Science, Technology and Civil Society:
Empowering Roles of Scientists and Engineers

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これからの科学技術と社会
－科学技術と社会のよりよいコミュニケーションをめざして－

Science and Technology for Society:
Creating New Relationships

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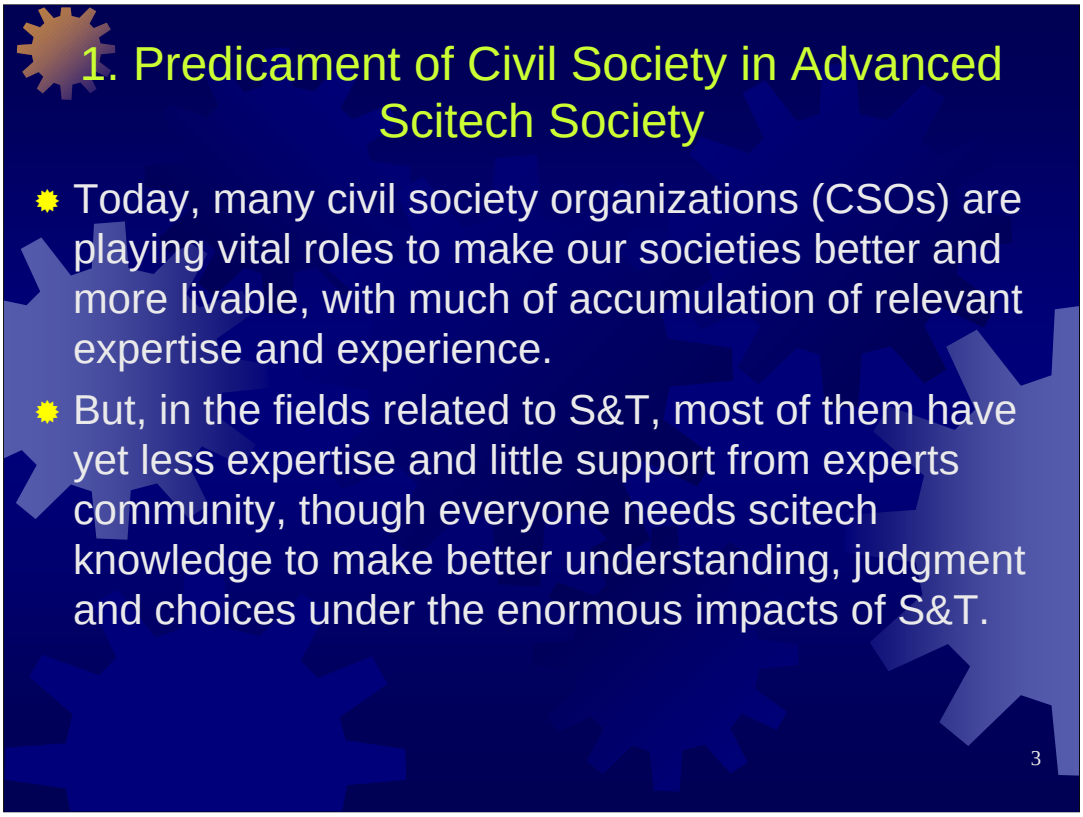
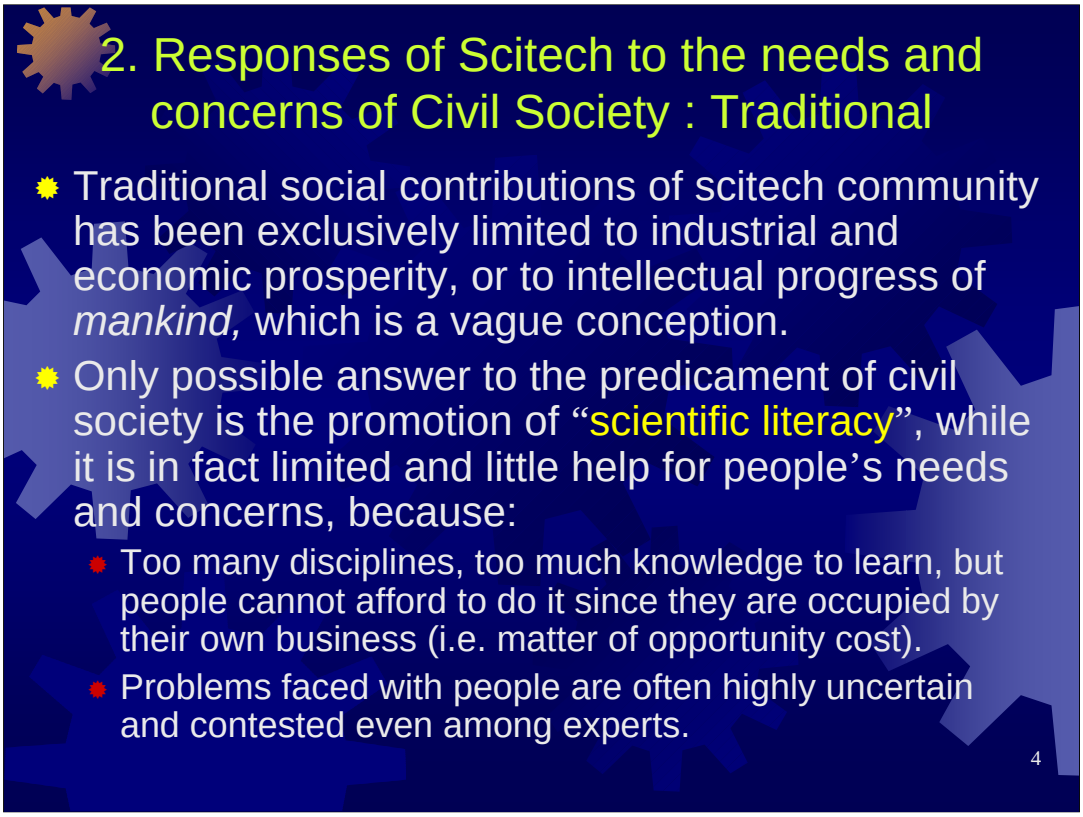


At first, what is the predicament faced with civil society in advanced scientific and technological (scitech) society? It is the scarcity, or worse, lack, of scitech expertise and support from professional scientists and engineers.

In contemporary society, one of hallmarks of advancement of society is the maturity of civil society in which people can freely exchange their views and opinions and act together in solidarity with others, regardless of their gender, age, vocation, natality, in order to make their society more livable. In fact, many civil society organizations (CSOs) are playing vital roles in various fields such as environmental and consumer protection, peace making and so forth, on various levels of local, national and global politics.

However, when it comes to the issues deeply associated with science and technology, most of CSOs and individuals have less expertise and little support from professional scientists and engineers. Under the enormous impacts of development of S&T, both positive and negative, we all need scientific and technological knowledge, or scitech expertise, to make better understanding of issues we face, better judgment and choices, and better commitment to actions to make their lives and society better. But, most of us cannot afford to learn it sufficiently or to hire scientists and engineers for our own problem solving. And it seems that this predicament is more serious in Japan as well as less developed countries than other advanced industrial countries.



2.1 Traditional Contributions

When the public, or civil society organizations (CSOs) are faced with such a difficulty, what kinds of contributions does the expert community make?

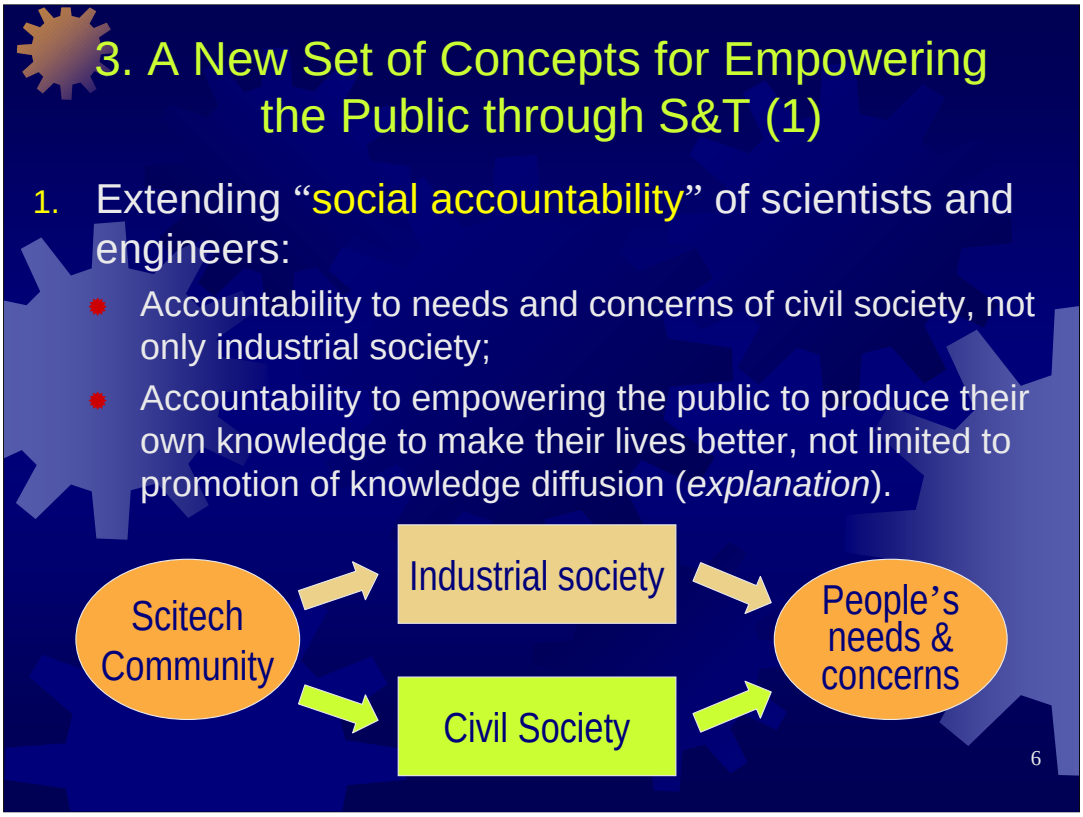
The traditional contributions have been exclusively limited to industrial and economic development, or to the intellectual progress of "mankind", which is too a vague and remote concept as compared to the concreteness and acuteness of needs and concerns of the public.

And only possible answer to the predicament of civil society has been the promotion of "scientific literacy". But it is in fact limited and often little help for people's needs and concerns. It is because there are too many disciplines and too much knowledge for people to learn. In this highly advanced scitech society, people are faced with diverse issues which require knowledge of multiple disciplines, but they cannot afford to do it since they are occupied by their own businesses; that is, it is a matter of opportunity cost. And another reason for the limit of scientific literacy is that the problems faced with people are often cutting-edge issues and therefore highly uncertain and contested even among experts, such as the future environmental impacts of genetically modified organisms (GMOs). It is impossible for lay people to give definite answers to such a question. Scientific literacy is not enough!

2.2 New Contributions

Thus, it is clear that the traditional ways of social contribution of scitech community is not enough, or even helpless to respond to public needs and concerns. We have to invent new ways of contributions and new roles of scientists and engineers.

Then, what type of contributions should we conceive? In the first place it must be more direct intermediating roles to bridge S&T and civil society, empowering people more straightly. It is to promote and support public access to scientific capacity of knowledge production as well as to knowledge itself. In other words, in order to *expertise democracy*, to make civil society more intellectually competent, it is necessary to *democratize the expertise*.



In order to realize the democratization of expertise, we need a new set of conceptions and models of S&T. This is what I want to talk in the latter part of my presentation.

At first, I would like to propose to extend a set of conceptions associated with scitech activities in order to make them more suitable to empower civil society more straightly.

3.1 Extension of "Social Accountability" of Scientists and Engineers

First of all, it is the extension of the range of "social accountability" of scientists and engineers. The concept of accountability is often understood as the responsibility of explanation of one's conducts and events. But it is at the same time the responsiveness to needs and concerns of civil society, not only those of industrial society. The public as citizens expect experts to solve their problems and in case of publicly funded research they pay much money to it as taxpayers. So that scientists and engineers should bear and fulfill their responsibility to meet public demands, especially by means of empowerment of people to produce their own knowledge outcomes, not only knowledge diffusion or explanation.

3.2 Extension of "Scientific Literacy": Literacy as Collective Property

The second element of new concepts is an extended conception of "scientific literacy", namely, scientific literacy is not only what is our mind but also what is in our community. In the traditional conception, scientific literacy is a personal ability to understand and judge scientific and technological issues. But we should extend it to the extent that it involves social, collective nature. It is a collective property of the community where people live. It is an intellectual asset of community consisted of network of human, knowledge, and other R&D resources. Therefore, the adjective of "scientifically literate" means that any members of community can afford to access to resources to learn and produce relevant knowledge for their problem solving.

3.3 Extension of the "Robustness" of Knowledge: Social Robustness of Knowledge

The last element of new concepts is the "social robustness of knowledge", which has two aspects.

On the one hand, this concept is defined in terms of the "multiplicity of knowledge sources". By this term, I mean following points. Firstly, it means that the basis of knowledge is not a single discipline. Secondly, it is not limited to professional works of experts, but also involves so-called "local knowledge" of various people. People have their own knowledge and experiences in their daily lives and vocations, and such a knowledge are often indispensable for understanding and solving problems such as environmental problems of local sites. Lastly, the multiplicity means that the robust scientific knowledge emerges from the exchange of information and opinions from multiple points of views and contexts. Controversy and mutual criticism are essential for making knowledge more reliable.

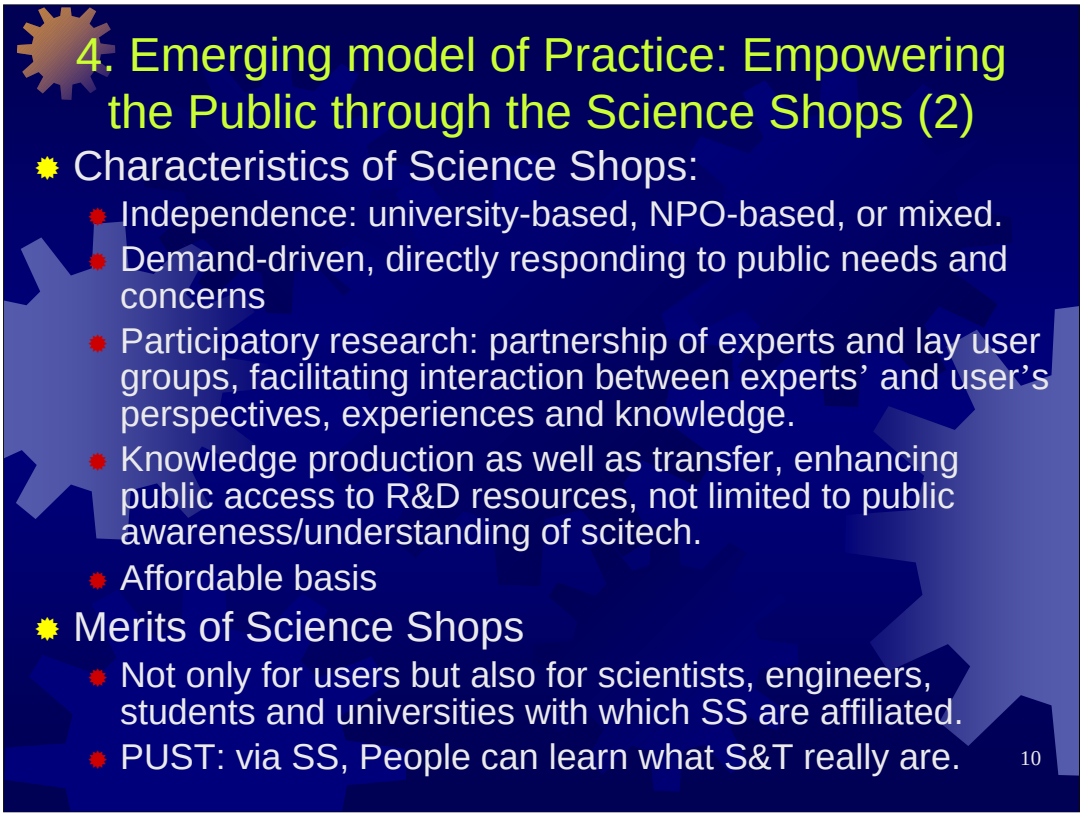
On the other hand, the concept of "social robustness of knowledge" means that the basis of robustness of knowledge should involve social values as well as scientific facts and values, and that social values are not only industrial and economic values but also political values such as empowerment, fairness and justice.

To sum up, combining the multiplicity and social values, it may be said that robustness of knowledge is based on "public proof" rather than scientific proof.

As the final section of my presentation, I would like to introduce you an emerging model of practice to empower the civil society directly. It is the science shops.

4.1 What is the Science Shop

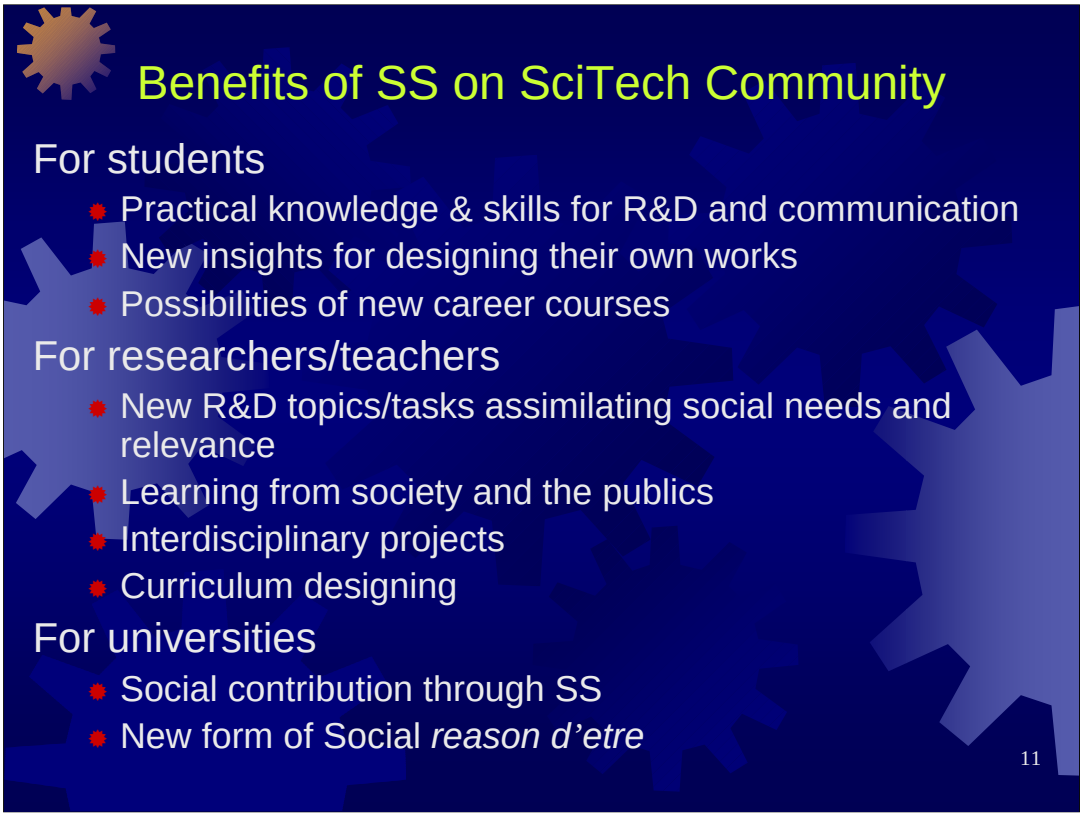
The science shops are activities analogous to that of legal advice office. They provide independent, participatory research support in response to concerns experienced by civil society on a demand driven and affordable basis. They originated in Dutch student movement in early ’70s and in USA there has been a counterpart called “community-based research center” that has a different origin in ’60s. Today, about 70 science shops exist in Europe alone. Most of them are located in the Netherlands, Austria, Denmark, France, Germany, Romania, and the UK. In USA, it is estimated that more than 500 community-based research centers. And in Asia, Korea has several science shops. Many of them are located in universities and some are independent NPOs. Especially in Netherlands, all universities have one or more science shops and they are incorporated into curricula of university education. And recently, the activities and network of science shops in European countries are supported and promoted by European Commissions as a program of *SCIENCE & SOCIETY ACTION PLAN 2002*.



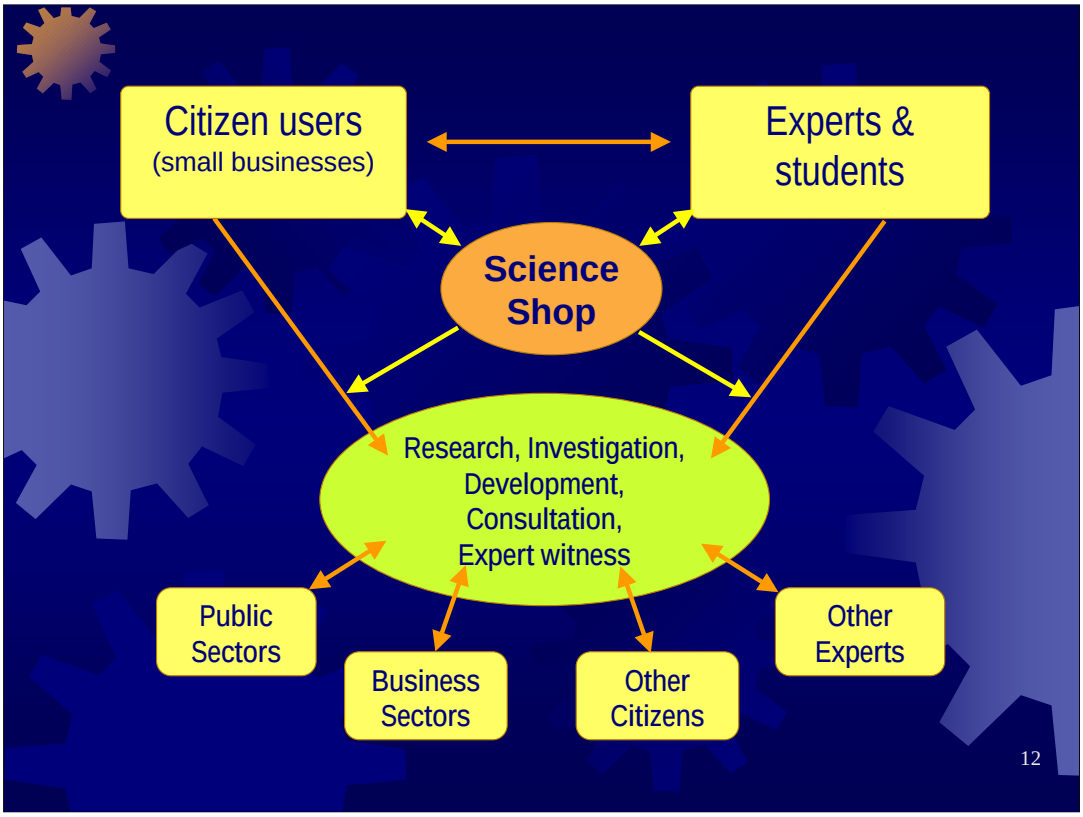
4.2 Characteristics and Benefits of Activities of Science Shops

The science shops have several characteristics as follows, and some of them reflect the essence of three concepts I mentioned before. First, science shops are independent and neutral organization, based on university, NPOs or mixed form of them. Second, their research activities are demand-driven, directly responding to needs and concerns of users. Their users ask them to give some technical advice, to produce research results to solve their problems such as environmental problems they face, or to develop some technical devices designed to meet users' needs. Thirdly, the research of science shops are basically participatory ones in which users and experts cooperatively produce the results through the exchange of their perspectives, knowledge, experiences and values. Furthermore, the service of science shops is not simply the *transfer of knowledge* but also *production of knowledge* to meet users' needs and demands. Finally, all the services are provided on lower prices or for free, because most of users don't have enough money.

Additionally, the activities of science shops are beneficial not only for users but also for scientists, engineers, students and universities with which they are affiliated. And more generally, science shop activities can promote so-called public understanding of science and technology (PUST). People can learn through the science shops what S&T are, appreciating its great potential and limits.



These are the benefits of science shops for providers of service, especially in case of university-based science shops.



This slide shows how the science shops work among various social actors.

Finally, I would like to briefly conclude my presentation by saying that such a practice of science shops represents a new form of dreams of scientists and engineers, young or old. It is to make more tangible and helpful empowerment of the public.