Electronic Commerce: Trend and Future

Yuichi HIRAMATSU*

Abstract

Accompanying the explosive popularization of the Internet, a new social structure is rapidly evolving, centered around networks. Within this movement, the commercial transactions which are an integral part of the mutual interaction of (governmental) administration, business and consumers have become electronic. This new structure, in the form of electronic commerce, or "E-commerce," has developed in earnest, reaching over broad range. In this paper, we will discuss various aspects of this E-commerce, such as its background and objectives, the scale of its market, the direction of development, the functions it must have, and the obligations of the participants.

1. Introduction

Today, with the 21st century in front of us, continuing innovation in the field of information technology (IT) is causing a new social structure to evolve. Today IT is involved deeply and extensively in all aspects of social life. This may be called an "IT revolution." Just as computers appeared on the stage years ago and now are deeply involved in social evolution, the "IT revolution" is developing in a way that has a broad and large effect across many areas, from companies to society and even to individuals.

Figure 1 shows the position of IT within the present social infrastructure. The "IT revolution," unlike independent vertical developments of the past, involves using network architecture, using OSI (Open System Interconnection), using de facto standards, and greater globalization. The IT revolution is a merging and harmonization of these trends, one with another. According to Nicholas Negraponte, founder of the MIT Media Lab, the essence of this IT revolution can be viewed as similar to the conversion from "atoms of media (matter) to bits of media (information.)"[1] The organically combined results (of this conversion), and the means for realizing the IT (revolution), include electronic commerce (E-Commerce), enterprise resource management (ERM), and the "informationizing" of homes. One of the technical requirements at the center of this development is network technology, which means the Internet.

Accompanying the explosive expansion of the Internet, the formation of a new social structure centered on networks is proceeding. Within that process, one movement which is rapidly evolving is electronic commerce, as mentioned above. In Japan, serious tackling of the issue of E-commerce began in 1995, centered around the Ministry of International Trade and Industry which provided a supplementary budget. That year, which could be called "the first year of the Internet era," was when service provider activity began in earnest. It marks a milestone year in social evolution in Japan.

2. Change in the Social Environment due to "Digitalization"

At present, we are in what futurist Alvin Toffler calls "The Third Wave," and in that context the transition to a "procumer" society[2] (where producer = consumer) is actually occurring. This is the information society which will be conducted while developing new social rules. Old-fashioned uniform (un-customized) service will die away and companies will have to bridge the fences that have separated them and work toward greater cooperation.

It must be recognized that in this new social structure, "flows" will be greatly changed. "Flows" includes the flow of people, the flow of things (merchandise), the flow of money and the flow of information. In particular, as things which had been based on an assumption of "atoms" (matter) are converted to "bits" (information), flows can be dramatically changed. Among those flows, especially in the field of economics, by "digitizing" the flow of money, movements can be done over networks, and also with the impact of the "big bang" in the financial world, major changes are already occurring. As a result, it can be said that convenience in peoples' daily lives is improving both in the "real world" and in the "virtual world." This kind of integrated social scheme becomes a common platform, a new movement for connecting the various fields of individuals, companies and government.

For all individuals living in the society, this movement involves consciousness reform and particularly an increased interest in personal computers and the Internet. According to a survey done by the Economy Planning Agency at the end of 1999, the percentage of households with personal computers was 29.5% and the percentage with Internet access was 11%, so that the population of (Internet) users had reached 15 million. Recognizing that historically the market penetration level which causes major social change is said to be 30%, we can see that individual lifestyles are already changing to focus more on the Internet. However, data for the US shows that in spite of the fact that the penetration rate for personal computers grew strongly from 29% to 54% in the last four years, the rate of actual
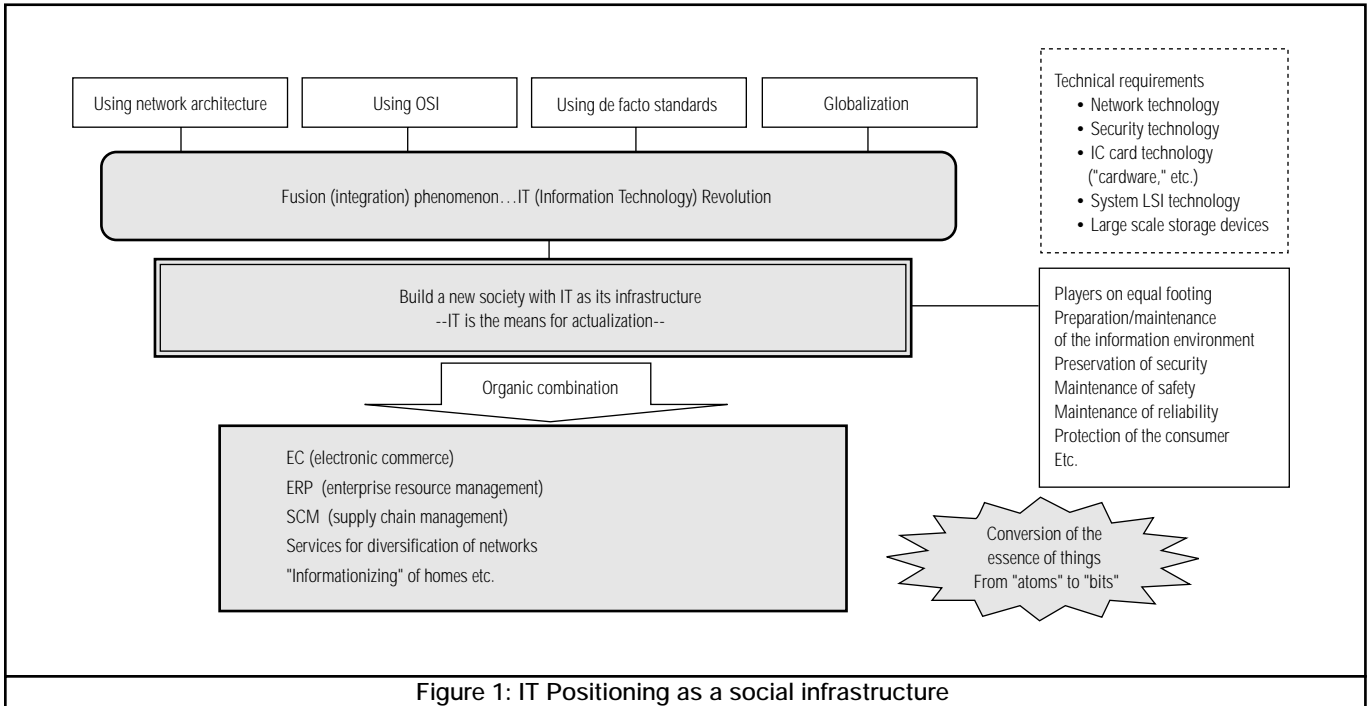
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* Director, Chief Engineer

Figure 1: IT Positioning as a social infrastructure

utilization retreated, falling from 90% to 53%. What does this mean? Perhaps it indicates that achieving further acceptance, beyond a certain level, presents a high hurdle given the current information equipment, and many users cannot make the grade. This reflects the problem of information literacy and directly relates to the problem of the "digital divide."

In Japan, the percentage of personal computers which are kept, but not used, was 4% at the end of March, 1999, a level much lower than might be expected. The rates of non-usage, according to the "reason for purchasing," were as follows:

- Management of home finances   84.0%
- Education / study   73.0%
- Internet communication   72.3%
- Game play, etc.   49.1%

At the same time, a point of concern is the matter of communication charges. At present a variety of methods for structuring and levying these charges are being considered. Domestically (in Japan) most communication charges are levied according to the measured rate system. Compared to the US environment where a flat rate system is used and where, within certain areas, usage at extremely low rates is possible, there is still much room for improvement, as has been pointed out by the US.

On the other hand, companies have begun to take bold steps, their consciousness focusing on achieving low costs and high profits. This movement indicates a change in business forms. The flows of information of the past, such as transaction information, settlement information, information concerning physical distribution, information related to business cooperation...all are undergoing major change. Other flows, such as those of deregulation and

structural reform, are also involved in this trend and the movement is toward the birth of new modes of business conduct, a social reform in which the conventional boundaries of industries are bridged.

In the handling of information in enterprises, the main form in principle has been the substitution of functions, and it has begun and ended with the storage of information. However, from now on information will be handled as products, and a trend toward greater coordination and symbiosis of companies can be expected, with digitized information as a foundation. This trend is shown in Figure 2. One of the movements in this more coordinated, more symbiotic society is E-commerce.

Even considering government administration, a reformation of consciousness is occurring in regard to the growing role of information. This expanded role of information is being recognized as an important means for achieving "reformation of government administration" and it is promoting reforms in the office activities, business, organiza-
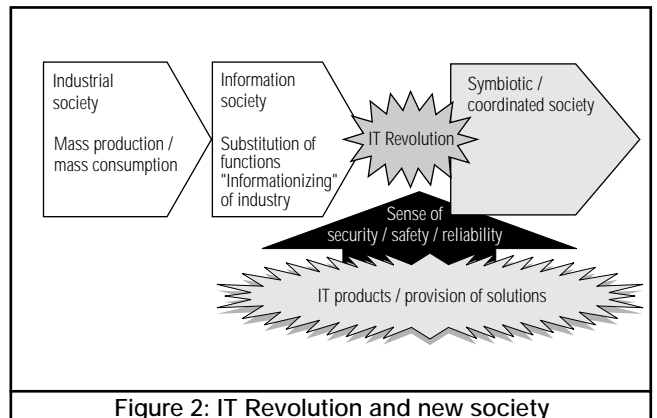

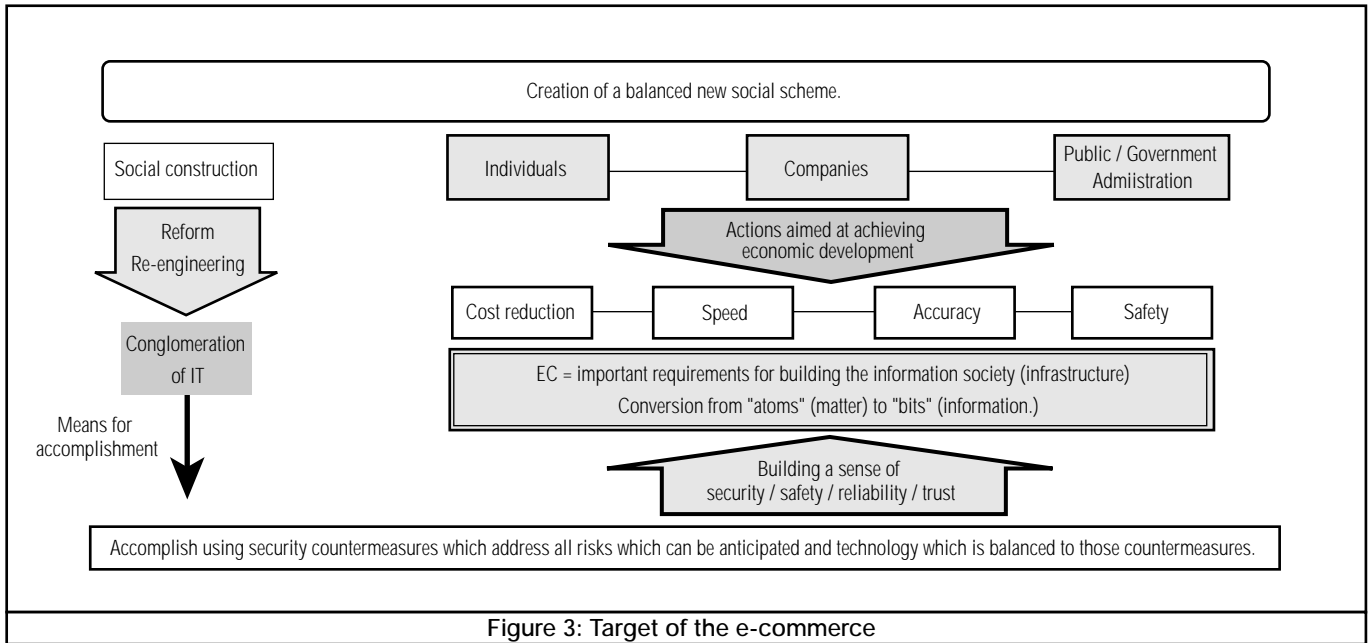Figure 2: IT Revolution and new society

Figure 3: Target of the e-commerce

tion, and other areas of government administration. One such reform is the switch from information management by "paper" to "digitized" information management. This trend has great import in the actualization of E-commerce. In this way, even within government a strong movement has begun, aimed at "realization of electronic government" with IT as the means.

3. Definition of E-commerce and its (Degree of) Penetration

E-commerce may be defined as "the technology, processing, and operations which occur when business transactions are done automatically over networks, using IT." In other words, the scheme of the total system, even including operation. Included in the term E-commerce are transactions between businesses and consumers (B to C), businesses and businesses (B to B), as well as operations internal to companies, the conversion of government procurement to electronic systems, and transactions between consumers.

The target of E-commerce, put in simple terms, is "creation of a balanced new society." This situation and its related elements are laid out in Figure 3.

As shown in the figure, E-commerce is an activity which contributes to achieving economic development, but to realize this, the elements of safety, reliability, trust, and sense of security are extremely important. Movement in Japan, in this regard, has been reactive: after an issue arises, it is dealt with and countermeasures taken. However, in the "network society," the world is becoming increasingly "borderless," and support and operation under the Japanese approach is difficult. If this situation continues, it is not an overstatement to say that (Japan's involvement) may be erased from the world economy. The approach of "dealing with problems after they occur" makes it impos-

sible to stop them, repair them or recover from them (in a timely manner.)

Because of this, the security countermeasures for each objective are a critical factors for achieving adequate service. This point is an element that has been lacking in information systems until now. Especially in regard to E-commerce, where settlements are the key activity, the meaning of this is especially deep. Here is a list of the special features of the network society which is the foundation of E-commerce:

- Anonymity .... specification of the participant is difficult
- Lack of traceability .... no physical trace; only electronic information
- Unlimited .... 24-hour society (including place, time, etc.) can be used anywhere
- Extreme high speed .... pushing one key (button) completes the transaction

It goes without saying that in such a society, it is necessary to maintain safety and completeness. In the network society, it is essential for systems always to be alert to attacks and threats of attacks involving crimes such as impersonation, hacking, wiretapping, altering information, cracking security barriers, etc. Countermeasures against such threats should include not only purely technical measures such as encryption, IT, etc, but also measures based on other perspectives such as operations, updating and improving laws, social rules, customs of daily life, and culture.

In particular, in the area of updating and improving relevant laws, Japan is behind the US and Europe and must move quickly. In regard to improving laws, instead of the approach of "dealing with issues after problems have arisen," which I touched upon before, it is neces-

sary to anticipate situations which could occur and legislate appropriate countermeasures. In the present world situation where Japan's business develops and advances in rivalry with the US and Europe, urgent actions are required to bring relevant laws up to a minimal level. Similarly, from the aspect of culture and the customs of daily life, in Japan the sense of individual responsibility is weak, so drastic measures are needed in a hurry. In particular, in the field of school education which is where human resource development of those who will support Japan's next generation occurs, we must take a long term view. An urgent task is to take actions to overcome the digital divide and increase information literacy, while still thoroughly accomplishing theoretical education.

Now let's look at the scale of the market for E-commerce. Table 1, part of a March, 1999 publication of the Ministry of International Trade and Industry, shows the scale of the EC Market in Japan and the US.[3] Table 2 shows the scale of the B to C market in Japan by product and service category. From this data, trends in the US[4], etc., we can infer that the first wave of vigorous activity has already begun. It focuses on B to B and improvement of the efficiency of transactions between companies, as well as providing the necessary capability within companies.

(Units: 100 million Yen)

	B to C		B to B	
	Japan	United States	Japan	United States
1998	650	22,500	86,200	195,000
1999	1,900	42,700	120,000	300,000
2000	4,300	71,100	190,000	500,000
2001	8,700	106,900	290,000	790,000
2002	16,200	153,600	450,000	1,170,000
2003	31,600	213,200	684,000	1,653,000
"Survey of the Scale of the EC Market in Japan and the US," Ministry of International Trade and Industry, March, 1999.				

Table 1: Market size of EC in US and Japan

(Units: 100 million Yen)

	1998	2003
Travel	80	9,100
Automobiles	20	4,900
PC's	250	3,700
Services	23	2,800
Clothing and accessories	73	1,800
Sales of other products	57	1,600
Food	41	1,500
Financial	14	1,500
Entertainment	14	1,400
Hobbies, miscellaneous goods, furniture	34	1,200
Books and CD's	36	1,100
Gifts	5	950
"Survey of the Scale of the EC Market in Japan and the US," Ministry of International Trade and Industry, March, 1999.		

Table 2: Market size of products and services

This movement originated in the US. In contrast, B to C, which focuses on consumers and pursues new added values and more comfortable lifestyles, involves building a new scheme (behavior model) utilizing portable telephones, convenience stores (for product delivery), etc. This total course of development is called mobile commerce, or M-commerce, and the base from which it is being launched is Japan.

For Japan, convenience stores and portable telephones are "imported culture," but they now have become deeply entrenched in Japanese culture.

A forecast of the market for the information equipment which will support development of E-commerce was announced on April 7 of this year by the Electronics Industries Association of Japan (EIAJ.) According to that report, this market in Japan is forecasted to be 2.77 trillion yen in the year 2000, growing to 5.9 trillion in 2005, and 8.1 trillion in 2010. Within the market for all PC's, portable telephones, game machines, digital image devices, and mobile electronic equipment, the "information equipment" referred to here means those devices which have the function of connecting to the Internet to transmit/receive data, including audio and image. Compared to the figures for Japan, the scale of the US market for 2000 is estimated to be 2.79 times as large, at 7.73 trillion yen, and for 2010 is forecasted to be 17.54 trillion yen, 2.17 times as large. Judging from this, it is apparent that the development of B to C commerce has taken off on a big scale, with individuals becoming more and more involved.

4. Changing Settlement Systems

The core of E-commerce is settlements and this area is evolving quickly, receiving a big impact from the conversion from atoms (things) to bits (information.) This development is driven by establishment of electronic settlement systems which make up the infrastructure of E-commerce.

Influenced by this trend, various fields—addressing government administration, companies, and individuals—are showing vigorous activity. This multi-step movement will result in the birth of a new mechanism for settlements and the development of new forms of cooperation among companies, breaking the constraints of the past which were based on business culture, keiretsu (traditional company affiliations), and field of business. These movements include development of (Japan's huge chains of) convenience stores as "bases" and involvement of non-financial institutions which focus on distribution. In any case, these movements involve firmly attracting and keeping individual end users and developing debit schemes and electronic money as new settlement mechanisms. The users, for whom these new systems are intended, view positively the increase in the selection of options as to settlement means. This relationship is shown in Figure 4.

It must be understood that, as the diversity of settlement options grows, users gain increased convenience, but the responsibility for selection falls on the users themselves.
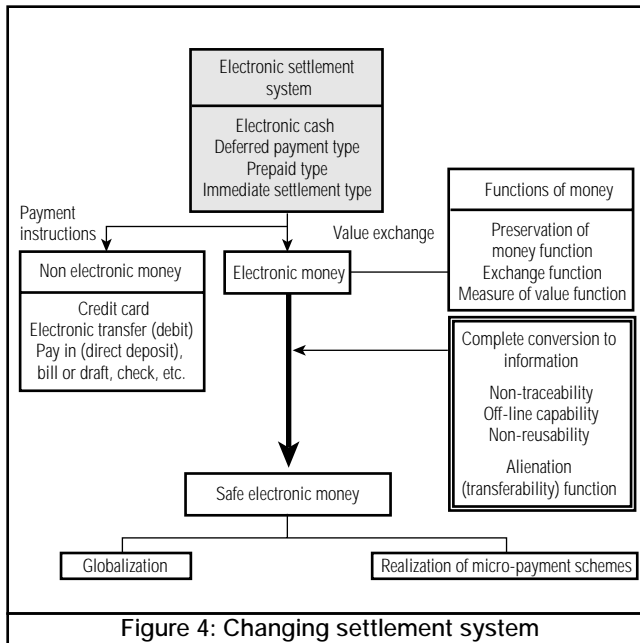
Figure 4: Changing settlement system

Through advances in IT, the following can all be realized:
- Improvements to the inconvenient aspects of cash
- Utilization of the good features of cash
- Elimination of the threats of forgery, alteration, etc.
- Development of systems for small lot settlements (electronic money, etc.)

However, precise consideration is needed in judging the best way to handle each of these advances. Users themselves must fully understand and recognize that, along with the rights born of the new scope of selection, obligations and responsibilities are also created.

To deepen this understanding, it is essential that information on the systems offered be open to the public. This should not be limited only to information on the service content of the subject systems, but should extend to concrete steps for maintenance of safety from the security standpoint, the traffic counts of transmissions/receptions, etc. In this regard, new rules and regulations may be necessary concerning making public the information users need in order to make judgments. In particular, in regard to the security aspect mentioned above, users cannot directly participate in system building, so they must make selections from totally unknown alternatives. One area which should be dealt with promptly is the creation of indices which can be readily understood by consumers, making it easy for them to compare one alternative to another.

In building security into settlement systems, a sense of balance is important. Elaborate systems should not be build for their own sake. Instead, in building systems, it is important that the starting point should be clarification of what is to be protected and specification of the appropriate levels of allowable investment cost, ease of use, and risk. Also, as the evaluation standard which is the base (for system design), "ISO/IEC 15408 Information Technology Security Evaluation Standard" should be followed.

5. AP's: the Infrastructure for E-commerce.

When considering the society of the future, based on E-commerce, it is necessary to think in terms of "a society in which people enjoy life fully-high standard of living, new types of added value, effective programs for seniors, etc." In other words, this society has "towns" in which the citizens can lead active and involved lives, and government and business develop consistent with that.

The issue of "town-making" which our company has been working on for some time involves the "informationizing" of self-governing communities, shopping centers, and other institutions. In that context, we have grasped "town-making" with a focus on the people (individuals) who live there as an important point. This structure is shown in Figure 5. This kind of "town-making" is the starting point for E-commerce. It goes without saying that the "things" (consumable materials, etc.) which serve the people move according to this scheme. Starting from this basic point, distribution channels (including the physical distribution of goods) are born, products are produced, and trade (both face-to-face, and indirect) occurs. And, in all of these activities, settlements are generated. The "place" in the society where these actions occur is determined and maintained by the customs of daily life and the culture of the region. Our company has taken up the task of building and supplying this "place."

The "informationizing" of district government and administrative organs which will evolve in the future will require ever more active exchanges of information at the regional level. It can be expected that such developments will become a new infrastructure and many new applications will come into being and grow rapidly.

Another point is the "informationizing" of the home. Products which will be readily impacted by the Internet can be listed in order as follows: financial products and securities, travel reservations, computer software, music, newspapers, books, images, etc. For all of these, transactions can be completed simply through the transmission of information. On the other hand, other business which involves the transfer of things (products) will be less influenced, but even they will feel the impact of the Internet, probably in the following order: general retail business, automobiles, clothing, consumer electronics, housing, perishable foods, etc. However, as knowledge increases, and new methods are developed in regard to provision of "service" for such products, even the business trends in those areas may be largely effected. One example is the trend in the full spectrum of automobile sales, including used car sales.

One of the prime examples of products influenced by the Internet is the field of securities trading in which stocks and other financial products are handled. This field underwent a large transfiguration, triggered by the complete liberalization of commissions on stock trad-
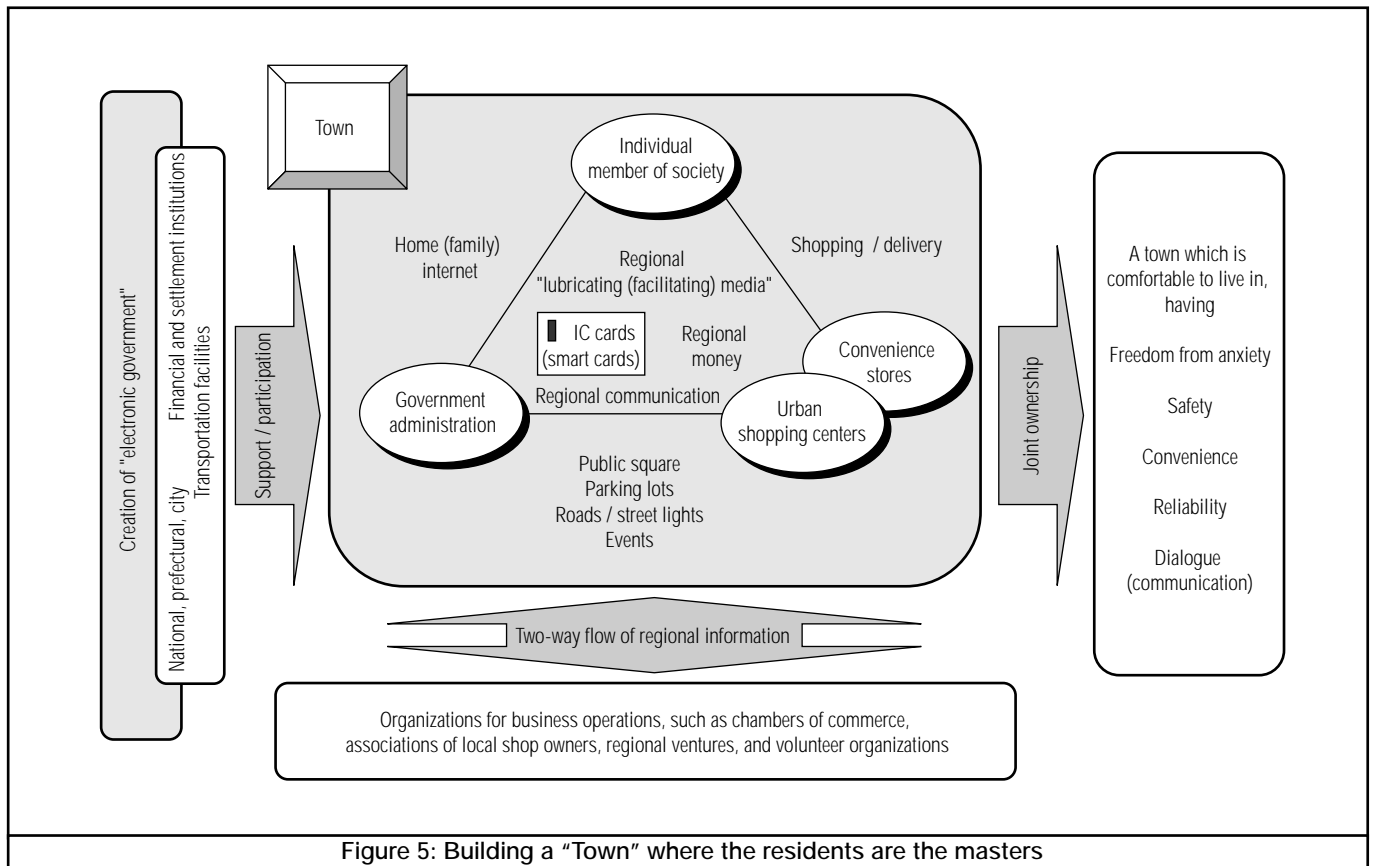
Figure 5: Building a "Town" where the residents are the masters

ing, which occurred in October of last year, and the start of on line securities trading businesses.

Given the impact of two important reforms occurring simultaneously and other factors, it cannot be said that this change has proceeded smoothly. The degree of concentration of trading has changed significantly from what it had been and, in trying to handle that, there were inadequacies in the traffic control system, and other system failures occurred. This experience regarding a fundamental part of the system, reveals the fact that in building systems, changes in the operating environment must be fully considered. This can also be said in regard to portable telephone terminals.

Also, with the digitization of broadcasting, TV broadcasting can become a part of E-commerce, enabling services based on bilateral communication. In this way, the breadth of application of the devices that relate to E-commerce can be extended. These devices will probably develop even further, due to their close connection with the informationizing of the home.

Taking into account the fact that the operating environment of systems can change greatly, as described above, is a matter of extreme importance. There is no question of this. As touched upon above, consumers (members of society) cannot participate in the design and building of systems. Consequently, it is necessary that measures for the maintenance of security in systems be adequately built in. This will take the form of "recognizing and authenticating

individuals" and will ensure safety, reliability, and a sense of security in relation to information access, settlement services, etc. This may even be called a new business logic for system providers. However, in doing this, it is not a matter of protecting everything at random in an attempt to provide "user protection." It is also necessary to clearly convey the duties and responsibilities of users themselves and to promote a consciousness of self responsibility.

When we consider that in the near future the Electronic Signature Law will pass the National Diet and be implemented, it is clear that "recognizing and authenticating individuals" must be built in as the very core of systems.

For this reason, among E-commerce applications, only those which have paid proper attention to security will be selected by users and will survive as part of the new infrastructure.

6. Conclusion

The starting point of E-commerce is "people" and how to make their living environment a safer, more secure "place" to live in. To that end, "creation of a balanced, new society" is required, freeing us from the high cost schemes of the past. E-commerce must be taken up as one part of the infrastructure of a new society. It is hoped that the various new systems which will be developed in relation to this will valuable to the society of the coming 21st century.

7. References

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