the elderly

1/4 of the population is a market which is big enough to attract industries. In fact, great many manufacturers are interested in the welfare industry. The central and the local governments are trying to help the new industry grow up. As the society as a whole, machines must be mass produced to satisfy the need and to be economical. The compatibility between the standardized mass production and the satisfaction of individual requirement is a problem.

The disabled is less in population and has more individual requirement, which makes the industry difficult to cope with the disabled. There must be a division of labor between the governmental activity and the industry. The orphan technology is considered, as an analogy to the orphan drug.

As another aspect, the technology today is designed only for the physical convenience, and the mind of people is often forgotten. The newly emerging technology, however, should be used also for the interfacing of people to improve the human relations. I call such technology the man-man interface.

5. Development of technology

11 sectors are listed as important in the prediction of social requirements and industries in Japan, in which the health and medical care is listed as the first from its urgent need and rapid growth. The government has various encouragement schemes for technology development, which are going to be reorganized next year. Basic lines then are research, development and transfer to practice. By the law for welfare goods, the development of technologies in Japan is encouraged through New Energy Development Organization (NEDO) and Techno-Aid Foundation. Many successful results are already seen.

In medical care, the high-technology oriented large scale projects will continue with a more strict pre evaluation. Amalgamation of research efforts similar to BECOM (biomedical engineering consortium), as well as the strong collaborations of medical and engineering facilities on particular topics, are

considered. The market is now highly internationalized with competition. Individual products are analyzed to enhance the power in the international market. Efforts are going to be integrated (called Medical Frontier Plan).

The development of welfare technology is still unmaturred, as in other countries. The technology for the disabled has a long history. The situation, however, is changing with the advent of the elderly society. Some researchers consider that the elderly will become disabled someday, and consequently, the traditional technology for the disabled can work effectively also for the elderly. This, however, is not true in views of the big market, motivation for using technology and the human relations.

There are many efforts to develop the technology for the elderly, with a considerable success. A more comprehensive view including researches, as well as the guiding frameworks, such as ergonomics, psychology, reliability, reuse and standardization, are needed. Some guidelines are already prepared and some are in progress.

6. Production and use

The technology for the elderly is similar to the home use equipments in view of the big market and the use by non specialists, where the safety, reliability and economy should be emphasized more than the performance. Then, the established technology should be used, rather than a new technology. Stick to a high technology often leads to a failure. Standardization, reuse and mass production should also be considered.

An aspect which differs from the home equipment is that the individual elderly and the disabled may require a special custom design. To satisfy flexibly the individual requirement while mass-producing machines economically, a modern fabrication technology can be used. This is still one of the issues that must be solved. The manufacturer should not only produce machines but also consider from planning, production to distribution, follow up and update, as a comprehensive system.

There is no definite boundary between the disabled, the elderly and the general public. There is an idea that the machine should be designed, as far as possible, from the viewpoint of such a broad spectrum. It is similar to the universal design, but is called "kyo yo hin" (goods for common use), which is now an international terminology.

7. Technology and human relations

The information technology is now penetrating rapidly into every corner of the society. The use of information technology is a must, and the elderly or the disabled who does not use the terminal such as ATM, is really an information divide. We revised the accessibility guideline for the disabled to

information technology, and now considering the version for the elderly. Mostly, however, the use of the information technology is discussed from the viewpoint of the physical help. Mental aspects must further be considered.

There will be changes in the thought process and human relations, including the elderly. The communication by PC, for example, sends only business matters without an emotional exchange. A society will emerge, where the contract and responsibility of the individual have more power than the emotional understanding.

The society may change, but the change of human relation at home may be serious, since the family including the elderly must educate child to maintain continuity of the society. In many plans, home is placed at the end of the network, but the human relation starts from the family toward the outside world. Many psychologists point out that the dialogue between the elderly and the grandson is important to develop a healthy mind, which should be realized by a technology. The use of home LAN for amusement may give a clue to restoration of the human relation.

8. Conclusion

From the viewpoint of the elderly society, there must be developed many new technologies, which are new, and not simply an extension of the technology for the disabled. We need to pass through the following four stages until a good machine is developed.

- a. Preference of human warm hands rather than cold machine.
- b. Machine and environment matched to characteristics of the elderly.
- c. Match mass production to individual requirements.
- d. Technology that approaches the human mind.

Probably we do not go through before the peak of the elderly population, but engineers should progress as far as possible.

It is rare that the problem in welfare can be solved by a single discipline. Rather, there must be a collaboration of engineering, psychology, medicine and practice of care. Recently, a new society is formed in Japan, with myself as the president, aiming at the horizontal exchange of expert knowledge and collaboration.

The technology has been developed for the disabled, and then it is extended to the elderly. Further extension of knowledge to cover the human characteristics in general will strengthen the industry and enrich the life of people. The engineers in the field of welfare technology are at the shortest distance to this goal. This is another issue for the future.