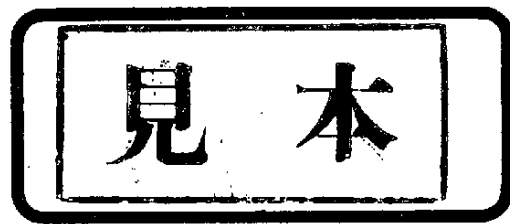1997

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Electronic Commerce Promotion Project

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NOTE: The opinions expressed by the various
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do not necessarily reflect those views held by
JIPDEC.

No. 108 – 109

From the Editor

Electronic Commerce (EC) is much talked about today. EC became a news story first time in 1994 and only 4 stories were written in newspapers including trade papers that year. The number increased to 663 in 1996. The Internet, which is essential infrastructure for promoting EC, has become widely used at an amazing speed. The number of domains in Japan rapidly increases from 2,206 in 1995, to 4,781 in 1996, and 15,477 in 1997 as of January each year. It is expected that the use of EC will be accelerated hereafter with the spread of the Internet at a striking rate.

What is EC? There is no clear definition harmonized throughout the world. Because the concept of EC is new and the environment surrounding EC is changing, various interpretations of EC exist. The Ministry of International Trade and Industry (MITI) defines EC as "all economic activities, including publicity, ordering, planning, development, and payment through networks." Electronic Commerce Promotion Council of Japan (ECOM) established by MITI, where JIPDEC acts as secretariat, constructs EC to "conduct a part or the whole of business deals over networks." In Japan, the scope of EC is taken broadly.

To enforce its policy on EC in Japan, MITI appropriated 31.7 billion yen for validation of EC in the first and second supplementary budget for FY 1995. MITI classifies various forms of EC into two groups, EC between a company and a consumer, and EC between companies, and, for the former group, carries out 19 projects, comprised of 14 validation experiments and 5 joint technical development projects, and, for the latter group, 26 joint development projects on CALS validation experiments, EDI enhancement, enhanced products database and retrieval technology, digital notary systems, and other themes. To achieve technical development and conduct validation experiments necessary to promote EC in various industrial circles, MITI allotted 5.6 billion yen for "building up an infrastructure common to EC" in the budgets for FY 1997. At the Ministry of Posts and Telecommunications, Cyber Business Council, established in 1997, launched "experimental projects on the EC of the next generation", with supplementary budgets for FY 1995, in order to examine all the problems related to security technology for communication peculiar to EC and thereby to promote "cyber business." Likewise, the Ministry of Finance started reviewing legal definition of digital money and its settlement, and related systems. The Ministry of Justice started reviewing the Civil Code and Commercial Code from the viewpoint of EC and also studying digital notary systems. On the other hand, at the private sector, EC has been already put to practical use in a certain region by means of the IC Card Base. Some companies launched cyber malls, and some financial institutions conducted validation experiments on banking service through the Internet.

With the development of EC, the conventional industrial and economic system will undergo substantial reform hereafter. EC will not be limited to industrial circles. It will have an influence on the fields directly connected with our social life, and thereby our life-style will undergo a further change. On the other hand, there are many problems to be solved for EC to be widely used. For instance, the security of communication is indispensable for EC, which involves transactions over the cyber space. In addition, there are many problems to be tackled, including the framework of systems, such as protection of privacy and consumers, and harmonization of taxation systems in international transactions throughout the world, as well as the provision of communication lines and cheap and convenient machinery and equipment and the improvement of the public awareness of participation in the cyber space. Unless those are solved, EC will never be commonly used.

This issue summarizes 19 projects for EC between a company and a consumer, and 26 projects for EC between companies, presently carried out by MITI.

To help readers to fully understand the details of each projects, the pages of this issue is more than the double of ordinary issues. Therefore, this issue is a combined issue for the 108 and 109 issues. On this point, the editor will appreciate kind understanding of readers.

Yuji Yamadori
Director
Research & International Affairs

CONTENTS

I. Integration of EC, EDI, and CALS

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Abstract

The Japanese economy is still stagnant, following the sudden collapse of the bubble economy in the early 1990s. The key to bringing revitalization and success to Japan's economy in the coming Information Society is to rapidly utilize advancing information technologies for business and public administration. In fiscal year 1995, such a direction was clearly indicated by MITI's policies in the government's main budget and in the first and second supplementary budgets. Many projects conducted now under these budgets promote Electronic Commerce. I introduce the main electronic commerce activities integrating the Consumer-EC and Corporate-EC including EDI and CALS in Japan.

1. Introduction

One of factors in the decision to promote electronic commerce is the drastic increase in the number of commercial Internet users. Commercial Internet was launched in my country in 1992. Since then usage has been increasing exponentially. The number of domains was about 13,000 at the end of 1996, which increased 2.5 times during the year.

The private sector is very concerned about the Internet in the midst of business restructuring and diversification, therefore the number of domains is dramatically going up. Under such circumstances, the Japanese government decided to adopt EC for Japanese economy, because EC was considered to be a useful vehicle to realize a highly information-oriented society for the 21st century.

2. What Electronic Commerce is

The term "electronic commerce" has come to be used a great deal in Japan over the past year or so, just as it has overseas. The phrase is used in a variety of senses, and people differ as to how they interpret it.

Here I would like to view "electronic commerce" as referring to the entire range of activities that corporations, individuals, and any other economic entity might undertake using a variety of computer networks, whether these be for design and development, advertising, commercial transactions, or settlement of accounts.

In order to help us better understand the concept of electronic commerce, I would like to consider its implications in two categories from point of view of a trade partner. That is, electronic commerce between corporations, so called Corporate-EC and between consumer and corporation, so called Consumer-EC (See Figure 1).

Figure 1
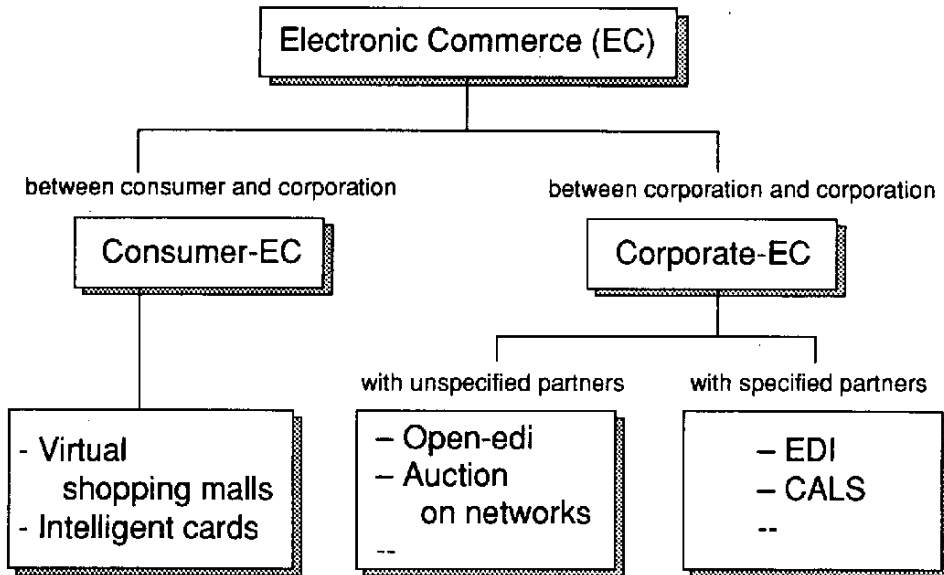
Corporate-EC can be divided into two trade types: closed trade or open trade. The former is electronic commerce between specified trade partners. The increasingly popular Electronic Data Interchange, or EDI, falls under this rubric, as does the so-called Commerce at Light Speed, or CALS, which enables distant companies to engage in joint design and development work in real-time over a computer network as if they were just like a one company, a so-called "Virtual Enterprise".

The latter is electronic commerce between a company and unspecified trade partners on the open market. This would include things like electronic auctions on computer networks in which an unspecified number of companies might participate, and cases where companies seek out the optimal partner for a transaction from among companies on networks around the world, with the result that companies that have never done business before sign a contract agreement.

In Consumer-EC, consumers go shopping and make electronic payments in a real shopping mall or a virtual shopping mall constructed on the Internet without ever leaving their homes.

From the standpoint of the national account,

consumers of final demand are divided into two groups: government and personal. Therefore, governmental procurement of goods and services from the private sector is included here. Between two groups, government and individuals, there is also an area where there are electronic procedures, for example, elections and tax payments. However, as they are not commercial subjects, I will not mention them here.

3. Electronic Commerce Initiatives in Japan

The phrase "electronic commerce" is new, and so is the concept. However, not all of its real-world manifestations are new, or still in the fledgling stages.

In the private sector in Japan, there has been a surge of electronic business in the form of retail sales by personal computer networks, catalogue sales via fax, and corporate transactions using EDI under Japan's CII Standards.

In the government sector, a number of pilot projects are being undertaken to model and promote EDI, chiefly under the auspices of the Ministry of International Trade and Industry (MITI). The Japanese government has also begun work a project to demonstrate the applicability of CALS to electric power generation plants in 1995. MITI and the Ministry of Health and Welfare have also just initiated a model project using intelligent cards, that is, cards that incorporate integrated circuits, in the medical field. These buds of electronic commerce are showing every indication of expanding rapidly with the surging in growth of the Internet.

For electronic commerce to take root, it will be necessary to provide well-established common-platform technologies such as for encryption and authentication, and for intelligent cards. These will entail testbed projects to pinpoint immediate technical issues and to identify the technical challenges involving in order to obtain maximal inter-operability throughout electronic commerce.

Testbed projects will be of major significance in making electronic commerce a reality in that they will not only allow us to identify the technological issues, but will also shed light on the social and institutional problems that may arise.

The MITI has launched an Electronic Commerce Promotion Project to develop and empirically test common platform technologies. The project, which is scheduled to run for three years starting in FY 1995 is funded through a sub-governmental organization of the Information Technology Promotion Agency (IPA). A huge budget allocation, roughly US$320 million, has been secured for the three-year period, with one third of the total ¥10 billion (or about US$83.3 million) allocated to Consumer-EC (19 projects), and two thirds ¥21.75 billion (or about US$181.3 million) allocated to Corporate-EC (26 projects).

4. Corporate-EC

4.1 Penetrating EDI

At present, the CII Syntax Rule developed by the Center for the Information of Industry / Japan Information Processing Development Center (CII / JIPDEC) is the only one applicable

on a cross-industrial basis in Japan. The CII-Standards, consisting of the CII Syntax Rule and standard messages based on the rule, have been adopted by many industrial sectors, as you can see in Figures 2 and 3. CII-Standards are used by more than 2,500 companies now and have actually become a de facto national standard in all domestic trade. The implementation scheme of CII-Standards is supported by "the CII-tanslator recommendation system", "Operating guidelines of CII-EDI Service" and "CII-EDI Service User Manuals" as well as "Electronic Data Interchange Agreement Model".

EDI in the past has handled "business transactions" mainly at the stage of order placement and acknowledgment. EDI has not been implemented sufficiently for "logistics", which result from business transactions and for "monetary transactions", which are the final settlement stage. However, commercial transactions physically deal with the transportation industry and financial institutions, which are in different business categories, in addition to dealing with customers. The entire flow or all business transactions must be able to be processed by EDI, as mentioned above.

CII standard messages on "logistics" were formulated in 1996 under the auspices of CII with the cooperation of the Ministry of International Trade and Industry and the Ministry of Transport. Furthermore, in cooperation with the Bank of japan and other financial institutions, part of EDI data used in "business transactions" and "logistics" were added to the intercompany settlement information of the domestic exchange

settlement online system, or the Zengin System linking about 44,528 branches of 3,325 banks all over Japan in the end of 1996. In this scheme, the partial EDI data were regarded as billing/payment matching keys (less than 20 digits for the moment). This system has been in operation since December 16, 1996 and the electronic component industry is aggressively implementing the system at present. the system enables automatic billing/payment matching work, to greatly reduce accounting work during accounts closing periods.

In international trade, on the other hand, a shift is under way made from proprietary formats to ANSIX12, or mostly to UN/EDIFACT, in compliance with requests from customers abroad.

The "BSR Committee of Japan" (BSRCJ) managed by CII / JIPDEC was set up last September. The Committee tried to build Basic Semantic Repository (BSR) in CII Standards and resulted in counting few common data elements in the industry-wise directory, reflecting different business activities. This year, it will try to build BSR between them and data elements on EDI used in international trade, and harmonizing them as much as possible internationally (the bridge of CII standard data elements and UN/EDIFACT data elements).

Japan Electronic Data Interchange Council (JEDIC) has the objectives of disseminating EDI knowledge and studying common EDI issues regardless of industry type, to promote EDI internationalization in cooperation with Japan EDIFACT Committee (JEC), and wide spread information sharing and to contribute

Companies
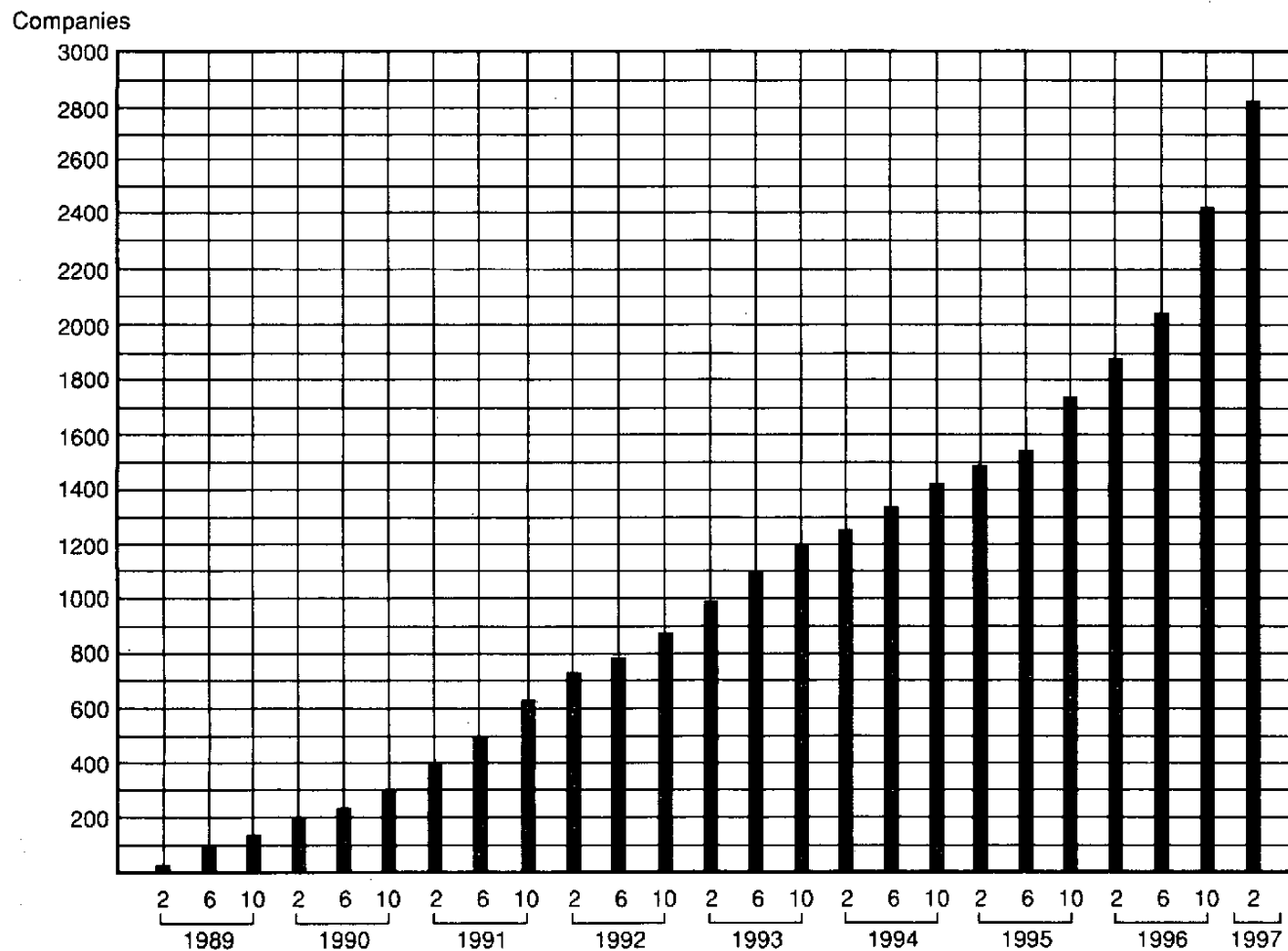
Figure 2 Increase of registration of "CII-Standard Company Code"

Figure 3 Registration of BPID (Business Protocol Identifier) in Japan

January 1997

BPID	Agency	Year
EIAJ	Electronic Industries Association of Japan	1989
JPCA	Japan Petrochemical Industry Association	1991
FEPC	The Federation of Electric Power Companies	1991
CINT	Promotion Fund for Construction Industry	1992
HIIS	Housing Industry Information Service	1992
JISI	The Kozai Club (Iron & Steel Industry)	1992
JEMA	Japan Electrical Manufacture's Association	1992
JCMA	The Japanese Electric Wire & Cable Maker's Association	1992
HOME	The Study Group of D.I.Y. Shops (Home Center)	1994
JGAS	The Japan Gas Association	1994
TIRA	Textile Industry Restructuring Agency	1995
NEWS	The Japan New Paper Publishers & Editors Association	1995
JTRN	Japan Domestic Transport Committee	1995
JAMA	Japan Automobile Manufactures Association	1996

to the promotion of EDI dissemination in all industries, JEDIC consists of industrial sectors or groups concerned with EDI (See Figure 4).

4.2 CALS at an Experimental Stage

CALS is one of strategy for implementing EC. CALS initially was introduced as "Computer-Aided Logistic Support" in The U.S. Department of Defense in 1985, but now has the interest of general industry as "Commerce At Light Speed".

Nippon CALS Research Partnership (NCALS) was established in May 1995 to demonstrate to Japanese industrial users that adoption of CALS will enable all information concerning the entire life cycle of a product to become integrated into a common property shared by all industries, in order to contribute effectively to enhancing management efficiency of the entire industrial community (See Figure 5).

A project for demonstrating the applicability of CALS in the field of electric power supply is being carried out for a period of three years starting from FY1995. In parallel with the foregoing demonstration project, joint experiment projects are being undertaken on the application of CALS individually to different industries such as motor vehicles, iron & steel, electronics, software, process plant, aircraft, shipbuilding, construction, and spacecraft. Targets are being set on an industry-by-industry basis for establishing data standards, interfaces, data base structures, network structures and other practical aspects, with a view to extending the applicable range of CALS.

Figure 4 JEDIC (Japan Electronic Data Interchange Council)

OBJECTIVES: (1) Disseminate EDI knowledge and to study common EDI issues regardless of industry type,
                     (2) Promote EDI internationalization and industry exchange wide spread information sharing, and
                     (3) Contribute to the promotion of EDI dissemination in all industries.

ACTIVITIES: (1) EDI Education and Dissemination activities
                     (2) EDI standardization activities
                     (3) EDI internationalization activities

ORGANIZATION: - Steering Committee
                     - International Committee
                     - EDI Education and Dissemination Committee

MEMBERS: 60 Industry Groups (more than 10,000 companies)
OBSERVERS: MITI (Ministry of International Trade and Industry), MoF (Ministry of Finance),
                     MoT (Ministry of Transport), and MoC (Ministry of Construction)
SECRETARIAT: CII/JIPDEC
                     (Center for the Information of Industry/Japan Information Processing Development Center)

> E-mail: cii-sec@jipdec.or.jp
> URL: http://www.ecom.or.jp/jedic/index.htm

Figure 5 NCALS (Nippon CALS Research Partnership)

OBJECTIVES:
    To demonstrate to Japanese industrial users that adoption of CALS will enable all information concerning the entire life cycle of a product to become integrated into a common properly shared by all industries, in order to contribute effectively to enhancing the management efficiency of the entire industrial community.

ACTIVITIES:
  - Pilot Implementation Project
    A project for demonstrating the applicability of CALS is being carried out, adopting as a model a practical application in the field of electric power supply.
  - Industry-specific R&D Projects
    In parallel with the foregoing demonstration project, joint experiment projects will be undertaken in the application of CALS individually to different industries.

PROJECT PERIOD: 3 years from 1995 fiscal year
PARTNERSHIP MEMBERS: more than 80 companies and industrial groups

> E-mail: ncals-ad@ncals.cif.or.jp
> URL: http://www.ncals.cif.or.jp/

Figure 6 CIF (CALS Industry Forum, Japan)

OBJECTIVES: To support CALS activities so that users of information systems can create virtual enterprises with their very own hands.

ACTIVITIES:
(1) Research and Development Activities
(2) International Cooperation
(3) Promoting the Spread and Introduction of the CALS Network
(4) Providing Education and Training Through Seminars and Other Events Support of Local Research
(5) The Offering Information Related to CALS

ORGANIZATION:
- General Board
- Board of Directors
- Steering Committee --- 4 Divisions (Planning, International, Industrial and Technical), Information Center, and VE2006 Center

MEMBERS: more than 200 companies and industrial groups

CALS Expo 97 International: 1997.11.4 (Tue.) - 11.7 (Fri.), Tokyo Big Sight (Tokyo International Exhibition Center)

> E-mail: cif-ad@cif.or.jp
> URL: http://www.cif.or.jp/

Figure 7 JSTEP (Japan STEP Promotion Center)

OBJECTIVES: To promote standardization foward STEP (Standard for the Exchange of Product model data) and usage in industries.

ACTIVITIES:
(1) Promotion of STEP standardization
(2) Research and awareness of STEP technology
(3) Development and implementation of STEP
(4) Research and awareness of SGML
(5) International Cooperation;IPO (U.S.A.), ProStep (Germany), CADDETEC (U.K.), GOSET (France)

ORGANIZATION: (JSTEP is one of JIPDEC affiliated organizations.)
- Members Meeting
- Steering Commiittee --- Japan National Committee for STEP (JNC)
--- Japanese Industrial Standardization (JIS) Committee
--- Technical and Policy Committee

MEMBERS: 37 companies and industrial groups

> E-mail: jstepinf@jstep.jipdec.or.jp
> URL: http://www.jstep.jipdec.or.jp/

You can see the interim results of these pilot projects demonstrated in "CALS Expo International 97" (Tokyo, Nov. 4-7).

CALS Industry Forum (CIF) has the central role of promoting the adoption of CALS in private-sector industries (Commercial CALS) in Japan, cooperating with foreign CALS-related organizations (See Figure 6).

For CALS-related projects, Japan STEP Promotion Center (JSTEP) as a branch of JIPDEC takes the role of consulting and coordinating them to smoothly implement an international standard "STEP" and "SGML" (See Figure 7).

4.3 Twenty-six Experimental Projects Underway

In Corporate-EC, 26 projects are classified by four categories; CALS, EDI, Data retrieval, and Common platform, and have been started in 20 industrial areas (See Figure 8). To promote EC, we have to secure the Internet telecommunications against unauthorized access through computer networks. The Japan Computer Emergency Response Team / Coordination Center (JPCERT/CC) started its operation on October 1996, serving to find out the cause and prevent actual damage if trouble suspected of being caused by crackers happens, as one of Common platform projects.

4.4 ASIAN relations with Corporate-EC

(1) APEC-EDI

MITI proposed "the APEC Internet-EDI

system" at the APEC (Asia-Pacific Economic Cooperation) telecommunication working group in 1995. The purpose of this project is to examine the technical and systematic potential of EDI over the Internet using some EDIFACT standard messages such as DELFOR, ORDERS, ORDRSP and INVOIC, aiming to promote the activation of business transactions for Small and Medium-sized Enterprises (SMEs) in the APEC region.

An electronic assembly company in Japan and an electronic parts company in Malaysia are at the experimental phase using actual data in early 1997. The result of this feasibility study will contribute to promoting EDI to SMEs in APEC members. This project is coordinated by CII / JIPDEC.

(2) MATIC

With the aim of setting up a cooperative production system in the Asian region that makes sophisticated use of the newest information communication technologies, MITI launched MATIC (Manufacturing Technology supported by an advanced and integrated Information system through international Cooperation) project with the participation and cooperation of SOPIS of MEI (China), BPPT (Indonesia), SIRIM (Malaysia), NSTB & Gintec (Singapore), and NECTEC (Thailand). R&D for the project is progressing in three fields: automobiles, electronics and textiles/ apparel under a five-year plan (1994 - 1998). This project is coordinated and implemented by Center of the International Cooperation for Computerization (CICC) in Japan.

Figure 8 Corporate - EC: 26 Projects

CALS projects - 10 projects

Ten CALS projects seeking greater efficiencies in joint design and development, maintenance, and operation through sharing of design information, technical documents, and other information as a means of fostering corporate partnerships.

automobiles; space; steel;
construction; aeronautics;
electronic equipment and components;
STEP; plant; software; shipbuilding

Common Platform projects - 4 projects

Four projects to develop common platforms for electronic commerce

Mutual electronic certification systems
Computer Emergency rResponse Team System
C/S system against natural hazard
Digital notary

EDI projects - 6 projects

Six industries - wide projects to develop advanced EDI on the Internet and using graphic multimedia.

petrochemicals; toys; travel services;
distribution; electrical wiring;
stationery supplies

Data Retyrieval projects - 6 projects

Six projects to construct corporate databases and develop and testbed advanced retrieval technologies for use in a distributed environment.
These will entail the standardization of product attributes in industries with huge product databases.

construction materials; steel materials; furniture
distribution; medical equipment; printing and
publishing; advertising

5. Consumer-EC

5.1 Nineteen Experimental Projects Underway

So far, private consumers have hardly interfaced with information processing equipment. However, the recent prominent evolution of information and telecommunication technology is suddenly involving private consumers also as players in commercial transactions on networks. The advances in the electronic information technology have lowered the prices of information terminal equipment, such as personal computers, connected to networks, sufficiently low to enable even private consumers to purchase them. The operability of the equipment has been greatly enhanced. Communication technology is evolving, allowing any private consumer to easily and inexpensively participate in a network. A good example of this is the Internet.

Figure 9 Consumer - EC: 19 Projects

A: Testbed Projects (14)

- A trial to operate a Cybermall with electronic commerce
- Electronic Marketplace
- Experimental virtual society; building the Cyber City
- JapanNet - Global CA System, Smart Card, SET Payment Gateway, Bank Payment Gateway
- Smart Collar Club; electronic commerce verification experiments
- Cybernet Club
- Development and testbedding of electronic payment systems using high security IC cards
- Electronic Commerce Experimental Project in Cyber Commerce City (CCC) Consortium
- Mediaport Nagoya
- Development of systems for authentication, encryption and settlement in electronic commerce
- Large scale testbed of electronic commerce, with a Virtual Exhibition as the centerpiece
- Virtual City
- Uniform system for provision of one-stop electronic public services
- Development and experimentation of the Cyber Card System Platform (CCP)

B: Development of Common Technologies (5)

- Project to develop and provide integrated content services in electronic commerce experiments
- Interactive multi-media information coding (MHEG) interoperability testing
- Technology development of the Commerce Navigation System
- Development of a common platform that implements a secure commerce protocol
- Development of a close-coupling contactless IC card and a corresponding read / write unit

The feasibility of Consumer-EC becoming a system is high. As part of its efforts to steadily realize an advanced information society in the 21st century, MITI has decided to implement the Consumer-EC experiment project (See Figure 9). Over 350 companies and over 500 thousand consumers are expected to join these test-bed projects.

5.2 ECOM as a Coordinator

Electronic Commerce Promotion Council of Japan (ECOM) was established in January 1996 to execute these projects efficiently and smoothly, and also to build a common platform for Consumer-EC.

For this reason, we intend ECOM to function as an open forum for examining every conceivable issue relating to the subject, its participants not being limited to the system vendors who build it, but also companies in retail, finance, and a variety of other service industries (See Figure 10). The Secretariat of ECOM has been set up in CII / JIPDEC.

To implement its programs in the four main focal areas;

(1) support for, and coordination of, technology development
(2) examination of social and institutional issues
(3) international cooperation
(4) support for, and coordination of, testbed projects.

ECOM set up working groups: eight technical working groups, five working groups on social

Figure 10 ECOM (Electronic Commerce Promotion Council of Japan)

OBJECTIVES: To build a common platform for Consumer-EC, intending to function as an open forum for examining every conceivable issue relating to the subject.

ACTIVITIES: (1) support, and coordination of, technology development
              (2) examination of social and institutional issues
              (3) international cooperation
              (4) support for, and coordination of, testbed projects

ORGANIZATION: - General Meeting
                - Board of Director
                - Steering Committee --- Technological Issues WG (8 WGs)
                                      --- Social and Institutional System WG (5 WGs)
                                      --- International Cooperation WG (1 WG)
                                      --- Testbed projects coordination committee

MEMBERS: Core Members: 23, Regular Members A: 97, Regular Members B: 96, Special Members: 7
SECRETARIAT: CII / JIPDEC

E-mail: info@ecom.or.jp
URL: http://www.ecom.or.jp/

systems, and one international cooperation working group, and a Testbed Projects Coordination Committee (See Figure 11).

The work of these different groups is functionally coordinated. Technical issues identified in the testbed projects are studied by the technical working groups, which address standardization and other issues, then feed their findings back to further testbed studies.

Similarly, the social systems working groups debate social and institutional issues arising from the testbed projects; once the thrust of solutions can be formulated, these will be forwarded to the testbed projects.

To explain our eight technical working groups activities, it will help if you imagine shopping for a T-shirt at a virtual mall. A content provider produces a virtual T-shirt by an advanced 3-D technique (WG on Shopping Mall Construction Technologies) and sets up a store at a virtual mall using the business protocols (WG on Business Protocols Between Malls and Providers). You need information of its color, material, and so on (WG on Standardization of Formats of Product Attributes), and to help you select from abundant information an agent will support you (WG on Agent System). When

Figure 11 Organization of ECOM
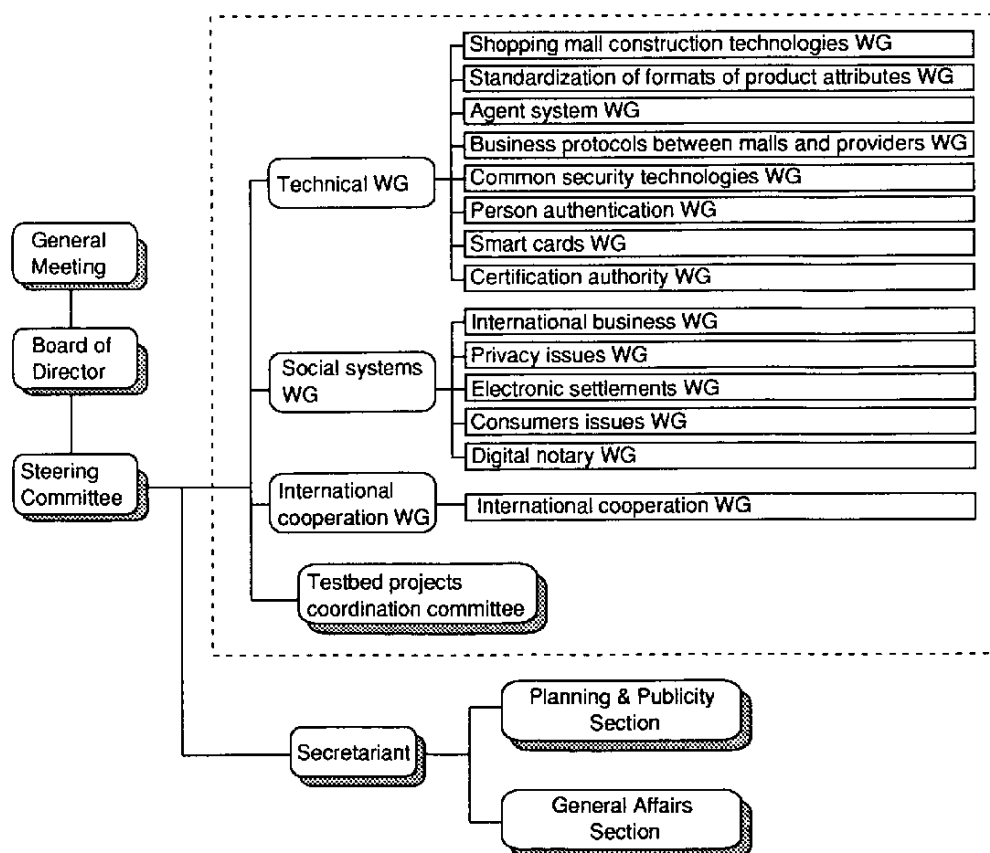
you pay, secure payment is required (WG on Common Security Technologies). You use an IC card (WG on Smart Cards). When you use the card, an organization requires your identification to determine if you are an appropriate IC card user (WG on Person Authentication, WG on Certification Authority).

As for the five working groups on social systems, WG on International Business discusses issues of custom procedures and currently exchange that will arise when international transactions are conducted over computer networks. Studying various settlements and developing a prototype is an issue of Electronic Settlement WG. The Privacy Issues WG studies the level of privacy protection that will be necessary. The Consumer Issues WG studies the legal, institutional, and operational problems to protect consumers on promoting EC. The notary system which can be used by all players without any anxiety is studied by the Digital Notary WG. These studies on social systems are conducted in cooperation with Electronic Commerce Social Environment Study Group in MITI.

The working group on International Cooperation is also very important. Electronic Commerce will be incomplete if it is confined to domestic business. Global links will benefit EC with the full synergism of its expansion. For this reason, we believe that it is vital that we work in cooperation with similar testbed projects of the kinds presented by our overseas colleagues at this session. Accordingly, we set up a working group on international cooperation to handle liaison with overseas projects.

As part of the results of WG, in early 1997, ECOM announced the "Operation Guideline of Certification Authority" and "Standard Agreement between Card Issuer and Cardholder" and "Standard Contract between Acquire and Merchant" in Credit-type Electronic Settlement. The "Business Protocol between Virtual Mall and Merchant", "Guideline for Use of Contact IC Cards" and other rules will be announced sequentially in the near future. These guidelines and protocols will be incorporated and reviewed in the experimental projects.

6. Summary

That concludes my sketch of what is happening in electronic commerce in Japan today, and our vision of what is in store in the future. As you might expect, the private sector is looking at these projects with great deal of interest and expectation. It is hoped that the project will provide a major impetus towards realization of electronic commerce in Japan, and that we will set the establishment of common platforms.

As mentioned above, information is implemented for each of different business transaction segments or for each of business contents. As the first phase, it is important to informatize and digitize even on an individual basis. As the next phase, it will be necessary to integrate them, sharing information and enhancing interoperability so that business activities become one business cycle connected seamlessly as a whole, instead of taking steps to informatize individually and independently such as design, development, production, sales and consumption/investments (See Figure 12).

19

<Type of EC>

Consumer-EC

- funded under first
  supplementary budget,
  FY 1995

Corporate-EC

- funded under second
  supplementary budget,
  FY 1995
- NCALS Project

<Promotion Organization>

Information Technology Promotion Association
(IPA)

<liaison>

Electronic Commerce Promotion
Council of Japan (ECOM)

| Technology Issues WG | Social and Institutional Issues WG |

International Cooperation WG

Japan Information
Processing Development Center
(JIPDEC)

EDI

Center for the Informatization
of Industry (CII)

<liaison>

STEP Promotion Center
(JSTEP)

Japan EDI Council
(JEDIC)

Nippon CALS Research
Partnership(NCALS)

CALS Industry
Forum, Japan
(CIF)

CALS

<Social and
International Issues>

feed back
test result

detail studies

Electronic Commerce
Social Environment
Study Group
(MITI)

Figure 12 Integrated System of promoting Electronic Commerce

The integration efforts will face the following issues:

1) Construction of communication networks that can meet social needs.
   Communication networks that can flow large volumes of information safely and instantaneously at low cost need be constructed as infrastructure.

2) Assurance of interoperability
   Interoperability to enable unspecified and many enterprises and consumers to easily use various types of application using information terminals and equipment needs be provided.

3) Legal system matching information society
   A legal system, such as the use of electronic records as legally-viable evidence, copyrights and legal jurisdiction of electronic commerce, must be established.

4) Protection of privacy and establishment of ethics
   Because digital information can be reproduced, processed, and retrieved easily, the protection of privacy and the establishment of ethics on the use of networks will be desired as more private players use the networks.

5) International cooperation
   International harmony in technical global interoperability, legal system and other social matters as mentioned above will become important to smoothly enter the global information society, in which anyone on the Earth can access other parties anywhere from anywhere. It will also be important to provide an internationality that fully respects many different cultures on the Earth.

It is believed that an affluent, advanced information-oriented society will become a reality in the 21st century through efficient and sound use of information technology in society as a whole.

II. Consumer-EC Project

As part of the 'Electronic Commerce Advancement Project' provided for in the first supplementary budget for fiscal 1995, Electronic Commerce trial experiments are being run by The Ministry of International Trade and Industry and the Information-technology Promotion Agency, Japan (IPA), among 19 enterprises and consumers. The Electronic Commerce Promotion Council of Japan (ECOM), one of the affiliates of JIPDEC seeks to cooperate with these 19 projects through the project communication coordinating committee, etc. This chapter is a translation of ECOM's "ECOM Today".

1. Experiment to Create a Cyberspace Retail Facility with Electronic Commerce

Aim

In order for EC (Electric Commerce) to really be able to create new markets and industries, in addition to the study of on-line processing used as EC procedures, the management of EC as a site and marketplace that will attract customers is also vitally important. To create an EC market, there must be research into and demonstration of the user interface for EC, and of methods of creating an appealing site.

Therefore, the aim of this trial experiment, is to create an attractive site with a complete array of casual information providing functions, where, using the Virtual Mall (now being developed by NTT Data Corporation, the realization of a three dimensional mall can be used to provide a meeting place where people can gather, and users can exchange communication, in addition to the collection and analysis and utilization of valuable market information through EC, using users' POA (point of access: activity data) and POS (purchasing data). Also, mechanisms to support

the site will be created, and in addition to conventional card settlement, credit settlement functions for many and unspecified users will be developed, and card settlement and credit / settlement functions for many and unspecified users, etc., will be verified through the trial experiment.

Outline

Verification of effectiveness of three dimensional mall interface
- How is the three dimensional mall received by the users?
- Users' assessment of three dimensional and two dimensional displays of merchandise, etc.
- Verification of interface from users' standpoint, including convenience of the service.
- Users' assessment of communication capabilities.
- Users' assessment of casual information provision capability.

Verification of effectiveness of marketplace management activities.

- In concrete terms, what is the user reaction to the creation of three dimensional images of store layout and shop construction and interior decor?
- Do the users respond well to bargains and special sales? Is there any sense of attractiveness? Is there any benefit to shops from holding special events?
- Do the users respond well to the three dimensional mall and to merchandise presentation, product line up and price ranges?
- Do the users make use of communication capabilities, such as chat and bulletin boards, mail boxes, etc?

Verification of effectiveness of a common platform for the three dimensional mall

- Verification of effectiveness of use of three dimensional display in shop management by content provider
- Assessment of simple image search function and high priority item search function from the point of view of development, operation and users' convenience.
- Assessment of operation of Inter CAFIS.

Experimental Environment Configuration Diagram

The system comprises the following servers, as shown in the project environment configuration diagram, and is a decentralized network.

- VM space server as the nucleus of the Virtual Mall system.
- High performance DB search server to retrieve product information.
- Application server for product purchasing.
- System management server for user management and operation management.
- Analysis / evaluation server for analysis and evaluation
- Credit management server for credit operations.

Connection to the CAFIS center is provided by DDX-P network.

2. Electronic Market Place

Aim

As styles of consumption become more and more diverse, it is important to have settlement mechanisms that are able to reflect individual consumption trends. For IC cards for use in individual consumption, international standards need to be considered seriously, and there needs to be a system that provides safety and safeguards against falsification of card details. Also, in the case of settlement over the network, there needs to be a system that provides for certification of the user, shopkeeper and credit card company, and for protection of information and verification of details.

The aim of this trial experiment is to develop a 'Multi-function IC card', with both credit and pre-paid capabilities, and technology to mount 'Credit Settlement Information Transfer Protocol (iKP)' on the Internet, and to conduct practical application tests on a comprehensive system for a secure and convenient electronic settlement among consumers, shops, virtual shops and credit card companies.

Players in the trial experiment

In Internet shopping, the targets are credit card companies, electronic shopping malls and consumers who use their PCs to shop on the Internet. Also, IC cards are used for individual validation in Internet shopping, and the IC card can be used at real shops by loading prepaid value onto the IC card.

Features of the trial experiment

As an Internet electronic settlement method, iKP (Internet Keyed settlement Protocol) the security protocol published on the Internet by IBM's research institute in June, 1995 is used. The codes used for iKP are NTT Advanced Technology's E sign, and the open key system elliptical Elgamal code based on an elliptical curve. With regard to user validation, the IC card substitutes for the CA function. This experiment studies the safety, convenience, and efficiency of the transmission of settlement related information on the Internet, and demonstrates the link between shopping and credit settlement in the electronic shopping mall. The multi-function IC card is ISO7816 compliant.

The IC card application layer is provided with validation function for electronic settlement, credit and prepaid functions and a point card function, and its convenience to users as a multi-function card, and security in IC card settlement, will be verified.

Structure of the trial experiment system

Both Windows and OS/2 can be used for the consumer's terminal (browser software). The virtual shops use an HTTP driver, a so called 'merchant server', and on the credit companies side, the credit gateway is linked with existing credit authorization systems. The gateway and merchant software server have been developed based on AIX.

The configuration on the user's PC side, is a browser (web client function)and transaction processing, and IC card interface and code module operate within the iKP. IC cards are issued by the CA centers set up in the credit companies. In other words, application blocks are split up at the CA centers, credit and prepaid information is initialized, and individual card information and holder information (validation information, etc.) are issued. The information is embedded into the IC cards, and the cards mailed to consumers who request credit. Counters will be set up so that pre-paid information can be written to the card at the shop and at the credit card service counter, when the IC card is to be used as a prepaid card.

Two types of IC card reader will be developed. One will be to link to terminals of iKP monitor consumers in order to read personal validation information. Another will to link to POS terminals which read information from prepaid cards at the point of sale.

There are an expected 2,000 PC user monitors, to whom iKP software and IC card readers will be distributed. The IC card reader is as a secure box, and coded information exchange with PCs is supported by connection through RS232C. 10,000 IC cards will be issued, including those to be used by the 2,000 monitors. Consumer monitors who are not using PCs will use the cards as prepaid cards and point cards at real shops.

Approximately 100 shops will be expected to participate in the experiment. Around 30 service counters at credit card companies will accept money to be paid into prepaid card accounts.

3. Experimental Virtual Society

Outline

The aim of the experiment is to construct a virtual society by connecting a CATV network and the Internet, and to study the effectiveness of the practical application of the various functions of the virtual society, and related issues.

Experiment image

Figure 1 illustrates the experiment image. There are industries on the left, and individual users on the right, with both sides being connected by EC. The central EC column describes the kind of experiments that need to be carried out in the event of a local society entering the network, Japanese society as a whole entering the network, in other words, being virtualised, and the virtualisation of international society. The virtual matrix is visualized as something like a home page into which one loads a moving image of oneself. The virtual mall, Internet transmission, Internet distribution, etc. are to be verified by the trial experiment.

The technology developments shown at the bottom of the figure present several issues for study. One major issue is that of tariffs to be applied when a user is almost permanently connected to the Internet. Telephone charges have a fixed rate system, and there is little prospect of demand, but CATV is extremely beneficial, since it is usually connected permanently.

In this case, there is real feasibility of individuals being able to transmit information from personal servers. Other issues include the location of personal servers, management methods, browser server concepts and the utilization of video browser servers for video images.

As an image transmission system, video allows various types of operation. Internet is basically text based, but the use of video in transactions will likely greatly improve the ease with which the Internet can be used.

Usage environment

The project will use the CATV network to access the Internet from PCs.

CATV cable modems are advancing all the time, and cheaper products are appearing. Cable Internet is a startling innovation that makes communication at between 10 Mbps and 30 Mbps possible even from one's home. Since even ISDN is 64 kbps, and an analogue telephone line is 28.8 kbps, the expectations of cable Internet are high. As regards the fusion of images and home pages, as CATV is originally a broadcast medium, it would appear to have a particular affinity. Therefore, we intend to test the significance of using PCs to access the Internet from CATV network, from which so much is expected.

Since data exchange with the customers is expected to be at 10 Mbps and over, the capabilities and prices, etc., of LAN, ATM and

FDDI, as a center type backbone, were studied, and 100 Mbps LAN chosen.

Technical features

This project has the following three main technical features.

(1) The development of personal servers that will allow individuals to broadcast information on the Internet.

(2) Experiments with images on the Internet at 10 Mbps, using CATV's high speed capabilities.

(3) Development of the world's first personal information system and MO box, using optical magnetic disks. Development of visual information to help the general public at work, in daily life and at play.

Figure 1 Experiment Image
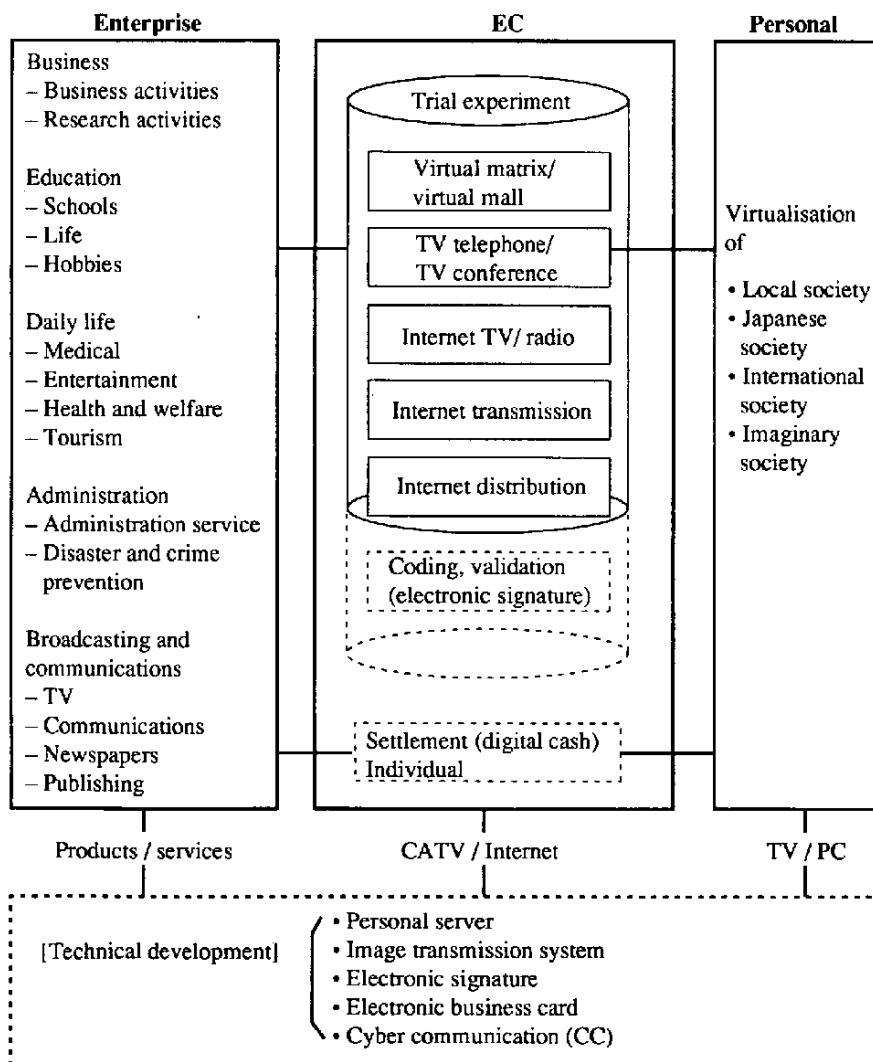
4. Development and Testbedding of Technology for JapanNet

Outline

The aim of the project is to utilize network security technology, such as authentication technology and encryption technology, in order to construct authentication systems, settlement systems, shopping mall platforms, electronic publishing platforms and electronic commerce systems, etc., and to synthesize these systems and verify the electronic commerce transactions.

Further, in order to be able to support international commerce on the Internet, a system will be developed to enable the development of an international mutual authentication system, and technological international exchange. Also, positive efforts will be taken to incorporate original Japanese encryption technology, etc., with the aim of popularizing original Japanese technology in the international market place.

Functions that are vital to the realization of electronic commerce, such as security, authentication and settlement, etc., will be provided not only to member enterprises of the project, but also to outside mall projects, etc. And in addition to the development of applications for individual consumers, such as electronic shopping and publishing, etc., applications that are necessary for electronic transactions between enterprises will also be provided.

Further, in order to seriously develop electronic commerce, rules for commercial practices and regulations, etc., need to be drawn up and revised, and to this end, the project aims to make positive contributions, such as proposals for 'Rules for domestic electronic commerce', and 'Rules for international electronic commerce'.

Specific examples of the use of JapanNet

(1) Electronic commercial transactions via a transaction center, among multiple enterprises

In this application example, trading transactions among multiple enterprises are performed electronically at the transaction center, and order processing and bank settlement are made possible on-line. JapanNet issues certificate to the enterprises participating in the transaction, as clients, and to the Transaction Center, as the server, and in addition provides a settlement system so that bank balances can be checked, and payments settled on-line, and electronic trading transactions can be realized.

(2) Intranet utilizing JapanNet authentication technology

Using JapanNet's authentication system, intranets can be used to provide in-house communications within a company, and company to company communications, in a secure environment. JapanNet's authentication system enables an internet-b a sed communication infrastructure for in-house

communications between sections, and the head office and branch offices of a company, and communication with customers, etc., with branch offices within Japan and overseas, and with overseas correspondents, etc.

(3) International electronic business transactions with overseas companies

This application utilizes the electronic signature and mutual authentication technology of JapanNet's authentication system to enable secure international electronic business transactions with companies overseas. When Japanese companies engage in electronic commerce with overseas companies, the Japanese authentication station issues certificates for individuals and corporations within Japan, and an overseas authentication station issues certificates to the overseas business partner. In this case, when transactions are carried out between the certification bearing overseas business partner and individuals/corporations in Japan, mutual authentication between the authorities overseas and in Japan is essential.

(4) Electronic sales and publishing at the JapanNet mall

JapanNet's in-house electronic mall is a business/consumer transaction application that uses the JapanNet authentication system (SET protocol compliant), and a card payment system to enable on-line shopping (sales of goods) and electronic publishing (sales of digital contents) in a secure environment.

5. Smart Collar Club Electronic Commerce Testbed

Aims

Various kinds of verification experiments are being carried out in America and Europe, to test electronic payment systems, but the encryption, authentication and settlement, etc., technologies that are vital to the realization of EC, have not yet been established. Also, as different trading practices exist in Europe and America, it is difficult to apply them as is.

The aim of this verification experiment is to study the advanced examples of Europe and America, and, after taking the unique trading practices of Japan into account, to test electronic methods of transaction via an open network. The project will also seek to realize the required infrastructure for the creation of new electronic markets, by establishing a low cost electronic settlement system to handle small payments, and a secure personal authentication system using an IC card.

Smart Collar Club Home Page construction

There are five theme halls.

* Information Center
  This is the information center for the Smart Collar Club Home Page, and provides an introduction, and enables contact with club members.

* Virtual Convention Center
  This hall comprises a general exhibition hall where members can display information,

such as company outlines, etc., an event hall where member companies can take turns to hold various types of events, and an international convention center for the publishing of domestic and international Internet related information, and information pertaining to events and meetings, etc., being held at real convention centers.

* Virtual Shopping Mall
  This is a permanent virtual shopping mall, equipped with the infrastructure necessary to handle card payments and payment of small sums.

* World Wide Shopping Center
  The Shopping Center has encryption capability equivalent to that used in America, and is equipped with the necessary environment to enable world wide commerce.

* Cyber Techno Museum
  Features experiments with the very latest tool expression technology, such as HotJava and VRML, and research and development information related to the creation of the 21st century.

Structure of the Smart Collar Club's electronic payment system

* Virtual bank and credit card system
  The Smart Collar Club offers a selection of two electronic settlement systems: a virtual banking system that can issue electronic cheques, using a tried and tested account transfer system, and a credit card system

based on the international SET standard. This structure enables a wide range of electronic settlements, from payment of small sums like digital contents, etc., to shopping over a minimum amount, such as mail order shopping, etc. The virtual bank account has a function that allows a spending limit to be set, and in preparation for future business expansion, also provides functions whereby details of usage of products can be obtained from the virtual bank, and where virtual bank account balances can be checked.

- Electronic settlement systems in preparation for future expansion.
  A full array of settlement systems, including credit, debit, prepayment, reception agency systems, etc.

- Convenient services for non card holders
  In the case of individuals who cannot become card holders due to age restrictions and income, an alternative method allows younger consumers to make payments on the Internet.

- Electronic settlement capabilities provided for own sites.

Basic System Design Policy

As well as the time required for development, and development and operating costs, related laws and restrictions also need to be carefully considered. Improvements may be made to existing systems, or new systems created. The fluidity of the system depends on whether the system is domestic or international. The question of acceptance by society depends on convenience, price (no unreasonable cost burden), and a sense of security when operating the system.

With regard to the question of anonymity, in the case of the Internet, an access log is created, so that anonymity has no real meaning in the context of electronic money. As making anonymity available will lead to increased costs, tracing capabilities will be utilized in follow up investigations for the prevention of improper use, and for electronic notary functions, etc., in virtual banks.

The risks involved are improper use by impersonation, falsification of transmissions, reneging of contracts, padded demands from bad shops, etc. In order to cover the risk of being unable to recover credit, possession of a valid bank account is a prerequisite, and a virtual bank account will be opened.

As a risk hedge, SET compliant electronic settlement protocol is adopted as personal authentication, so that the user can be identified. Also, the use of communication protocols such as SSL, guarantees transaction security, and the setting of a maximum monthly spending limit controls risk. New products will be devised (small sum contents, etc.), and mutual aid society formed for the tenants of the virtual shopping mall, as a countermeasure to unexpected problems.

6. Cyber Net Club
– Electronic Commerce Settlement Project –

Aims

Recent technological advances and the increasing popularization of PCs at the level of daily life, have prompted the emergence of more and more products and services being bought and sold on the Internet. As a result, there is a growing need to be able to pay charges over the network. Our aim is to construct an electronic commerce settlement scheme that may be adopted as the next generation settlement method. We also aim to construct a settlement scheme based on digital signatures, for transactions between companies and individual consumers, in-house and among different companies, etc., in addition to conventional settlement schemes, so that anyone will be able to participate on the network, and with security.

We also intend to establish a third party authentication organization (cyber passport center) that is capable of being accepted globally, and to find practical application for authentication of the parties involved in cyber transactions, such as users, member shops, card companies and payment gateways, etc.

Further, in order to prevent improper use by malicious third parties, and the theft, and misuse of membership numbers, and leaking of personal information, we aim to create a Japanese original public and highly secure payment protocol, by utilizing the SET based SECE protocol which is suitable to Japanese business practices. In the future, establishing

compatibility with protocols used overseas, we aim to perform a verification test for borderless payment protocol.

Also, we are in the process of verification experiments aiming at the practical application of a convenient and secure scheme for consumers, using a security system provided jointly by Hitachi Ltd. and Fujitsu, Ltd., and as for encryption technology, we are going to use multiple encryption technologies.

Outline

The project of UC Cyber Mall operated by UC card, Cyber Route 66 (scheduled for completion in the year 2001, in advance of the 'Roppongi rokuchome re-development project' and attempting to reflect real town development processes into simulations carried out in virtual cities constructed on the Internet) by the Mori Building Consortium, and several other malls are using settlement schemes developed in this project. A personal authentification organ 'Cyber Passport Center', will be constructed around major companies such as UC Card and its parent banks (Fuji, Daiichi-Kangyo, Asahi, Sakura, Daiwa), Master Card International, etc. Personal certificate will be issued on-line, using digitized information.

Centered around the authentication station (Cyber Passport Center) in the upper left corner of the figure, there are members, member shops, and card companies. Gateways which are a new phenomenon, is playing a vital role in the

structure of electronic commerce. Members and member shops, and member shops and gateways are connected by the Internet, and electronic documents flow among them, and these transactions are protected by encryption. Even when members call the authentication station, electronic documents pass through Internet space, so they are protected by encryption.

Also, as an experimental dedicated card, the 'UC cyber net card' will be issued, and will be able to be used in virtual and real situations, not only on the Internet. Furthermore, the UC mall will be operated, enabling on-line shopping.

Transaction outline diagram
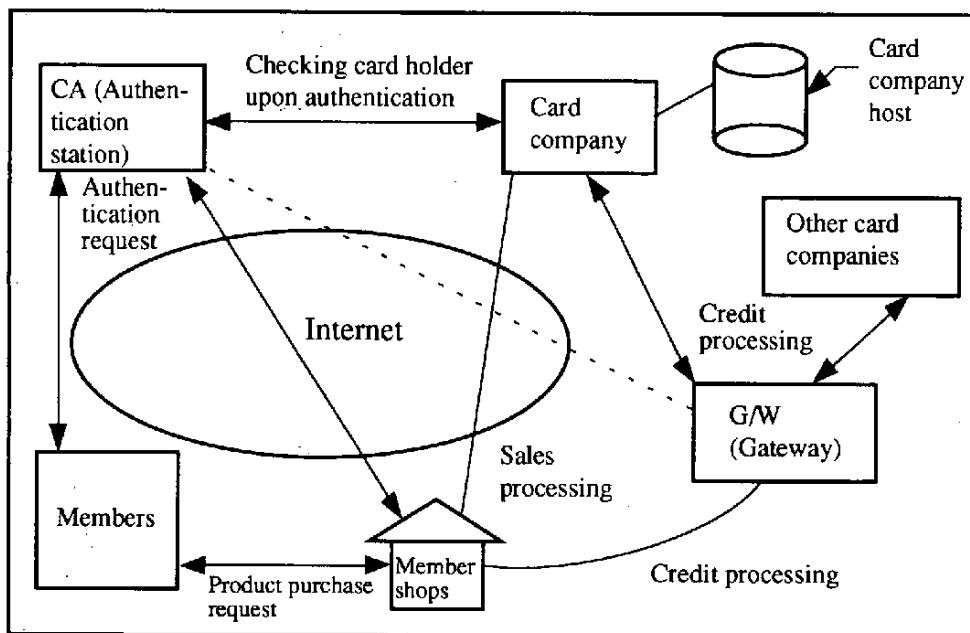
7. An Experiment in High-convenience Shopping Systems with Use of Multipurpose IC Cards

Outline

There are many methods of payment in Japan's consumer society; cash, credit cards, cheques, bank transfers and pre-paid cards, etc., but payment of small amounts is still mainly by cash, and there is a need for an electronic method of using IC cards to pay small amounts.

Recently, the environment surrounding IC cards in EC has undergone a radical change, examples of which include,

- commencement of field tests of electronic money verification experiments,
- forgery countermeasures using built-in encryption and authentication functions,
- card holder authentication when doing on-line shopping on the Internet,

etc.

Japan needs an electronic money system that is suited to Japan's legal system, financial system and commercial practices. Also, a flexible system that takes into account interoperability with international money is required. Further, in Japan, too, we need to push ahead with research into countermeasures against the various types of fraud that are connected with electronic money (forgery, etc.), using encryption and authentication functions, etc.

Project aims

This project will carry out the joint development of a highly secure electronic money system that will be capable of being used throughout Japan.

Further, this electronic money system assumes that the electronic money itself is issued by financial institutions, or Japanese government related institutions, so that after development of the system, we will continue with verification experiments, in conjunction with major Japanese financial institutions. (Schedule not decided yet)

Consequently, the aims of the project are:

- Use of high security IC cards, based on card to card protocol.

  In principle, sums of electronic money are always transferred from one IC card to another, so that IC cards can be built into retailers' terminals and ATMs, so that when a payment is made, the sum is transferred from the customer's IC card to the terminal's built-in IC card.

- Supply of highly convenient and secure terminal equipment to both consumers and retailers, based on our card to card protocol specifications.

- Construction of a Money Management Center.

  The total electronic money issued by a financial institution can be controlled centrally, and all electronic money issue controlled by this device, and retailers' sales can be returned to the Money Management Center.

Electronic money verification experiment scheme

In order to operate this system, there has to be a financial institution that issued the electronic

money, and malls (participating shops) that actually use the electronic money. We are currently negotiating the construction of the scheme with financial institutions.

Development details

In this electronic money system, the bank issues money, the user then opens an account with the bank, and using the bank's ATM or IC card telephone, withdraws a specified amount from the account. Then, the value of that amount is credited to the IC card from the Money Management Center. When the card holder goes to a participating shop to make a purchase, the electronic money is used to pay on-line, and the required amount is transferred from the holder's IC card to the IC card that is built into the retailer's terminal. The amount stored in the terminal is then transferred onto the Money Management Center.

IC cards used

The IC cards that will be used in the system are ISO compliant, and have an MCU with RSA calculation co-processor. The processor is mounted with our proprietary card to card protocol.

Card to card protocol (card security)

An electronic money system that uses IC cards needs to have protection against forged electronic money, and systems for secure processing and transfer of the electronic money.

Our card to card protocol uses both the RSA public Key cryptosystem, and the DES common encryption system.

- IC cards are built into the terminal from where the payment is made, and are also held at the Money Management Center. Amounts can be securely transferred from one IC card to another.
- Using digital signature technology, the correspondent can be specified, and falsification prevented.

Therefore, in order to enable RSA public key encryption processing, the IC card issuing system equips each card with the following four keys,

(1) RSA secret key
(2) Public key bearing the signature of the issuing body
(3) Public key of the issuing body
(4) DES common key

8. Mutual Authentication and Electronic Settlements among Members of the CCC (Cyber Commerce City)

Background and Aims

Recently, with the spread of the Internet and PC communications, Osaka Municipal Government, and local authorities throughout Kansai have been making steady progress in the provision of foundations for Internet use, and there is growing interest in the commercial user of the Internet by enterprises and local authorities.

While electronic commerce (EC) promises much, such as
- low personnel costs, equipment costs and sales costs,
- faster and more rational commercial transactions,
- a wider range of information supply, leading to greater consumer choice, etc.,

but also presents a host of issues, such as
- identification of the individual when making payments, and the security of encryption systems,
- adequate responses to changes in commercial transaction formats, and structural changes in industry, etc.

Against the backdrop of this environment, EC verification experiments are progressing, based in Kansai but with a nationwide perspective, for the purpose of researching and erasing the problems mentioned above. In addition, a Cyber Commerce City Consortium (CCC) was established, with the participation of major enterprises in the Kansai region, in order to utilize the results of the experiments in the creation of new markets, and for the revitalization of economic activity.

Features of the EC verification experiment in CCC

(1) All Kansai project

In addition to the major enterprises in the Kansai region, with the cooperation of various local authorities, the experiment aims to encourage local industry in Kansai, and small and medium sized businesses. Also, the experiment has been designed to facilitate the participation of enterprises in earthquake damaged areas.

(2) Open system

With an open system using advanced Internet levels as the basic premise, My Dome Osaka where major facilities are equipped, Kyoto Sub-Center and credit card companies will be organically linked, and an EC test bed constructed, featuring electronic settlement systems and product retrieval systems, etc.

There will be link ups with concurrent EC verification experiments in other parts of the country, with mutual utilization of elemental technology, such as authentication systems, encryption systems and settlement systems, etc., as shared technology.

Details of the EC verification experiment

(1) Verification experiment task force

The CCC EC verification experiment involves some 20 companies, including department stores, retail store and manufacturers, as supporting members, and around 100 small to medium enterprises and shops as ordinary members and member groups. From these, verification experiment players (businesses or business groups) will be selected to form a task force. The EC verification experiment players will clarify what is expected from EC, and what the issues are, with each player carrying out actual commercial transactions based on the target items of the verification experiment.

(2) Monitors

Around 5,000 monitors are being sought, in order to allow participation in the EC verification experiment from the standpoint of the consumer.

The monitors will be asked to
• make electronic payments by credit card,
• experience product presentations using multi-media technology,
and to participate in CCC monitor forums, held on the Internet, and to exchange information and ideas.

(3) Verification experiment items

The following are to be assessed and verified.
– From the standpoint of existing EC in the world,
   • the potential for expansion and replacement of existing business into EC
   • the application through EC of sales policies for shops and malls
– From the standpoint of new worlds opened up by EC,
   • new products that utilize the functions and features of EC
   • new markets that utilize the functions and features of EC
   • the model of EC consumers
– From the standpoint of prerequisites for the realization of EC,
   • multi-media product presentations
   • product presentations with added service functions
   • ability of product retrieval functions to meet the demands of the consumers
   • establishment of authentication and settlement functions

Outline description of the CCC mall

The illustration shows the CCC mall top page. Originally, the following four methods will be provided for purchasing products from the CCC mall.

(1) Selection from the shop display

A list of 'shops' that have been opened in the CCC mall by CCC member businesses is displayed, and the customer enters the shop by selecting from the list.

(2) Selection of product type

Crossing over the 'shop' boundaries, the customer selects from a list of product types such as electrical goods and stationery, books,

clothes and haberdashery, etc.

(3) Product search

A search function for newly developed products has been prepared, and products can be searched for by entering a key word or free key word.

(4) Search by region

The customer may search by region, looking for shops in the Kyoto area, or in the Kobe area, or in Wakayama, etc.

In conjunction with the launch of the EC verification experiment, various projects are planned, such as a new products corner, and a CCC mall recommended products corner, etc.

9. Mediaport Nagoya

– An Ideal Virtual City in which Any Person Make a Home and Pursue Business Opportunities–

Aims

The aim of the experiment is to create a virtual city on the Internet, and by performing actual business transactions, and building experience upon experience, to create an ideal virtual city that can be used with security, from the standpoint of both users and entrepreneurs.

The virtual city will not be divided into areas by industry, but rather by function, such as reservation areas, gift areas, bridal areas, and each of these areas will provide organic links to the virtual city, by offering settlement and search functions. The virtual city will be used to test the following three points.

1. What kind of presentations are needed in order for electronic commerce to become a more attractive option than catalogue shopping, for the consumer?
2. What needs to be done to achieve a secure and easy to use payment system between businesses and consumers?
3. What is the potential of the virtual city to function as market?

Furthermore, through this experiment, it is hoped that the virtual city will not be just a row of shops in imitation of reality, but will achieve its own form and reliability through the right mixture of virtuality, reality and locality.

It is also hoped that the experiment will contribute to the revitalization of industry in the Chubu region.

Outline

Using the SET compliant settlement protocol (SECE: secure electronic commerce environment) on the Internet, the aim is to construct a virtual city where shops (information suppliers) and users (consumers) can enjoy a sense of security. The virtual city will not be divided into areas only by industry, but also according to function, and by using database links and SECE protocol, an urban space with superior quality settlement capabilities and search capabilities can be provided. Distribution companies can also be contacted on-line, dispatch instructions given, and dispatch results received. Purchasers can check their own purchasing history, as well as tracing the dispatch of items purchased.

From the user's point of view, attractive presentations, and secure and easy to use settlement methods will be verified. Specifically, visually clear and easy to understand product presentations will be studied, using technology such as VRML, JAVA and Shock Wave.

In addition, with regard to operability until the desired goods are found, information based searches, product based searches and town divisions themselves are described as search systems. Therefore, overall they can be useful in reaching the desired goods. As part of the

division of the virtual city into areas, there is a plan to have a gift area, and one major point is the convenience of the gifts. Specifically, users who have register as citizens of Mediaport Nagoya will be able to check the history of which goods were sent to which address, in their own homes. The system needs to be able to accommodate the gift needs of individuals and corporations.

In order to provide a secure and simple payment system, settlement will not be on a shop by shop basis, but should be made once for the whole virtual city, surpassing the shop level.

Seen from the entrepreneur's stand point, this system will reduce distribution, create new information style businesses, and provide two way marketing, so that they will be able to see which products are suited for electronic commerce, and which are not, and whether the reasons for this are price, product quality or some other. They will also be able to answer such problems as the advertising effectiveness of the electronic medium, and which people react in what ways to which contents, along with the monitors.

In the experiment image diagram, with the exception of the distribution companies, the basic concept is to have authentication for the content providers, Mediaport Nagoya, users and payment gateways. In order to make it easier for businesses to open small and medium sized shops, and to make display and exhibition easier, connection to content providers will be via the Internet. Once connection to the Internet is made, additions and deletions to the product line-up, and events such as time bargains can be carried out at any time.

As a result of the verification experiment, it is expected that effective presentation skills, and on-line based marketing technology, which is not retail marketing technology can be obtained and that new businesses in the Chubu region will be fostered and encouraged.

It is estimated that the number of users of the virtual city will be over 5,000, in a membership system. There are expected to be some 300 shops and services.

10. Smart Commerce Japan

Background

Smart Commerce Japan was established by businesses in cooperation, as a site for research and survey, so that security technology in electronic commerce transactions between businesses and consumers could be established, through encryption technology, authentication technology and settlement technology, so that transactions over the network would become acceptable to consumers and that the formation of businesses of entrepreneurs with different missions could be verified.

Themes

As a key component, the scheme uses EMV specification IC cards. These IC cards, in addition to conventional credit card functions, are equipped with a stored value card (SVC) function that enables small amount transactions to be settled without incurring costs, and this function will be tested.

Sites for electronic transactions will be established in virtual malls and in real malls, in consideration of convenience to the consumers, and the settlement methods in both cases will be basically the same.

Verification experiment details

Participants (around 30,000 people) will exchange their current credit cards for IC cards bearing a magnetic strip. In the real mall, there will be settlement by credit card, and also by SVC. When paying by SVC, the card holder will operate personal reader with an LCD and simple keys, and will be able to confirm the balance on the SVC, and to check purchase history. The virtual mall can be accessed from home and commercial facilities. In the home, an IC card reader/writer will be connected to the user's PC, and at commercial facilities there will be kiosk terminals set up. In both cases, when making purchases, the IC card can be used for individual authentication, and the credit card for payment. The kiosk terminals are a new type of equipment for use by unspecified numbers of users, and will function as a supplement to the real malls, with access to the virtual mall services also available.

The IC card used in this experiment can be used not only in the virtual mall, but also in real malls as a credit card and SVC card, so that a single card can enable several different methods of settlement. Also, individual and mutual authentication, a vital technology for transactions over the network, will be enabled.

By installing reload terminals (where the IC card can be topped up with money) in commercial facilities where large numbers of shoppers gather, SVCs can be tested as a means of using the IC card as an electronic wallet.

Using the cards in this way, consumers' spending patterns in both real and virtual malls can be studied.

Verification experiment system structure

In real malls, POS terminals or CAT (credit

acknowledgement terminals) type terminals will be used for the new IC cards. POS and CAT terminals for the IC cards will also be able to take SVC cards, and POS and CAT terminals that are not set up to handle IC cards will allow credit payment using the mounted magnetic strips.

In the virtual mall, PCs and kiosk terminals can be used to access the products offered by information providers or service contents.

SVC cards will be used for settlement. In either the real or virtual malls, from the consumer's point of view, products and services have to be enjoyed equally well, and the payment systems must be coordinated. From the perspective of the participating businesses, products will be displayed in both the real and virtual malls, and the effectiveness of IC cards as a means of individual authentication and payment will be verified, in order to enable test marketing by the collection and analysis of such data as how will the consumers react to such and such a product, what effect would changing the price have, etc.

11. Large-scale Testbed of Electronic Commerce, with a Virtual Exibition as Centerpiece

Outline

The contents of a product exhibition are stored on a WWW server. The server is then connected to the Internet, so that the contents can be freely accessed from anywhere in the world. In addition to various information pertaining to the exhibition, the server is also equipped with a mechanism for recording user access history, so that data on user activity in the WWW site can be accumulated. Also, within the experiment, comparison will be conducted as to the load dispersion among sites, and to the utility of the retrieval systems.

Background

In general, the popularization of EC faces the following three issues.
1. How to ensure secure and accurate communication.
2. How to link product information display systems with conventional in-company order management systems.
3. How to provide information that will attract the attention of users.

Of these, with regard to the first item above, there are already many attempts being started in the development of electronic money and security protocols.

With regard to the second item above, as this involves connection to the information systems of individual companies, and is likely to be taken up within the companies themselves, it is not a suitable subject for ordinary experiments.

The third item may be considered from two angles.

In the first instance, the point is to present sufficient information of the type that users really want. With the explosive growth of information on the Internet, information that is actually needed tends to get buried under other information (called 'noise'), making it extremely difficult to find the information that one needs. Then again, once the information has been located, it is usually difficult to tell whether it is the latest information or not. Among virtual exhibitions on the Internet, there are some that provide product search functions with a database, but there are none whose functions are yet sufficient, and users either cannot find what they want, or end up wasting valuable time searching through multiple lists that contain lots of unwanted information. Virtual exhibitions need to be equipped with functions that provide sufficient amounts of the latest information that the users need.

The second aspect is 'How to provide sure and pleasant access to the information.' When users are unable to access information because of crowded servers, or have to wait ages for information to download, they are unlikely to want to try to access that server again. Sure and fast access to information is a vital factor in providing information that is attractive to the user.

Authentication experiment outline

Against the above backdrop, this project, taking virtual exhibitions on the Internet as its theme, sets out to verify the two aspects described below, related to the issue raised by the spread of EC of 'How to provide information that will attract the attention of users.', and through the experiment aims to develop the software described below, with the eventual aim of establishing a framework for the realization of large scale virtual exhibitions.

- Exhibition applications
- Information navigation mechanism
- Mechanism for load dispersal among distributed
- Mechanism for contents synchronization among distributed servers

(1) Verification of the possibility of information navigation

The first aim is 'to provide the users with sufficient information that they really want'. In order to realize this, we have to determine what the users want, and then search for the information that the users want from among the plethora of information that is available, and display it in an easily understandable fashion.

The realization of these points raises many questions, such as information filtering, high speed text search and high speed database construction, etc., but this experiment will attempt to verify information navigation technology in an effort to clarify the relationship between the as yet untested users' purposes and search methods, and the methods of displaying search results. It is expected that the results of this experiment will enable the selection of information search methods and display methods adapted to user characteristics and reasons for accessing the site, and enable users to be provided more easily with the information that they really want.

Specifically, in a virtual exhibition on the Internet to be accessed by an unspecified number of users multiple information retrieval methods and results comparison and display methods will be provided in order to test whether there is a discernible difference in the selection of product information retrieval methods and results comparison and display methods, due to user purpose, individual characteristics, and contents (the products that are the subject of the search).

(2) Verification of design and control pertaining to load dispersion among servers

The second objective is to provide pleasant access to information.

In order to provide pleasant access as against multiple access, in other words, small access delay and large communication throughput, it would be most effective to widen the band width of the line, and to improve the capacity of the servers. However, with regard to widening the line band width and improving server capacity, only one server can be improved per line, and since cost performance would suffer, an effective way to improve capacity over a certain level is to disperse the site functions. Also, since the Internet consists of many complex mutual interconnections, if site functions are diversified according to

proper design and control, even with the same level of line and server performance, much higher performance services can be provided than with a single site. Therefore, the dispersal of site functions is a vital question for the future popularization of EC.

This experiment will attempt to verify design and control of server dispersion. It is believed that this will enable a more pleasant service to be provided to many more users, using the same resources.

Implementation of the verification experiment

In this project, a virtual product information supply system (virtual exhibition) for the Internet will be constructed, and multiple information navigation systems and different methods of system load dispersion will be made available, and compared and verified. The virtual exhibition will run for over one month. Preparatory test and additional test periods will be established when and if required.

12. Virtual City Concept

Outline

In the virtual city concept, the entire process of purchasing will be examined, from purchase motivation of the consumers to actual purchase and on-line payment. A virtual city will be constructed on an open network, providing a venue where electronic commerce can take place. Also, by maintaining very close communication with the consumers, the project aims to be able to provide products that are closer to the consumers' needs.

This verification experiment will feature
- a 'virtual mall system', where attractive product contents and secure settlement can be realized,
- the 'super multi media kiosk' SMMK system, established at public facilities, stations and department stores, etc.,
- visual product information in a database and provided in a 'visual product information system',
- an electronic 'settlement system' that enables credit card payment, bank account payment, etc.,

and a 'security system' that encompasses these.

Visions

The Virtual City is not just another electronic shopping mall project. It aims to create new businesses, based on the following 'four visions'.
- Creation of global commerce
- Encouragement of local industry
- Complementing public services
- Realization of consumer friendliness

Main contents and features of the verification experiments

In the Virtual City, in addition to 'material goods', which are the current focus of electronic commerce on the Internet, there will also be systems in place for the sale of 'information goods' and 'services goods'. In particular, downloading digital contents like 'information goods' will enable small amount sales.

13. Uniform System for Provision of One-step Electronic Public Services

Aims

The concept of this project is to find ways to make reporting procedures to local authorities and service companies (public utilities) simpler and more efficient, from the user's view point.

For example, when changes in one's status, such as a new address, occur, citizens are required by law to report these changes to the local authority. Similarly, services that are essential for daily life, such as electricity, gas, water, broadcasting, finance, post and telephone, etc., need to be reapplied for and canceled, etc.

When faced with the trouble of completing all of these procedures, people often wish that there was a single point where they could all be completed at once. In response to requests for such 'one stop services', this project aims to realize a service that would meet the needs of citizens in completing procedure required by local authorities and public utilities, by converting the procedures to electronic formats.

In this project, an environment will be constructed so that these one stop services can be put into concrete form, and verification experiments conducted into their technical possibility and usefulness, with the aim of making user procedures simpler and more efficient, and increasing the efficiency of the bureaucratic processes of local authorities and public utilities. Through the verification experiments, issues from the point of view of

operation and systems will be extracted, and knowledge for the spread of one stop services obtained, and the foundations of future expansion and development, such as providing easier and permanent access to terminals can be consolidated.

Outline

The concept of the system to be constructed in this project is as described below.

In this way, the user will be able to carry out all procedures at a single point (public terminal). The details will then be sent to a virtual center, installed at the rear of the terminal, where each public utility will perform its own procedures. The results of each process will be collated at the virtual terminal, and relayed to the user via the public terminal. In other words, all of the procedures will be able to be handled in a single location.

The user would input the required conditions of the procedures by responding to questions in the public terminal's guidance function. The user would select the appropriate procedures, and input the characteristic items of the procedures in the same way. When one round of procedures is complete, the input details are sent to the virtual center. At the virtual center, a function that might be called an agent allocates the required information for each procedure, and separately requests processing of each procedure from the utility concerned. The public utilities process the requested

All procedures enabled at a single terminal
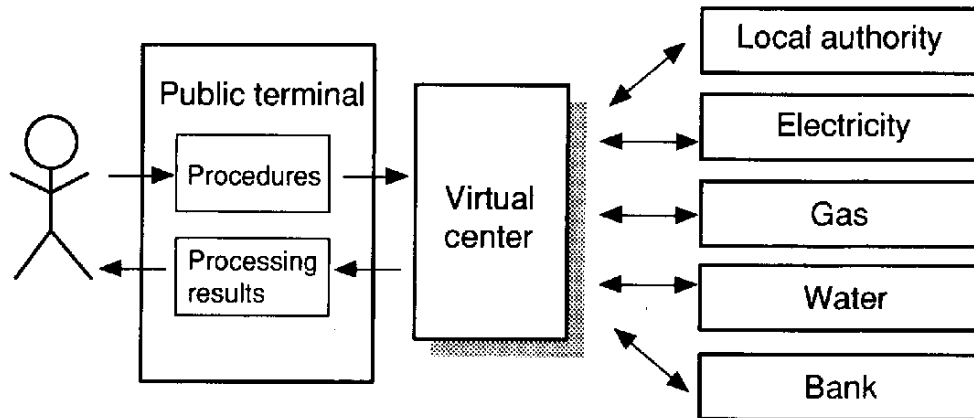
procedures, and return the results to the virtual center. The virtual center collates these results, and performs electronic authentication, to assure the procedures, and then stores and returns the data to the user via the public terminal. The local authorities will have a uniform enquiry 'window', so that changes to the resident's register and other procedures, such as National Health Insurance, National Pension and Child Allowance, etc., can be completed all at once.

Koshoku City in Nagano prefecture has been selected as the test bed for this project, and in addition to the city authorities, other public utility providers, such as Chubu Electric Power and the gas and water departments of Nagano prefecture Business Bureau, and Hachijuni Bank, with Densan Co., Ltd., participating as a provider of information processing and communications. The 'Electronic Public Service Uniform System Promotion Council' has been formed, and the project is underway.

Main points arising from this are the strict observance of the applicable legal system, and the absolute protection of private information, and the project will proceed based on these premises. For example, the necessity of certain signed and sealed documents to be delivered, and legal requirements barring access to residents' registers, etc. need to be taken fully into account, and in addition to installing public terminals within local authority buildings and making the submission of documents possible, countermeasures are being created such as delivering electronic data via floppy disk with the local authority off-line.

Also, from the vitally important aspect of protecting private information, security measures such as data encryption and access restriction are being devised.

The experiment will be divided into two; a monitor experiment and an operation experiment. The monitor experiment is a theoretical experiment, and is based on three main pillars; the operability of the public terminals, the psychological effects created by the public terminal environment and the form that user services should take, each of which

will be examined. The examination of the operability of the public terminals will look at input methods and guidance methods adapted to the level of understanding of the user, and will try to determine how best to approach the perfect solution as closely as possible. Examination of the public terminal environment will look at the effects on the user's sense of ease, fatigue and time of the enclosed environment of the booth, and screen displays while procedures are being processed, etc. The aspect of service contents will be assessed from the view point of how much information will users find acceptable when they receive the results of their procedures.

The operation experiments, which target users who actually need the procedures, will examine usefulness of the system to the users, local authorities and public utilities. For example, from the user's point of view, the question will be how simple the procedures are, and how much more efficient they have become. Meanwhile, from the local authority standpoint, the question will be whether putting submissions and applications on floppy disks will make administrative handling easier and more efficient, or not. Public utilities will be concerned as to whether the switch from conventional oral application to standard electronic data will increase reliability or not. The effectiveness of these one stop services is evaluated.

The major schedules will be the commencement of the monitor tests from July, 1997, and the running of the operation test from September to December, 1997.

14. Development of Cyber Card System Platform (CCP)

Aim

The aim of this project is to assist the rapid popularization of electronic commerce throughout Japan, and to utilize the automatic account transfer feature of the Japanese credit card system, without requiring the addition of extra equipment, such as IC cards, etc., and to construct a platform that will form the foundation of electronic commerce, thus reducing the costs of commercial transactions.

Furthermore, in addition to technology for the maintenance of security, business operations for the establishment of security across the full range of commercial transactions among consumers, shops and credit card companies will be tested and verified, in order to contribute to the establishment of a Japanese style security management functions.

Characteristics of the verification experiment

• Actual commercial transaction experiments
Specific monitor members and shops are enlisted, and actual transactions carried out. These are not virtual transactions, but involve actual sales.

• Cardless card system
This is a card system without physical cards. As there is risk during the experiment period, and contract discussions are extremely difficult, actual cards called cyber cards will be issued

to monitor members only, and commercial transactions carried out with cyber card members. Experiments involving electronic prepaid cards with the same setup are now under discussion.

• Security
In order to protect confidential data, such as credit card numbers and personal information, encryption processing using public key encryption and electronic signatures, and authentication systems, will be used for the concealment of personal information. The public key cryptosystem used will be RSA 1024 bit, and the common key encryption system will be DES 56 bit key length encryption keys.

• Combined credit and authentication
Credit and authentication functions will be combined, in other words, the creditor who provides credit to the card holder will be able to issue authentication certificates over the network. Therefore, authentication station systems will be installed at the card companies, and authentication certificates will be issued to cyber card members on-line.

• Survey of user needs
Until now, the needs of the users have not been seriously considered in electronic commerce, but these will be raised as part of the verification experiment, and a survey carried out into the requisites for a more easy to use platform, and the goods and services that shops should make available.

• Survey of shop needs

The needs of businesses that are opening virtual shops will be raised during the verification experiment, and a survey carried out into the requisites for a more easy to use platform, and the goods and services that shops should make available.

• Development of commercial transaction related administration

Commercial transactions carried out via virtual shops will involve new rules and administration for the consumers, shopkeepers and card companies concerned. In this respect, there are more serious issues to be resolved in addition to the protection of confidentiality during transmission. In the verification experiment, through experimentation, development and operation of administration systems that match current systems, and do not sacrifice security, will continue.

Details of the verification experiment

The actual verification experiment will be a joint purchasing experiment involving consumers, shops and credit card companies. In view of the rapid spread of EC, home use, in particular, is envisaged. For this purchasing experiment, consumers who will act as monitors in the joint purchasing experiment will be recruited and asked to become credit card members of the cyber card that will be used in the experiment, and will then shop at the virtual stores.

With regard to settlement in the experiment, there are still various operational matters to be discussed, because of the possible risks, and in order to lessen the risk to the credit card company. Therefore, settlement will be handled by the credit card company issuing the cyber card. With regard to the scale of the verification experiment, around 5,000 monitors are due to be recruited in fiscal 1996, and purchasing experiments carried out. Then, in 1997, some 10,000 people will be recruited as the second wave of monitors.

Firstly, the monitors will use the on-line sign up facility to apply for the cyber card. The credit card company will then verify the individual by telephone, and issue an authentication certificate. Thereafter, the member can use this certificate to conduct coded communication with the other parties in the scheme. Since the fundamental concept of this experiment is that crediting and authentication should be combined and performed by the same party, this job will be done by the credit card company.

As for the actual transactions, the monitors will access the electronic shopping mall via the Internet, and select the goods that they want. When the goods are ordered, the orders will be processed through a special client software to the settlement server. Upon receipt of the order, the settlement server relays the order to the shop server, which is the virtual shop. The shop will relay credit authentication to the credit card company, and upon receipt of the order, the goods will be dispatched. The final invoices from the shop will be wired from the shop to the credit card company, via a dedicated line, where they will undergo batch processing. This is because, when one considers the possibility of canceled orders due to cooling off and termination of agreements, etc., is it better to

process sales invoices in batches, in order to minimize the effects.

Credit authentication with the credit card companies is now done off-line, but this is due to be changed to on-line in 1997. Settlement information is due to come from the shops in batches. Currently, product information publication and ordering information are all put on-line, via the Internet, and transmitted to the participating businesses, and electronic settlement handled by a third party.

As an electronic mall, the shops currently participating in the experimental NRI Cyber Business Park and Telephone life Club, Sanwa Research Institute Corp's Green Cyber Mall, and Dai-Ichi's Internet Shopping Mall, etc., will be used. Furthermore, during the experiment, the needs of the users, which have not really been given much serious consideration up till now, and the needs of businesses that are opening virtual shops will be raised, and a survey carried out into the requisites for a more easy to use platform, and the goods and services that shops should make available. In addition, EC transactions will need new rules and administration for the consumers, shopkeepers and card companies concerned. In the verification experiment, through experimentation, development and operation of administration systems that match current systems, and do not sacrifice security, will continue.

15. Project to Develop and Provide Integrated Content Services in Electronic Commerce Experiments

Aims

Integrated services means that the product and service information of different companies are combined laterally, and offered to general consumers as a kind of product package. The aims of this project are to establish a standard data format for the description of the contents of such integrated products and services, and through the provision of a support environment for the creation of integrated services, to prepare the infrastructure for the preparation of integrated service contents.

Outline

In comparison to providing individual products and services on the Internet, integrated service offer the possibility of providing ever more convenient integrated services to users.

For example, consider the case of a service that offers the user the ideal beauty plan for a certain fixed sum.

With conventional services, the user, with calculator in hand, would probably begin by buying a diet book, and continue to scour the home pages of different companies, gradually building a diet plan.
Now, data that can be viewed with a WWW browser have been standardized into HTML (Hyper Text Markup Language). However, HTML is a format specification for displaying text on a WWW browser, and does not regulate the description format of the meaning of the

display content. In other words, in HTML, when product and services price information is converted into electronic data, the software cannot determine whether the price is displayed using 'yen' or '\', or whether the table columns contain only numerical figures, which means that price information cannot be processed automatically.

Therefore, in order to provide integrated services, there needs to be a standard format that specifies how meaningful content information like prices are to be described. If this format is followed to describe information, the user can be provided with a support service so that the contents of different companies can be used to provide a beauty plan within a certain budget.

In addition, once a standard format is established, it will be much easier to combine information and to process it automatically. For example, it will be possible to have software that automatically checks at the home pages of used car dealers, at regular intervals, and creates a list of the desired type of car, together with their ages and prices.

Furthermore, by using the network's inherent ability to re-use and combine information, integrated contents can be used again as new contents to generate new business. Taking the example of the used cars, information from the home pages of the used car dealers, car manufacturers, and car magazines could be integrated to provide new contents by

combining used car price lists with the latest information on the cars, and reports of test ride impressions, etc.

In this project, firstly, a standard format will be developed for the description of meaningful information of a wide range of products and services, and this format used to create an experiment contents database. Then, single services within the database will be combined, and a support environment for the development of integrated services developed.

16. Interactive Multi-media Information Coding (MHEG) Interoperability Testing

What is MHEG?

MHEG specifies the standard exchange format for multi-media information exchange between different types of machine or systems. It is due to be recommended in ISO 13522, and in ITU-T T.171, T.172. Adapters that are used for CATV, etc., (basically, televisions) are envisaged as the equipment to actually display the information. This means that operation will be possible through the TV's remote control key pad (arrow keys), making the system very family oriented.

Applications of MHEG

The use of MHEG in the environment of electronic commerce is for such things as mail order catalogues (naturally, including moving images and sound), as a sales promotion tool for PR activities, in information kiosks (e.g., installed on street corners, and enabling information to be searched for freely) and for manuals, etc.

Features of MHEG

The main features of MHEG are the following five points.

(1) Can be used even in the limited environment of a set top box, etc., hooked up to a television set.

(2) It assumes use of simple controls, such as a keypad.

(3) It guarantees replay of information in the way that it was intended. For example,

HTML may appear completely different, depending on the viewer used, but MHEG guarantees the same display.

(4) It features the interactive controls of video and audio, in other words, pause, play and rewind, etc.

(5) MHEG data are only for viewing by the end user, and cannot be reused after reception. This means that it is not intended for editing.

Required environment

Conditions will change depending on the implementation, but typical examples would be usage in set top boxes, PCs, and game machines. User interface can be with a keypad, mouse, etc. Transmission media and storage media should ideally be CATV (cable modem), digital TV transmission, CD-ROM, LAN and other high speed devices (capable of transmitting MPEG1 video).

Comparison of HTML and MHEG

The table below illustrates the results of a comparison between HTML and MHEG. Output timing means that, for example, when a screen appears, the next screen should be displayed 5 seconds later. HTML does not allow this type of programming, but MHEG does. Neither does HTML support real time play controls (video pause, play and rewind functions, etc.). However, unlike MHEG, HTML does allow the user to edit the data.

Merits of standardization

Multi-media will not wait for MHEG, and there are already various types of products on the market, but the merit of standardizing MHEG is that the information display format does not rely either on the software vendor or the hardware vendor. This means that the data can be operated on any hardware, and with one viewer, any information source can be accessed. This will vitalize the distribution and use of information, and generate low cost use of multi-media

MHEG prescription range

To encode information contents such as text, still video and moving video, etc., there are MPEG and JPEG encoding systems. MPEG is an encoding system for moving video, and JPEG is for still video. In contrast, MHEG corresponds to the layer above this, and is used to specify the output location and the output timing of the contents. It can also be used to specify user interface conditions, in order to enable interactivity with the user, and to specify operating conditions, in order to run in accordance with the user's instructions. The application layer, which is above MHEG, is unspecified, and might be used for on-line

shopping or information provision, etc. At the lowest layer of the diagram the recording method, transfer protocol, hardware, processing of details, etc. are specified. However, in MHEG, these are not specified, and the study and specification of these items is one of the topics of this development theme.

MHEG mutual exchange experiment

The experiment contains the following three elements.

(1) Establishing rules for mounting MHEG (detailed rules for the use of MHEG). In particular, Japanese language environment, computation functions and uniformity of reproduced image.

(2) Development of prototype MHEG viewer and MHEG authoring tools
Viewer: For Mac OS, Windows95
Authoring tool: For Windows95

(3) Exchange experiment
Verification of data exchange, and linking to WWW.

Firstly, the rules for mounting MHEG are detailed rules for the use of MHEG. The ISO and ITU recommendations are extremely

	HTML	MHEG
Specify screen layout	x	O
Specify output timing	x	O
Real time play control	x	O
Hyper link	x	O
Data editing	O	△

general, and more detailed rules are needed for actual implementation. For example, the character code to be used should be decided on the user's side. Also, the decisions about whether MPEG 1 or 2 should be used for moving video, and whether JPEG or GIF should be used for still pictures, need to be made separately. In particular, in the Japanese language environment, allowing the use of vertical writing, or not, is quite significant.

Next, based on the rules for mounting MHEG, development of prototype MHEG viewers and authoring tools will be carried out, and these tools used in the creation of multi-media data for use in the exchange experiment.

Finally, these will be used in off-line and on-line exchange experiments.

Experiment system image

It is our feeling that the authoring tool should be able to be operated on a stand alone basis. Then, the created MHEG data can be stored on media such as a CD ROM, and off-line experiments conducted. Also, if the created data are stored in the server of a workstation base, as shown in the diagram, on-line experiments can be conducted, as well as testing of links with HTML.

The network line to be used in on-line tests will be through a comparatively fast LAN, such as 100 Base - TX, etc., connected to a PC. The client PC will be mounted with an MHEG viewer and HTML viewer.

17. Commerce Navigation System
– Technology Development and Testbedding of Network Agent Systems –

Issues associated with the spread of EC

Internet is said to be one of the biggest forces in the spread of consumer oriented EC. Internet features include open networks, two way communication channels, distributed systems and multi-media handling, etc. The spread of EC using networks with these features will likely bring several issues with it. At the planning stage of the Commerce Navigation System, we focused on the following points.

- How to find the information that one needs from a widely varied and massive amount of dispersed information.
- Converting highly transient and anonymous communication into a form that can be viewed by others.

We believe that the following two mechanisms will be effective in tackling these issues.

(1) For the consumers,
   a mechanism whereby the right information can be found at the right time, accurately, speedily and with ease and security.
(2) For retailers and service industries,
   a mechanism whereby information can be effectively provided to the target customer group.

The planning of Commerce Navigation System was based on these points.

Base structure of Commerce navigation System

Usual WWW systems consist of a client PC that the consumer operates, and WWW servers (virtual shops) operated by retailers and service industries. Commerce Navigation System adds a gateway server, operated by the network, to the above two elements.

In a gateway server, the product and service information provided on dispersed WWW servers (virtual shops), can be found together by accessing a database.

Personal information communication functions

The main function of Commerce Navigation System is the personal information communication function, which is explained below.

When a consumer accesses the gateway server, that person's personal information, stored in the client PC, is sent to the gateway server automatically. When searching for products and services on the gateway server, the search items entered on the screen, and matched with the personal information, and the search conducted.

For example, if the item 'shoes' is entered in the search, if the user were a man, the logical place to start would be with men's shoes. If the user were a young salary man, it would be

better to start with business shoes, like 'Regal', etc.

In the process described above, the personal information is sent to the server by the consumer. In contrast, when the user looks for products and services on the gateway server, his or her search trends are automatically downloaded from the PC. Also, when making purchases and reservations at virtual shops, the information (receipt) is automatically stored in the client PC.

Thus, the client PC stores not only the individual's characteristics, but also information relating to past purchasing activities. This personal information (individual characteristics and search trends) can then be used in the next product search.

This personal information communication function enables virtual shops to offer a range of products that more closely matches the demands of the consumers. For example, when a shopper goes to a department store, the shop assistant knows the customer's sex and age range at a glance. And from the clothes the customer is wearing, one can also guess as to the professional class and fashion taste. This allows the shop assistant to suggest products that are likely to match the customer's needs. In cyber space, also, the personal information communication function allows the same kind of sales activities that are conducted in a real shop to be realized with even more accuracy.

Merits of the system

The merits of using this system are

(1) For the consumers,
- by making one's personal information available, information that is suited to one's needs is given priority when searching.

(2) For retailers and service industries operating virtual shops,
- various goods and services can be offered to the customer, in response to their personal information.
- marketing strategy can shift from mass marketing to that which supports an on-going relationship with the customer (continuous relationship marketing).

(3) For networks that manage gateway servers,
- information pertaining to lifestyle trends, which closely follow consumer trends, can be grasped.

Participating businesses

Commerce Navigation System was planned by the Saison Group Internet Forum Secretariat, which comprises three companies; I and S, SMIS, and Saison Information Systems. The actual operation and utilisation plan will be carried out by an eight member EC consortium, which in addition to the three companies mentioned above, includes Seibu Department Store Co., Ltd., The Seiyu, Ltd., CREDIT SAISON Co., Ltd., PARCO Co., Ltd. and SS COMMUNICATIONS INC.

18. Development of a Common Platform That Implements a Secure Commerce Protocol

Aims

Secure and reliable payment and settlement of electronic transactions between businesses and consumers, over open networks such as Internet, and the development of a common platform for consumers that enables a secure commerce protocol that can respond flexibly to Japanese business practices (SECE: Secure Electronic Commerce Environment).

Outline

The structure of SECE comprises 1) secure commerce protocol specifications, 2) a common platform consisting of a communications library and security library, required in order to enable secure commerce protocol, and 3) API (Application Programming Interface) specifications for the realization of applications on top of this common platform. The results of these are provided in an open format.

The secure commerce protocol comprises two protocols; a payment and settlement protocol, and an authentication protocol. Payment and settlement protocols, of which SET (Secure Electronic Transaction) is a representative example, which accompany purchases, are those which can handle credit card settlement or bank settlement, or protocols that handle transactions between consumers and banks (balance checking, transfer functions, etc.).

Special characteristics of SECE

Settlement systems generally support settlement by credit card and settlement by bank. Payment and settlement procedures enable an environment that is capable of responding flexibly to payment and settlement processes that may differ according to the shop and transaction.

As a payment and settlement protocol, credit card settlement is based on SET, and can be changed or added function in order to be able to respond flexibly to particular Japanese commercial practices, such as payments by bonus, etc.

A protocol is required in the consumer's PC so that she can access the Internet in order to perform the necessary procedures to apply for authentication to an authentication station, to prove that she is the actual user. Also, the client PC needs to be mounted with a function to manage the certificate obtained by this certificate in the customer's own PC, a function for the management of the gateway authentication of the shops and credit card companies, and a function to manage an authentication revocation list.

SECE provides the protocols necessary for these functions, and the common platform for the realization of these functions.

In order to enable a payment settlement system that does not rely on one WWW browser, SECE

enables payment settlement by helper applications and Java Applet. Payment settlement by Java Applet requires authentication to prove that the Applet is valid. An electronic signature is added to the Java script, and the client side checks the electronic signature to verify that it is valid, thus maintaining the security of the payment settlement transaction.

In the payment settlement protocol, secure and reliable transactions are enabled by the use of encryption technology, moreover, a structure which can select an encryption logic from multiple encryption algorithms is realized.

As encryption technology, RSA encryption is used for the public key encryption, and DES encryption is used for the common key encryption, and SHA used for the hash function.

Moreover, Japanese produced encryption, etc., is provided in cassette form.
Bank transactions will be matched to the style of Japanese bank transactions, and a protocol based on SET will be developed. The developed protocol will be reviewed by ECOM's working group, and a library will be provided in order to enable this, so that testing can be carried out on the verification experiment site.

SECE transaction format

Purchase linked credit settlement/ bank settlement

(1) The product to be purchased is selected on the WWW, and the intention to purchase communicated. A message comes from the WWW to activate SECE.

(2) In response to this, the client PC and SECE application inform the shop of intention to purchase.

(3) The shop sends a list of the credit card brands accepted, by way of confirming the intention to purchase.

(4) The client PC selects the card, and sends the payment request to the shop. The payment request is an electronic document, and contains information related to the order, such as the purchase date and product code and quantity, etc., and settlement related information, such as the credit card brand, card No., period of validity, and settlement value, etc.
The credit card number, etc. is encrypted by the payment gateway's public key, and cannot be read by the shop. The order details, etc. are encrypted by the shop's public key, and can therefore be decoded by the shop.

(5) The shop receives the payment request, and carries out a credit check with the payment gateway, and receives credit information from the credit card company. Depending on the product, payment may be immediate or deferred, and should the payment settlement process be interrupted and resumed, there are status confirmation messages and responses so that the current progress of the transaction can be monitored.

(6) The shop's server analyses the results of the payment gateway's credit check, and

informs the client PC of the results. The results are displayed on the client PC screen.

At the time the product is selected, and the intention to buy is communicated, the consumer is given a choice of whether to settle the payment through his bank account, or by credit card. Selecting to pay by bank account here, causes the payment to be settled by bank account. Selection of settlement by bank account initiates a series of protocols and operations by which the appropriate amount is transferred from the client PC to the shop's bank account.

19. Development and Testbedding of an Contact-less IC (Smart) Card for Use in Electronic Commerce

Background

(1) Social background

Rapid advancements in semi conductor chip technology in the late 1980's brought chip prices down, and made for dramatic improvements in cost performance. Against this backdrop, technological innovations in electronic information, such as the downsizing of computer systems, development of networks and open systems, etc., enabled previously unimagined electronic commerce, where all manner of economic activities, such as commercial transactions and settlement, etc. are carried out using a variety of computer networks in an integrated way.

In order to realize electronic commerce, which is carried out in a variety of ways, between companies and individuals, between companies and companies, between individuals and individuals, and with many different frequencies of usage, it is absolutely vital to have security technology that allows verification of the user, and mutual authentication on the network, regardless of whether the system is open or closed.

IC cards, which have a microprocessor memory CPU, have personal authentication functions, data carrier functions, and security functions, etc., and have great potential as a tool for individual and mutual authentication over the computer networks.

(2) Technical background

CPU equipped IC cards can be largely divided into 'External Terminal IC cards', which perform transmission and reception of data between the card and the reader writer, via a contact point, and 'contactless IC cards' which transfer data by electromagnetic induction and electromagnetic waves, etc., without making contact. Also, the contactless IC cards are further divided into those which are used within a few millimeters of the reader writer, and are called 'Close Coupling Contactless IC cards', and those which can be used at a greater distance, called 'Remote Coupling Communication Cards'.

The External Terminal IC card had its ISO/IEC 7816 standard establishment accepted by the International Standards Organization/ International Electrotechnical Commission (ISO/ IEC), and in Japan, JIS X6303, 6304 and 6306 were established, and enacted from 1st October, 1995.

Meanwhile, standardization of the Close Coupling Contactless IC card and the Remote Coupling Communication Card by ISO/IEC JTC1/SC17/WG8 is progressing, and as of April, 1996. The Close Coupling IC card is awaiting issue of ISO/IEC 10536-4, and in Japan, in 1996, work is underway to set JIS standards that comply with ISO/IEC 10536 series standards.

Aims

The 'Technical development of a contactless IC card for EC, and a reader writer unit for general purpose terminals' project has as its main aim the development of technology to enable the practical use of the close coupling IC card, for which ISO/IEC international standardization is almost complete, and its related general purpose reader writer unit.

Project outline

(1) Overall outline

The project will first of all set down the loading rules for the close coupling IC card, which conforms to international standards ISO/IEC 10536-1,2 ,3 ,4 and the related international standards ISO/IEC 7816-4, and its related general purpose reader writer unit.

Secondly, based on the above loading rules, by designing and testing the close coupling IC card and its related general purpose reader writer unit, interchangeability between the close coupling IC cards, and interoperability of the close coupling IC card and its related general purpose reader writer unit, will be verified and assessed.

The project will be implemented jointly by New Media Development Association, and the IC Card Transaction System Research and Development Association.

Table 1 International standardization of close coupling IC cards

IC card identification	Applicable standard (ISO/IEC)	WD	CD	DIS	IS
Close coupling IC card	10536-1 Physical properties	Issued			
	10536-2 Coupling area	Finished		94.11	Waiting
	10536-3 Electronic signals	Finished		96.01	Waiting
	10536-4 Operational procedures	95.06	96.01		

Table 2 International standardization of remote coupling communication cards

IC card identification	Applicable standard (ISO/IEC)	WD	CD	DIS	IS
Remote coupling communication card	14443-1 Physical properties				
	14443-2 Wireless frequency interface				
	14443-3 Transmission protocol				
	14443-4 Security function				

(2) Outline of technical development items

The following is an outline of the technical development items that comprise the close coupling IC card and its related general purpose reader writer unit.

1) Close coupling IC card

The close coupling IC card comprises the following functions, and loading rules are to be established for each function, and design, trial and verification assessment carried out.
- Structural functions: contactless electrically powered transmission function, contactless signal transmission function, clock formation function, reset signal formation function, digital signal processing function, data transfer processing function, command processing function, file generation and management function, security function.

2) General purpose reader writer unit

Like the close coupling IC card, the general purpose reader writer unit is composed of the following functions, and loading rules are to be established for each function, and design, trial and verification assessment carried out.
- Structural functions: contactless electrically powered transmission function, contactless signal transmission function, digital signal processing function, data transfer processing function, personal authentication function, mutual authentication function, encryption and decoding functions, command processing function.

III. Corporate-EC Project

1. Promoting EC in the Petrochemical Industry

Aims

Traditionally, the petrochemical industry in Japan has been managed with a focus on the domestic market. However, with the slowing in the growth of the domestic market, and users' overseas developments, etc., the business environment is undergoing marked changes.

In future, in order to respond to these changes in the management environment, it will be necessary to have 'open model' management that makes optimum use of information communication technology.

Further, in order to realize 'open model' management, it will be necessary to construct an information sharing base.

The aim of this verification experiment, is to conduct field tests for industry BPR (Business Process Re-engineering), involving not only petrochemical companies, but also related industries (trading companies, consumers, distributors, etc.), with the construction of an information sharing base for the petrochemical industry in mind.

The principal aims of the experiment are to prepare an information sharing base for the petrochemical industry in Japan, and to realise order placement and reception and distribution EDI, and joint marketing, based on the use of a common backbone network. Also, with the aim of constructing a shared information base for overseas business development, the experiment will work towards standardisation in order to bring about electronic marketing in international transactions, and to eliminate the barriers that prevent Japanese petrochemical companies from branching out into overseas marketing.

Specifically, the verification experiment will be carried out for the realisation of the following three points.

(1) Spread and expansion of order placement and reception EDI using JPCA-BP*.

* JPCA-BP: Industry standard business protocol for order placement and reception EDI, based on the CII standards laid down by the Japan Petrochemical Industry Association in 1990.

With the aim of popularising and expanding the order placement and reception EDI already used among some petrochemical companies and trading companies, a new JPCA-BP order placement and reception package software will be developed.

Users of the current order placement and reception package software will be able to switch to the new software without any discomfort, and by incorporating functionality that enables the software to be used with current terminal environments, such as LAN and Windows95, the experiment aims to further spread and expand the order placement and reception EDI using JPCA-BP.

In addition, with the aim of introducing EDI into overseas order placement and reception transactions, which are expected to increase in the future, the use of EDIFACT, the international standard EDI, in overseas transactions in the petrochemical industry will be studied. The aim here is to realise the standardisation of overseas order placement and reception EDI within the petrochemical industry.

(2) Promotion of efficiency and openness in distribution

The experiment aims to promote business efficiency through the standardisation of, and introduction of, EDI into distribution business processes, which are a particular source of increased costs in the petrochemical industry, and to bring about BPR (Business Process Re-engineering) in the industry.

(3) Establishment of a new marketing system

Another aim is the establishment of a new marketing system for petrochemical products, utilising an information communication system.

The aim is to establish a marketing system for

the IT (Information Technology) age, by constructing product databases linked to web sites on the Internet, with user friendly search functions.

Outline of verification experiment

• EDI standardisation

Order placement and reception EDI and inter-industrial distribution EDI will be standardised, for the purposes of promoting EC in the petrochemical industry.

With regard to the standardisation of order placement and reception EDI, there are already national industry standards (CII standards), laid down by the JPCA-BP. Therefore, the target of this latest standardisation is order placement and reception EDI used in international transactions, and the adaptability of international order placement and reception EDI to the EDIFACT will be examined. Specifically, investigation and standardisation proposals will be drawn up (selection of standard messages, and matching of EDIFACT data elements).

With regard to the standardisation of distribution EDI, standardisation has been discussed by the Distribution Committee of the Japan Petrochemical Industrial Association, and based on their distribution EDI (draft proposal), in order to develop ties with the Inter-industrial Distribution EDI Promotion Committee, this experiment will discuss EDI in a framework that encompasses many different industries, based on a more open technology, and we will participate positively in the planning of inter-industrial distribution EDI activities, and from

a universal standard (full set), the parts (subset) to be used within the petrochemical industry will be specified, and the realisation of standardisation in the Japan Petrochemical Industrial Association, maintaining a high degree of affinity with other industries, will be studied.

CII syntax rules will be adopted. As for communication protocols, the Japan Bankers Federation protocol and the rapidly spreading TCP/IP protocol are being considered.

• Development details

Based on the current JPCA order placement and reception package software, a new package software will be developed, incorporating the ability to operate with LAN and TCP/IP protocol, which are the mainstream of recent information technology. The basic functions of the current JPCA order placement and reception package software will remain intact, and from this, package software whose operating environment is for stand alone terminals and client/ server devices will be developed. The package software for the stand alone and client/ server device environment will run on Windows95.

The package software will be designed to work with both the Japan Bankers Federation protocol and TCP/IP, so that it will be able to handle transfer in the current environment (Japan Bankers Federation protocol), and future expansion (TCP/IP).

• Details of the verification experiment

The three areas of order placement and reception work, distribution work and marketing work will be investigated.

For order placement and reception work, the newly developed JPCA order placement and reception package software mentioned above will be used, and order placement and reception EDI carried out among petrochemical manufacturers and small to medium sized trading companies, in order to gauge the entry effect and efficiency of new functions of the JPCA package software, and to verify the feasibility of order placement and reception EDI in the Internet environment. In addition, the convenience of the software from the user's view point will be investigated, and know how accumulated for the 100% realisation of order placement and reception EDI in the petrochemical industry. Also, for users who have already introduced the current JPCA order placement and reception package software, and who have implemented order placement and reception EDI, the order placement and reception EDI operating experiment will be aimed at solving any problems that arise when shifting from the current package software to the new package software.

As far as distribution work is concerned, the recently developed JPCA distribution business protocol will be used, and distribution EDI implemented for distribution duties between petrochemical companies and distributors, and the pros and cons of standardised messages, translator functions and the operation of the work to be standardised in the same business protocol will be assessed.

With regard to marketing work, a WWW server (home page) for this experiment will be

constructed using the latest Internet/intranet technology, for the purpose of realising joint marketing of petrochemical products. Specifically, a data base of petrochemical products will be created for the server, and the data base, containing product information and other industry related information, will be published on the Internet, so that users will be able to search the database using a Web browser.

In this way, making optimum use of the real time characteristics and interactivity of the WWW server (home page)/ Internet, to accumulate and analyse server access data, user questionnaires and enquiries, we will be able to test a marketing model that uses the latest information transmission technology, and will accumulate know how for the construction of future marketing systems.

• Participating companies

Members of the Japan Petrochemical Industry Association; 33 manufacturers, trading companies, distributors, etc.

2. Verification Experiment for the development of multi-media EDI in the toy industry

[Background and Aims]

In the toy industry, text information collated by the industry's safety inspection system (ST system) has been converted into a data base, and the EDI system 'TOYNES' developed since 1989. However, though the merits of the standardisation of business protocol and operation of an EDI system are considerable, many feel that text information alone does not help in product specification and analogy, and it is often the case that toy distributors use the product catalogues of the manufacturers, etc., in conjunction with the text information. In addition, with over 100,000 items for distribution, and over 30,000 new product items appearing every year, the maintenance and management of such product information on paper is one area that obviously needs attention throughout the industry. Nevertheless, we have yet to see any serious solutions.

In response to these issues, in conjunction with the verification experiments, along with the industry's revision of the ST system, which includes still pictures of products, as part of industry standardisation, product information will be converted into a multi media data base, and inter company order placement and reception EC utilising the data base will be constructed, and its effect on the rationalisation and improvement of the work of the industry as a whole will be assessed.

[Outline]

= Development outline =

A 'multi-media DB function', which is for the construction and maintenance of a product information data base, including still pictures of products and based on the new ST system, will be developed, along with a 'multi-media EDI function', which is for the realisation of inter-company EC, focusing on a multi-media product data base. Figure 1 gives an outline view of the whole system.

Multi-media DB function

This function comprises the 'ST inspection information function', which incorporates and manages still picture information of the ST inspection system, and a 'database management function' for the creation and management of a standardised multi-media product database within the toy industry which includes the product information of items outside the ST inspections, but based on the ST information database.

- ST inspection information function
  While companies (mainly, manufacturers) that apply for ST inspection send inspection application information, including still pictures, on-line, the ST inspection organisation handles the ST inspection application, maintains information such as the progress and results of the ST inspection, and

return ST inspection information to the ST inspection applicant in a timely manner.

- Data base management function
A multi-media data base is created and maintained from the ST product information data, produced from the still pictures and product information created in the ST inspection information function, and the product information data taken from still pictures and product information of non ST inspection products, in accordance with the standardisation proposals drawn up in the toy industry.

Multi-media EDI function

This function comprises an 'Company information management and authentication function' which makes a multi-media product database produced from the multi-media DB function available on the network for user companies in the toy industry and performs management and checking of qualifications for use, an 'electronic catalogue search function' which allows user companies to quickly search for desired product information from the multi-media product database, and a 'browser type order function' to perform ordering work related to the retrieved product information.

- Company information management and authentication
User companies will input and update security management information via WWW GUI. Also, based on the input information, the user's clearance level will be authenticated.

- Electronic catalogue search function
User companies will use WWW GUI to search the multi-media database, by inputting either a 'random free word', 'information such as a product code or age characteristic, etc.' or 'product type and registration date category'. The retrieved image will then be downloaded. Figure 2 illustrates the multi-media database search flow.

- Browser type order function
User companies will order the products that they have found using the 'electronic catalogue search function', via WWW GUI.

= Verification experiment outline =

The developed functions will be made available over the network, based on TCP/IP protocol, and will be used by the participating companies (user companies), in order to test mainly the items listed below.

New ST inspection system
In the new ST inspection system, the operation of the flow of the work, from ST inspection applicant's ST inspection application to the ST inspection application organization's ST inspection information response, will be verified.

Electronic catalogue search
A multi-media product database will be constructed, and the ease of searching for product information, including still pictures, and the practicality of product information characteristics will be verified.

Browser type ordering system

The conformity of orders made by retailers and wholesalers, and orders received by wholesalers and manufacturers will be verified.

With regard to the above verification items, statistical data gathered during the duration of the experiment, and information obtained from user companies by questionnaires, will be collated and analyzed.

3. Project for the Promotion of High Level Electronic Commerce between Companies

'Implementation of Pilot Project using I-EDI'

Background

Within the Japanese travel related industry, the use of inter-connected computer systems to conduct electronic commerce between companies is almost completely limited to large transport organisations and major travel companies. Moreover, the protocols that are used tend to vary, with each major transport organization using its own individual protocol, so that the development and maintenance of inter-connecting computer systems involves a considerable cost, especially for the travel companies. Also, even among travel agencies, though there is mutual contact in the form of package tour products, etc., such transactions have hardly enjoyed any of the benefits of networks. Under these conditions, in particular in small to medium sized travel agencies, the terminals of large operators needed to be installed, resulting in the phenomenon of a multitude of terminals, each with its own protocol.

Meanwhile, moves to promote the standardisation of business administration protocols have been underway, as part of the United Nations' UN/EDIFACT, and activities got underway in the travel related industry from 1990. In 1995, the use of interactive EDI (I-EDI), a necessary form of UN/EDIFACT for the travel related industry for test purposes, was recognized, and its use was begun in the European and American travel industries also.

Transactions involving travel related products, by the very nature of the products, involve interaction with foreign countries. In particular, in recent years, the rapid growth in the number of Japanese travelers going abroad indicates the gradual internationalisation of travel, and the demand for overseas travel products has grown rapidly. Against this background, the adoption of a worldwide standard, and the promotion of verification experiments to this end, will be instrumental in the establishment of methods of linking computer systems so that small to medium sized enterprises, which up till now have not been able to enjoy the benefits of computer transactions, and the wider travel industry as a whole will be able to benefit economically. In addition, as a response to the challenge of the international electronic commerce age, this is surely an important and significant development.

Aims and Objectives

The principal aim of this verification experiment is, to test the possibility of exchange of standard EDI messages, mainly for reservations and cancellations, by an interactive EDI system among various travel related systems, including existing systems, and that, in the coming age of domestic and international electronic commerce, the Japanese travel industry will be able to meet the challenge smoothly and economically,

Further, the three objectives of the experiment are as follows.

Firstly, the experiment will attempt to verify whether UN/EDIFACT (I-EDI) can be put to practical use in the Japanese travel industry, particularly for reservation and cancellation work, in the computer systems of the transaction parties, and whether it may be adopted as a standard method for domestic and international transactions involving travel products.

Secondly, many companies are already using previously developed computer systems, and the experiment will seek to verify whether UN/EDIFACT can be used without changing the basic structure of these systems, and whether transactions can actually be carried out by computer. For this reason, a new gateway system will be developed, and in addition to exchange with existing computer systems, UN/EDIFACT will be used as a standardised method of coupling the gateway systems, and the actual use of the gateway system tested.

Thirdly, UN/EDIFACT will be incorporated into the computer systems of the travel products sales companies (agents), and a new sales computer system constructed. The feasibility of the use of UN/EDIFACT in the computer systems of travel product suppliers, for mainly reservation and cancellation work, will be verified. In this verification system, the above mentioned gateway system will be put to use in the computer systems of the suppliers.

Overall project outline

This verification experiment involves the participation of the suppliers of travel products, and the sellers of those products, the travel agents. The suppliers already have systems for the shelf allocation control of their products, etc., and the agents have systems for shelf allocation control of the products that they purchase from the suppliers, and to handle on-line connection to the supplier system. The verification experiment will develop a gateway system (G/W) using a system specified by UN/EDIFACT (EDI system) to connect previously unconnected supplier systems and agent systems, and test reservation and cancellation work conducted from the agent systems to the supplier systems. Also, the EDI system will be used to develop an agent system featuring a message exchange function, and reservation and cancellation work conducted with the supplier systems will be tested. This setup is illustrated below.

4. Development and testing of ECR systems for the improvement of EDI in the distribution industry

[Background]

The situation regarding EDI in the distribution industry in Japan is that it is mainly used in data exchange for order placement and reception, and the introduction of EDI across the whole range of transactions is now an item for discussion. For the construction of a more effective system of commerce and distribution, more detailed transaction data need to be exchanged. To this end, a freer and more versatile format is required, rather than the current fixed length format with its technical limits on the available number of items and digits. Since fiscal 1994, development of standard messages has been underway, using the international standard variable length format EDIFACT, and the next step of verifying and testing the messages designed with EDIFACT, is of vital importance to the improvement of distribution EDI.

Further, the future efficiency of the distribution industry will require total rationalisation with cooperation across the three phases, from manufacturing to sales. An EDI system based on a business relationship that involves a development from a mere product sales relationship to a more cooperative relationship, and the integration of the whole production to sales process, is the ECR (Efficient Customer Response) system, proposed in America. The relevant know how has not yet spread sufficiently through the Japanese distribution industry. In particular, automatic delivery systems (delivery decision support systems), which are a vitally important technology in the construction of an ECR system, are not yet fully developed in Japan, and their practical application is needed.

In order to support the operation of these EDI, ECR systems, the development of a product master control system which can accumulate and supply product data, and is able to respond to the characteristics of the industry is required.

Similarly, in support of the operation of EDI, ECR systems, there needs to be an image information system for shelf allocation, and the development of the technology for this.

[Aims]

Distribution EDI is becoming widespread in the distribution of groceries (daily necessities, processed foods, cakes, etc.). In order improve EDI in this area, this verification experiment aims to carry out the technical development of the four necessary items listed below, as well as verification and testing, to establish the elemental technology required for the improvement of EDI, and to encourage its spread throughout the distribution industry, including small to medium sized distributors, in order to contribute to the future rationalisation and increased efficiency of distribution systems.

(1) The development and testing of elemental technology for the improvement of the efficiency of working procedures in all commercial transactions, through the widespread introduction of EDI.

(2) The development and testing of a data exchange system for standard messages, designed using the variable length format international standard EDIFACT, for the improvement of EDI.

(3) The development of an automatic delivery system, the elemental technology for the ECR of an improved EDI system centred on a cooperative relationship among the three phases, from manufacture to sales, and the verification and testing of the ECR system.

(4) Technical development and testing of a product master control system and shelf allocation image system, both of which constitute support systems for EDI and ECR.

[Verification experiment system outline]

There are many small to medium sized enterprises in the distribution industry, with many types of business relationships. The development and verification work of this experiment will be divided into two groups. One group will focus attention on the establishment of the most up to date sections of ECR technology, centred around large distributors, while the other will prioritise the development of an expedient and easy to operate system for small to medium sized retailers.

(1) Large distributors

Assuming the operation of an automatic grocery delivery system by the wholesalers and manufacturers who provide the merchandise, based on dispatch (or POS) data sent from the retailers, a shelf allocation image data exchange system technology which is required for retailers' product display, will be developed and verified.

The system operating image is illustrated in Fig. 1. The system development targets are the sections surrounded by dotted lines in Figure 1.; A. a standard message exchange system for POS data, delivery schedule data and other ECR, through EDIFACT, B. an automatic delivery system for groceries, C. a shelf allocation image system for shelf allocation, and JICFS image DB protocol type, in order to support automatic delivery, and D. the development of operating systems for A, B and C. Furthermore, the automatic delivery system will be developed to match the actual conditions of the distribution industry in Japan.

(2) Small to medium sized distributors

This verification experiment will focus on a voluntary chain of small to medium sized retailers, following on the results of group (1), focusing on large retailers. The retail headquarters will operate an automatic delivery system for daily delivered groceries, such as milk and "natto", etc., based on POS data transmitted from retailer outlets. EDI will be introduced and operated across the whole range of business activities, and as a prerequisite, the technology for a product master system for the voluntary chain of small to medium sized

Figure 1. ECR System data process flow chart (large distributors)
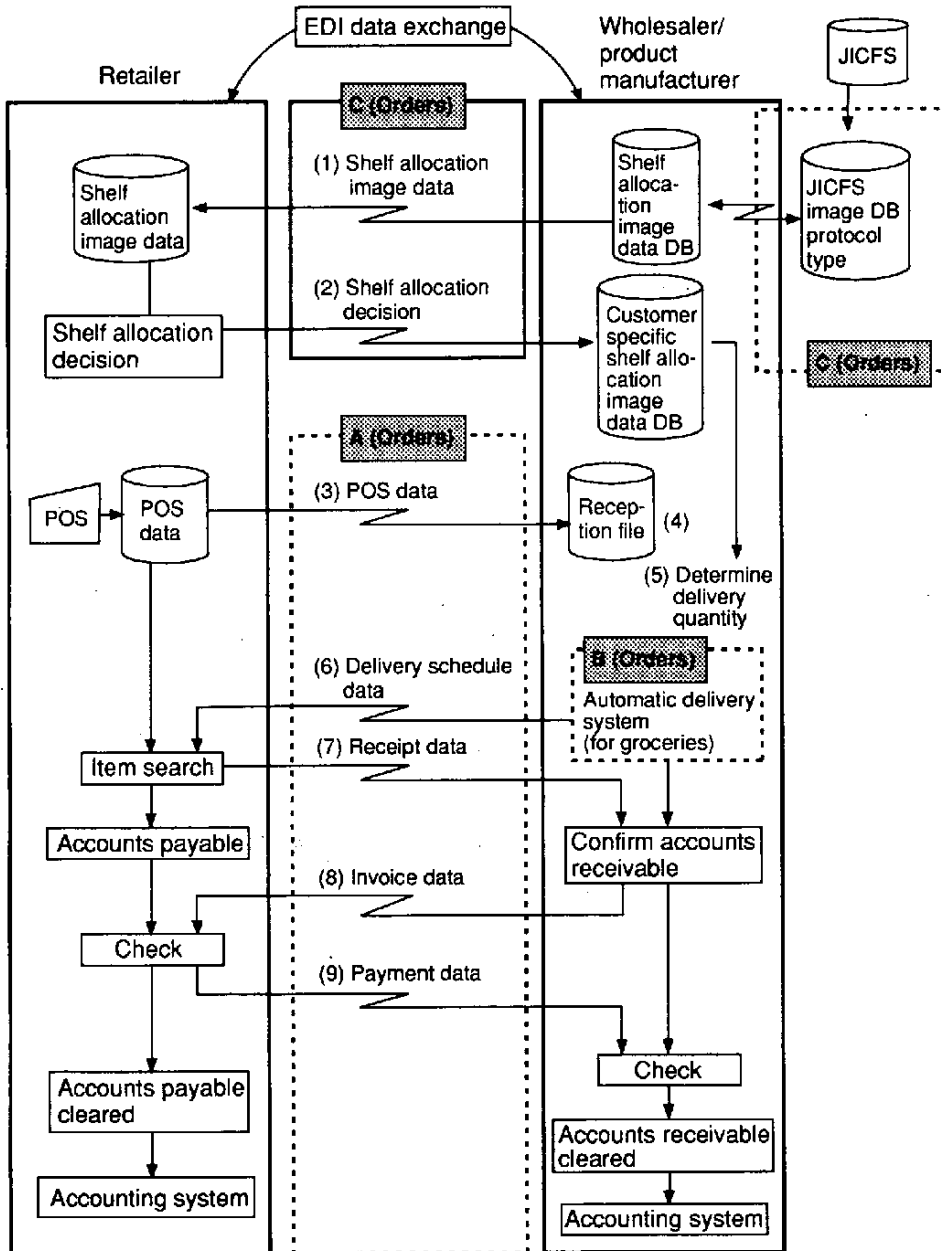
(Orders) The development target

Figure 2. ECR System data process flow chart
(small to medium sized distributors)

Voluntary chain headquarters

Wholesalers/
product manufacturers

E (Orders)

(1) JICFS

JICFS

Product
master

(2)
Product
information

Terminal

Retailer chain headquarters
(distribution centre)

Retailers

C (Orders)

Recep-
tion file

POS

POS
data

(3) POS
data

(4) Finalized delivery
number

E (Orders)

Automatic delivery
system
(Daily delivered
goods and groceries)

E (Orders)

Recep-
tion file

(5) Order
data

Order processing

(7) Distri-
bution
data

Item search

(6) Delivery
data

Item search

Confirm
accounts
receivable

Accounts payable

Invoice data

Accounts
payable

Check

Payment data

Accounts payable
cleared

Check

Accounts receivable
cleared

Accounting system

Accounting system

(Orders) The development target

retailers will be developed and tested. The system operating image is illustrated in Fig. 2.

The system development targets are the sections surrounded by dotted lines in Figure 2.; E. a master control system for products of the voluntary chain, such as daily delivered products, cakes, processed foods, etc. F. an automatic delivery system for daily delivered goods (groceries will use the results of the system developed by group (1)), G. ECR data exchange system between the retailer chain headquarters and retail outlets, using the results of the system developed by group (1), and H. the development of operating systems for E. F and G.

5. 'Experiment for the practical development of EC in the wire and cable industry

(1) Background and Aims

In 1984, the Japan Electric Wire and Cable Makers' Association established an Industrial Information Committee, for the purposes of improving productivity and efficiency in the industrial information field. From the outset, the Committee has been studying the possibility of the standardisation of common documents and forms and data exchange between large transaction partners. EDI has taken root and is expanding, with the use of standardised systems, mainly in the electrical power and electrical machinery industries.

Under these circumstances, in the construction and electric power sales industry, each manufacturer uses an individual electronic data exchange system, linked by the on-line systems of the cable manufacturers. With regard to these wires and cables, it was necessary to study how to shift EDI, as used in this field, to a standardised system.

Meanwhile, due to the latest developments in information technology, EDI is undergoing a real development from the existing batch EDI to using new technology, such as the interactive EC and CALS, etc. Also, in the wire and cable industry, the aim was to study and utilise this new infrastructure, and to promote business reform in the industrial information field, and to construct a more efficient framework with improved productivity.

(2) Project outline

1) Overall outline

The development of a standardised EDI for a short delivery period transaction format, assuming shelf allocation via distribution, was a major topic of concern for the promotion of EDI in the wire and cable industry, and this verification experiment is being conducted with the aim of developing an interactive EDI for general purpose wire and cable transactions, and the development of a simple package for order placement in wire and cable transactions, in order to promote the spread of EDI in small to medium sized enterprises.

• Interactive EDI for general purpose electric wire and cable transactions
To hypothesise and draw up a model system to enable the shift of the on-line systems currently used by the manufacturers, where orders are placed after checking shelf allocation, to a standard and interactive EDI, and to conduct verification of the feasibility and practicability of EDI in general purpose wire and cable transactions.

• EDI packages for mid-range companies
This project will take the standardisation and general application of conversion across industry standards, and conversion to the business application of the individual company as its theme, and will develop a simple package that is able to function as the front end processor for administrative

systems in EDI for order placement and reception, as a PC level system that can be easily incorporated into small and medium sized companies.

2)　Outline of work of drawing up standards

In order to conduct a verification experiment for interactive EDI, standards for 'product characteristic information' and 'general purpose wire and cable transaction messages' will be drawn up.

The 'product characteristic information' standards will be standards for applications of electric wires and cables, and standards for information from specifications to designating general purpose wire and cable products.

Standards for 'general purpose wire and cable transaction messages' will include messages used in wire and cable transactions, such as ordering, estimates and reservations, and messages used by the system to update shelf allocation sales information and shelf allocation information databases.

3)　Outline of development work

• Development of 'Functions for the operation of general purpose wire and cable transactions using interactive EDI'
With wire and cable applications and specifications as the key, this function will enable product characteristic information databases and shelf allocation information databases to be searched, and products required at agency stores to be designated. From such product information, the user will be able to designate a particular manufacturer, and data exchange system will be constructed so as to allow transaction information between agencies and manufacturers, such as estimate requests and replies, reservation requests and replies and order placement and reception, as well as checking prices and shelf allocation.

• Development of 'Function for the operation of EDI by means of a software package developed for mid-range companies'.
The development of a function whereby, focusing ordering information and delivery request information on EDI using CII standards, messages from the sender which are set in a different format can be allocated to items defined by the receiver, and edited by the addition of other items particular to the receiver, thus formatting input data for the receiver.

6. Verification project for improved information systems in stationery, paper products and office equipment

(1) Background and Aims

Promotion of the introduction of EDI into the stationery and paper products industry, which accounts for the majority of the business of small to medium sized retailers, the mainstay of the Japanese distribution industry

The following items will be carried out, as a concrete method of creating the future shape of information distribution (information systems as operated by retailers and wholesalers) for the new age.

- A network (intranet) using an open network environment will be constructed, open network communication protocol introduced and high speed transmission realised, with the aim of expanding information development by means of a cheaply operated network.

- The development will be started of the standardisation of a simple format EDI (a system enabling the transmission and use of data in the same format, even without routing via computers) using EDIFACT and a large volume data carrier (second dimension code), enabling data transmission via multiple routes, with the aim of expanding companies using EDI suitable to the scale of the company.

- Using the expansion of the information base, the structure of distribution will be reconstructed, and a distribution system

utilising second dimension code, which can be used nationwide at the distribution stage, will be developed and introduced, for the purposes of improving business efficiency by reducing total costs.

(2) Project outline

The theme of this verification experiment is the response to an integrated EDI, and various types of efficient system management using large volume product codes (second dimension code) which do not rely on data bases, as functions essential to next generation industry EDI.

As technologies to be developed as a shared base, as a transmission protocol converter there is TCP/IP (the Japan Bankers Federation protocol), and EDIFACT translator as a message conversion function.

The individual items of the verification experiment are described in outline below.

(a) Implementation of EDI without a product data base, using large information volume product codes (second dimension code)

A verification experiment will be carried out wherein the development of large information volume product codes at a level worthy of practical application, the establishment of a practical transmission system, and the construction of a low cost scanning system, will enable the use of

mechanical scanning input that could not be operated without the backup of the existing product data base, even without a data base, and without transmitting via a VAN network.

The development of technology to be used in this verification experiment involves the following.

The development of an application level for second dimension code symbols, confirmation of reader scanning technology (high speed, improved scanning depth, inferior environmental conditions), development of technology for printing onto different media, encoding technology and distortion correction technology for FAX data.

(i)   Verification of validity of use of second generation code at retailers' terminals
By having retailers use reader / decoders functions to scan second dimension code printed onto a medium, the experiment will attempt to identify methods of improving convenience to the users, and the possibilities of continuation of the system.
The medium used to print the second generation code is the 'product catalogue'.

(ii)   Experiment for network-less EDI, using second dimension code
Retailers and wholesalers will conduct business by faxing order forms and delivery forms printed with second dimension code, and the convenience, possibility of continuance and reliability

as an information carrier, with regard to the scanning accuracy and reproducibility of the second dimension code, will be clarified in this experiment.
The medium for producing the second dimension code is the 'FAX form'.

(iii)   Experiment for network-less EDI, using second dimension code and EDIFACT
Distributors use fixed position scanners (optical scanning devices) to read information from the manufacturers' tags, printed with second dimension code, and the practicality of second dimension code in distribution, and its reliability as an information carrier will be verified.
At this time, experiments will be carried out to change the size of the second dimension code printed on the tags, the volume of information, the scanning depth of the fixed scanner, the travelling speed of the tagged packages, and the degree of soiling. Then, performance data regarding error rates at high speed sorting, information entry speed by manual operation, and data reproducibility after soiling will be gathered and compared.
The medium for printing the second dimension code will be the 'tags' attached to the packages when products are shipped.

(b)   Verification of integration of EDI by EDIFACT

Wholesalers and manufacturers will change their 'industry standard formats'

to 'EDIFACT standard messages', and will carry out actual order placement and reception work with the distributors that are their business correspondents, by data exchange with distribution EDI standard format, and will verify the economic effectiveness and convenience of an integrated EDI.

EDI was being operated as the current EOS (computer based ordering system), with several hundred types of cross correspondent formats being converted by the stationery industry wholesalers by individual systems. In this experiment, EDI will be operated with existing industry formats for 'order placement and reception' and 'warehousing schedule data', and the various messages will be transmitted to the EC server via the network, and mutual data exchange performed.

The details of technology to be developed in this verification experiment are as follows.

EDIFACT translator (Japanese version), EDIFACT standard message industry subset

(i) Verification of 'EDI by EDIFACT' with distribution EDI related companies
An EDIFACT translator function will be developed, in the EC server newly developed in the industry. For the participating users, data exchange will be performed over the network, via the EC server, with distribution EDI related companies. The effectiveness of this method of data exchange and existing cross correspondent formats will be compared. As a result of this, the awareness of the convenience and effectiveness of the EDIFACT translator function will be clarified.

7. Construction Materials Information Research and Development Project (KISS)

2. Background

Due to the revolution in technical information in recent years, the utilisation of computer networks has enabled transactions between enterprises and inter-enterprise link-ups and cooperation. Thus, in all manner of economic activity, the introduction of electronic information technology has advanced, bringing far reaching changes to conventional industrial and economic activities, and enabling improvements in production and efficiency in many kinds of industrial fields. On the other hand, from the point of view of the realisation of a plentiful lifestyle for the populace, demands are being made for corrections to be made to the differences in prices at home and abroad. In the construction materials industry, the reduction of costs of materials used in the construction of housing and other buildings has become a major topic. In order to address this question, the following problems will need to be solved.

(1) The rationalisation of inefficient work, as viewed by many industries involved in construction.
(2) The rationalization of costs involved in distribution.
Increased distribution costs due to the delivery of small quantities at frequent intervals.
Increased manufacturing costs and warehousing costs caused by large product line-ups.
Increased costs due to the multi-layering of distribution.
(3) Correction of ambiguous trading practices. Unwritten deals, and the system of pricing materials and work as a single set.
(4) Restricted selection of materials, due to insufficient supply of construction material product information with users.
(5) Response to information development

The construction industry is one of Japan's biggest, with a value of some 20 trillion yen. However, with many small to medium sized contractors, the industry has been slow in the development of information technology. Meanwhile, though large companies have been investing considerable sums in information technology, each company has its own information systems, and the plethora of terminals has lead to work becoming more complex, with increased costs due to overlapping investment. Also, each company has its own data formats, and the lack of unification has meant that the efficiency of work in the construction materials industry has been hampered.

2. Aims and Objectives

The aims of the project are to advance the rationalisation of work by the development of information technology, and to improve the provision of information to construction material users, thus directly and indirectly preparing a base from whence to tackle the problems mentioned above. To this end, the following systems will be developed, and data

formats established.

(1) Verification experiment for the establishment of product technical information data formats, and the development of a navigation system.

For the purposes of improving the construction materials information supply function, a product technical information data base for construction materials will be constructed, using the Internet. To this end, a data format for product technical information will be established, and a navigation system developed, and a verification experiment carried out in order to assess their practical application. With regard to the usefulness of a database, its content and more efficient methods of information retrieval, as well as ease of creating data are, of course, vitally important items. Therefore, this verification experiment will seek to identify the industry common data items that are necessary for openness of information concerning construction material products, and to study the practical usefulness of the data characteristics as well as DTD.

(2) CAD - company server linking system, and I-EDI system

The verification experiment will focus on design work and commercial transactions, from the point of view of improving work efficiency, and also tackle the development of a CAD - company server linking system, and I-EDI system. The information data format required for CAD work will be discussed, and the rationality of CAD work verified, as well as the practicality of eliminating the current problem of many different types of terminals,

in I-EDI.

3. Concrete results aimed for, and their significance

(1) Construction of a product technical information data base for construction materials

A data format for product technical information data base for construction materials will be established, and the subsequent data base will make product technical information data bases for many different types of construction materials available in a uniform manner, and supply the information objectively. Specifically, the work of selecting desired products from maker specific catalogues will be made more efficient, and the users will be freed from the work of having to manage catalogues themselves. Further, since the maintenance of the information will be the responsibility of each company, the details will be secured. On the other hand, the manufacturers will be able to cut the cost of producing product catalogues. In addition, small and medium sized businesses that cannot afford the costs of sales promotion activities will be able to conduct sales activities easily by registering with this data base. Moreover, it is expected that the user's selection of products will expand greatly, and that there will be significant changes in the existing distribution systems.

(2) Improved efficiency of CAD work

To improve the efficiency of CAD work, information needs to be arranged properly, and the data format established. Also, a data base

for CAD needs to be constructed, for the increased efficiency of CAD. It is assumed that rationalisation will be achieved through actual work and the systems to be developed. This verification experiment is expected to create an incentive for the promotion of the development of information technology among different industries. (3) I-EDI (Elimination of the multi terminal phenomenon)

The current EDI system forces users to cope with many different types of terminals, and it is expected that I-EDI will release the users from this troublesome work, and enable manufacturers to avoid wasteful expenditure, thus keeping costs low. At the same time, it is hoped that the experiment will provide a trigger for the realisaton of high quality electronic commerce among companies.

Implementation system

The activities of the verification experiment will be carried out with the KISS Promotion Committee, formed by the construction manufacturers, as the parent body. Actual

activities will be implemented by the KISS Promotion Committee Executive?, selected by the KISS Promotion Committee.

Overall implementation system

The overall system of this KISS project is as explained below.

System diagram

For the establishment of a data format for construction material products technical information, a data format establishment working group will be formed, responsible to the KISS Promotion Committee Executive, and for the establishment of a CAD information format, a working group for the establishment of a CAD information format will be formed. Also, there will be a system development working group for system development and the verification experiment, a coding committee for the classification of categories, and a thesaurus committee for the classification of surface markings.

KISS Promotion Committee
KISS Promotion Committee Executive

Data Format Establishment Working Group	System Development Working Group	Coding Committee	Surface Markings Thesaurus Committee	CAD Information Data Format Working Group
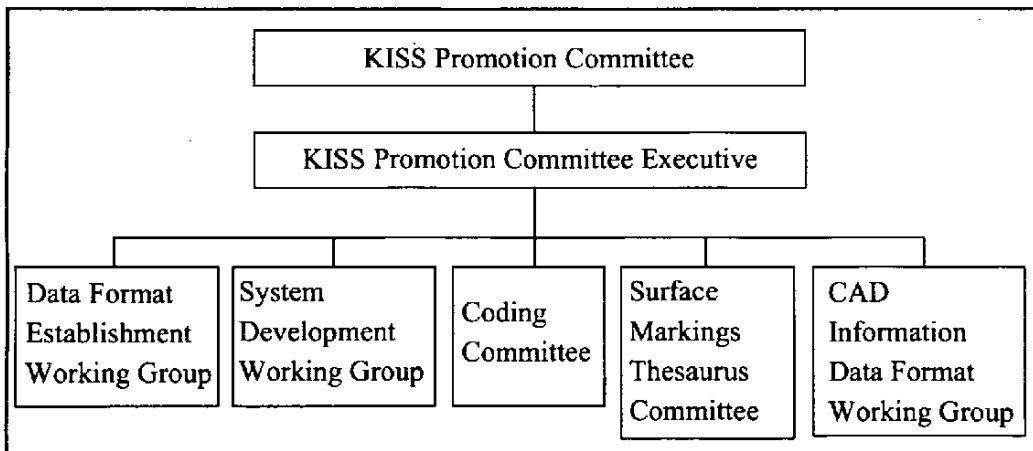
8. Research into the practical usefulness of EC in the Iron and Steel industry
- Realisation of an efficient inter company business base using open EDI -

Background

The Japanese iron and steel industry, in both demand and distribution circles, in the midst of tough international competition, is facing the problem of how to further strengthen competitiveness. Together with the business efforts of individual companies, the industry also needs a new business base that extends beyond the boundaries between individual companies and industries, and much is expected of the practical application of EC.

Seen from this perspective, the following issues need to be addressed, with regard to steel materials transaction duties.

(1) Inefficiency of information gathering in order placement and reception work between companies (companies placing orders use telephone, fax, etc., to confirm the consumer's schedule, intermediate distribution shelf allocation, etc., person to person, and then procure the required quantity of materials.).

(2) In the steel materials distribution process, it is difficult to obtain uniform product information, for the following reasons.

(i) There is a complex distribution route between the shipment of base metal from the blast furnace manufacturer to the consumer (fan-shape type and downstream dispersion distribution).

(ii) In the distribution of steel materials, various types of forming carried out in the steel materials processing industry (Coil Centre, etc.), result in changes of the form of the article, etc. (e.g., a single wide coil is divided into several smaller coils, and even the name of the article may be changed.)

(3) It is difficult to establish a production and warehousing system that can respond quickly to the quantities required by the consumer, which may change due to reasons (1) and (2), above.

Further, in the use of information in transactions involving steel materials, in comparison with fully developed in-company information systems, the information systems between different companies are generally behind in the following respects, and improvements will need to be promoted in the future.

(1) In standardised information, information exchange by EDI among some enterprises. (For large companies: Huge volumes of regular transmission, for small to medium sized companies: large initial investment costs.)

(2) For non-standard information, assessment and exchange by throwing waves of

people at the problem.

Aims

Targeting the complicated transaction work for sheet metal for electrical machinery manufacturers, the mainstay product of blast furnace manufacturers, which undergoes complex forming in the distribution process, this research will develop a mechanism where by blast furnace manufacturers, trading companies, coil centres, electrical equipment manufacturers, etc., may freely search for product characteristic information on the Internet, within the scope of the mutual disclosure and access rights to the information (an EC mechanism for the materials industry). The aims in this respect include the following.
(1) The rationalisation and improved efficiency of order placement and reception related work between companies involved in steel materials transactions.
(2) A speedier response to alterations in circumstances by companies in the supply chain, based on the shelf allocation of blast furnace manufacturers and distributors.
(3) The early realisation of inter company collaboration (study of new directions)
Verification experiments will be carried out to verify the suitability and usefulness of the mechanisms developed, with regard to practical business.

Development themes and details

In this project, within the situation of the downstream dispersion characteristics of distribution and information flow, companies participating in the supply chain, from the blast furnace manufacturers to the electrical machinery manufacturers, will conduct a unified information search for information involving steel distribution, company by company, based on an open data base environment using the Internet.

In consideration of the needs of the administration side, and the size of the growth of those needs, and new technology, etc., the following have been set as development themes.

(1) Design of a cross-industry administration work model

The following five models have been designed, and are expected to produce dramatic improvements in the efficiency of cross-industry administration work, and cross-industry business speed, as well as the realisation of a production system that can respond swiftly to changing demands and shelf allocation reductions, etc.

(i) Receipt and payment work model for steel materials (order placement and reception work)
(ii) Base metal delivery work model (Blast furnace manufacturer to coil centre)
(iii) Product delivery model (Coil centre to electric machinery manufacturer)
(iv) Blast furnace manufacturer inspection results check model (Product quality information exchange)
(v) Article search model (Individual information search)

(2) Development of cross-industry protocol

(i) Open EDI protocol;
Proposed standards will be laid down for

data definitions, design, operation and security, necessary for using an open EDI.

(ii) EDI standardisation between specific companies
Cross-industry applicable standards will be discussed and organised, based on existing standards in the iron and steel and electrical equipment industries (Iron and Steel EDI Standards, EIAJ Standards).

(3) Development of technology for distributed open DB architecture on the Internet.

The development of architecture mechanisms to enable the unified distribution information of each company to be made available to the open data bases of other companies (standard data model management structure, etc.)

(4) Development of an inter company information search agent system

Development of an agent system (network type agent), and peripheral functions, that will allow searching on an open data base, and extraction, collation and return of the desired data.

Details of the verification experiment

With the above mentioned development systems selected as representative examples of commercial distribution, the experiment will be set up to run at ten sites; two blast furnace manufacturers, three trading companies, two coil centres, two electric machinery manufacturers and the Steel Material Club (shared control centre), and search operations conducted on the Internet, and experiments conducted into the suitability and effectiveness of the system in cross industry business.

9. Verification experiment for the development of a Virtual Furniture Mall (VFM)

1. Project aims

In recent years, consumers' aims when purchasing products, including housing related products, tend to focus upon so-called lifestyle coordination, which is the matching of various products, and harmony of colour and style, in an effort to realise the individual lifestyle of each consumer.

In order to be able to adapt to the wide ranging needs of individual consumers, those in the business of providing products must be able to provide an ever increasing range of items, and at the retailer and intermediate distributor level, estimate shelf allocation and shelf allocation risks are becoming steadily greater.

With conventional methods of distribution, costs incurred in increasing the types of available products, and shelf allocation risks, inevitably are reflected in the final sales price.

The aim of this project is to use multimedia technology and computer network technology to develop a system (VFM net package system) for the formation of an industry wide virtual mall (Virtual Furniture Mall: VFM), with a shared virtual warehouse, between the companies which have the merchandise in warehouses, and the retail stores, in order to provide a rich product selection in transactions between companies, and in order to provide rich new choices, including the promotion of coordination demand, in sales to consumers

who have been limited to the range of products displayed in conventional stores. Experiment in the actual use of this system will be carried out with the aim of providing verification of the feasibility of electronic commerce, and to promote it within the industry.

2. Outline of the verification experiment

(1) Creation and proposal of standards for a multi-media product catalogue data base

In order to create a product information data base in which the industry can participate openly, a common format for a product catalogue for the development of multi-media information will be drawn up and proposed. Based on this, a common data base for an open access multi-media catalogue will be constructed.

(2) Development of a common access application system

A common access package system (VFM net package system) will be developed, with the suppliers as the product contents suppliers, and the retail stores as the users.

The VFM net package system will provide the users with application functions, including a multi-media catalogue data base system, multiple parameter search function, product

presentation function and order placement card storage system.

By registering product information with the VFM net package system, the supplier will be able to use many more shops as retail outlets.

The shops will be able to have the product information of a great many more suppliers, and so will be able to offer a rich selection of goods, including those that are not actually displayed in the shop, which are necessary for the realisation of the consumers' lifestyle coordination.

(3) Commencement of the verification experiment

This project will commence from April, 1997. An industrial consortium will be formed, made up of four representative suppliers, two retailers and a voluntary chain supervising company (JAFSA Central Co., Ltd. Head office: Suita city, Osaka) as a shared data base centre. A standardised multi-media catalogue will be drawn up, and a data base created, and the VFM net package tested in sales to consumers and in transactions between companies.

The experiment will attempt to verify the usefulness of the multi-media catalogue from the aspect of order placement and reception between companies, and its usefulness in consumer sales. At the same time, it will seek to further the expansion of the participating suppliers and stores.

(4) Characteristics of the network

• Client - server system
The server maintains all of the application functions of the VFM net package system, and supplies them via WAN or LAN networks. The client will be able to access the data base and functions held by the server, simply by mounting a standard WWW browser.

• Distributed server installation stores and dial-up connection stores
In the retail stores, distributed servers will be installed, and by using a LAN set up inside the store, the user will be able to connect to the client terminal. This will allow the standardisation of the security of the speed of downloading multi-media catalogues that contain huge amounts of data, including high definition images and audio explanations.

Access to the data base, between the distributed server in the shop and the common centre server, will be achieved via high speed digital lines, and the master file periodically synchronised.

Also, for those stores who do not wish to bear the cost of installing the server hardware, dial-up access to the common centre server will be available via ISDN lines, so that multi-media catalogues can be used.

10. Experiment for the development of wide area use technology through a standard medical products data base structure and Internet connectivity, and its mutual operation in the industry

(1) Background and Aims

[Background]

In the medical equipment industry, each manufacturer controls a vast quantity of product subgroup data under their own coding system. In addition, dealers and medical organisations also have a lot of duplicated product information, stored and managed in their own, individual systems, resulting in an extremely wasteful distribution structure, from which many problems arise. In order to standardise and increase the efficiency of this distribution system, there needs to be a unified format for handling the transaction information of all products, and an industry wide standard information base to be operated by the distribution system using the information needs to be established quickly. Further, the creation of efficient systems and mechanisms that allow medical organisations and companies within the industry to exchange distribution information speedily and accurately, by organic connection to electronic communication lines, is desired not only within the industry, but also from the perspective of the public needs, where the control of medical expenses is demanded.

[Previous attempts]

With the aim of creating an 'efficient system', in order to try to revise the distribution structure, approximately 120 industry manufacturers and dealers have invested in the establishment of a company for the operation of an industry unified VAN, J-MENET Co., Ltd. The company has already begun operation of an industry unified distribution VAN, called J-MENET (Japan Medical and Equipment NETwork), and by focusing on the standardisation of order placement and reception work between manufacturers and dealers, is trying to achieve standardisation and unification in the industry, through regular meetings. However, the participating companies represent only a fraction of the whole industry. And while the work of collecting the fundamental information for the work of standardisation is progressing, this information has not yet been analyzed, nor linked to standardisation. Moreover, the industry VAN is actually one to one communication, and the all important cooperation of medical institutions has not yet been obtained, and open commercial transactions have not yet been realised.

[Aims]

This project aims to advance the work of standardising an industry unified data base, called the 'Standardised Medical Equipment Data Base', and the standardisation of operating rules for the industry, via the network, and using these standards, to create a data base and develop a service for the application of the data base, and while creating the service environment, the main participants in this

project, the medical institutions, manufacturers and dealers, will use the services provided over the network, and the value of each service to the users will be tested.

(2) Project outline

[Structure of the experiment environment]
The data base will be linked to industry standard e-mail, WWW (World Wide Web) and file transfer technology on the Internet, and the data from the standardised product data base will be able to be accessed from the client PCs, via the network. Specifically, the machine structure will involve the setting up of a TCP/IP LAN for dial-up connection on the centre side, and network servers and DBMS (data base management system) servers will be constructed on the servers connected to the LAN. In order to avoid the security problems of the Internet, the constructed LAN will not be connected to the Internet, and access will only be available via dial-up connection. With regard to the user's environment, a dial-up TCP/IP connect capable PC with Internet client software, including a WWW browser, is assumed.

[Standardised Medical Equipment Data Base]
The Standardised Medical Equipment Data Base produced in this project will consist of the following.

(i) Standard product data base
    The medical equipment and materials of different manufacturers will be entered into a data base, using industry common 'standard product codes' and 'standard product classifications', in order to enable

simple management.

(ii) Members' information data base
    A data base will be constructed to contain the specific information of participating companies and medical institutions, etc.

(iii) Transaction information data base
    This data base will contain the information pertaining to orders placed and received over the network. The information will be able to be updated directly from the client PC, allowing the latest transaction information to be reflected in the data base.

[Drawing up of standards]
- A system of standards for the standardised medical equipment data base (standard product codes, and standard product classification, etc.)
- Standards (user authentication rules, rules for order placement and reception over the network, etc.) for industry operating rules for the services provided over the network.
- * The work of drawing up these standards will be done by a 'Standardisation study committee' (provisional name), made up of industry organisations that consist of medical equipment manufacturers and dealers.

[Development work]
An 'Internet Server - DBMS linkup programme' will be developed to handle the link between the network server 'WWW/ e-mail/ file transfer' and the DBMS. The user's client PC will use commercial software to access the standardised medical equipment data base, and use the various information provision and commercial transaction services available.

The following services will be provided.

(1) Standard product data retrieval service
(2) Standard product data maintenance service
(3) Standard product order placement service
(4) Standard product order reception service
(5) Standard product transaction history service
(6) Members' information update service
(7) Help desk service

[Construction of the experiment environment]

Construction of the experiment LAN, servers and data bases, creation of the WWW service contents, construction of an environment to enable users to access the TCP/IP LAN via dial-up connection from their PCs.

[Verification experiment work]

• The experiments will verify whether the network services offered are well received by the users, from the point of view of operability of the services, protocols, reliability, security and practical usefulness of the data, and will attempt to identify the topics related to improvement of practicability. With regard to the methods of experiment, each experiment will employ a different environment and operating rules as its operating parameters, and the users will access the services under these parameters for a fixed length of time. After that, data will be collected in order to assess the sufficiency of the system. These data will be collected via a survey of the users, wherein the users' assessment of the sufficiency of the system, opinions on problem matters and requests regarding the use of the system will be gathered and stratified, according to the characteristics of the users (medical institutions/ manufacturers/ dealers). Also, from the service access history recorded in the server log file, we will be able to compute the degree of usage of various services under different parameters, and use these data also in the assessment of the sufficiency of the system.

• Items to be verified in the experiment will include the following.

- What types of product data retrieval will be acceptable?
- What types of display will be acceptable for showing search results?
- What types of data format will be acceptable for downloading product data?
- What order placement methods and operation rules will be acceptable, and what kinds of standardisation of business operating rules will be appropriate?
- What order reception methods and operation rules will be acceptable, and what kinds of standardisation of business operating rules will be appropriate?

11. Construction and verification of a network system for EC in the publishing industry

Outline

In the Japanese publishing industry, there is a pressing need for a system of information supply that links publishers, distributors, book stores and readers, and is able to respond to readers' needs accurately. Also, there are many instances where product information data bases and transaction data networks, etc., now separately managed, could benefit from being unified.

In this project, we will attempt to construct a data base and network system, using the Internet, to solve these problems, and will conduct verification experiments into the ways in which the industry should be developing, and to contribute to future research.

Project background

The Japanese publishing industry consists of around 4,600 publishers, some 70 distributors and approximately 26,000 book shops. Linking these and the readers are a number of different information transmission systems and distribution mechanisms, through which some 600,000 publications pass.

Within this situation, there are separate individual networks developing among publishers, distributors and book shops, using VAN, etc., but for a real improvement in efficiency, the industry really needs a unified system.

Further, there is still the problem of the reform of individual publication product information data bases, being developed by distributors and others. As an example, when a reader requests information from a book shop on a particular publication, several different types of information are provided for the same product, leading to problems with the provision and management of information. This problem needs to be resolved by the provision of an environment where accurate information can be retrieved by a simpler operating method.

Project aims

Under these conditions, if the open network Internet is used as a networking platform, even small to medium sized publishers and book stores that up till now have not been able to be easily included in networks, will be able to access the network environment on equal terms, and on the same network platform written form information and transaction information will be able to be standardised, allowing for greater efficiency and vitality in distribution.

The verification experiment will seek to build a system that will link publishers, distributors, books shops and readers via the Internet. The project will also verify the management of publication product information and the supply of information via the network with a more highly operable user interface, and through this interface, will seek to provide readers with a fast information supply, and to vitalise

distribution in the publishing industry.

Scope and content of the verification experiment

Networks using VAN, etc. are already operating to a certain extent in the publishing industry. Therefore, it is expected that, even after the Internet platform is ready, there will be a period where this and existing systems are used side by side, before a gradual shift to the Internet environment.

Accordingly, for the time being, the overall image of the publishing industry's network system, as mentioned elsewhere, will consist of publishers, distributors, book shops and readers principally using the Internet to relay publication information, publishers' inventory information and transaction information (orders received, in the case of readers), with some sections of the industry using publishing VAN for these purposes.

Of this setup, this project will deal with those sections in the diagram surrounded by dotted lines. The project will focus on the building of an Internet base platform, and will also emphasise the registering and retrieval of publication information via the Internet, from the aspect of information provision. Details of the development content are as follows.

(1) Construction of a publication product information data base

A data base registration environment will be provided, and a data base created for such publication product information as books and periodicals information, visual information, audio information, event information, book selection information, and publication taste characteristics. In addition, an environment for the use of a data base retrieval function will be provided.

(2) Creation of an environment for electronic commerce

The development of networks is particularly slow between publishers and distributors. Experiments will be carried out to provide an environment for the use of the Internet for commercial transaction data exchange.

12. Electronic Commerce in Advertising Project outline materials

(1) Background and aims

In the advertising industry, the demands of advertising clients have become more diverse, and at the same time the need for greater speed and accuracy in business transactions has increased. In order to respond to these developments, advertising companies and media companies (newspaper companies, broadcasting stations, etc.) have developed their own internal on-line systems, and some companies have adopted the Bankers' Federation communication protocol for inter company communication, and have implemented one to one EDI (Electronic Data Interchange), which has contributed to a decrease in the administration workload involved in ordering, estimates, allocation of advertising materials, checking advertising manuscripts, billing, etc., and improving the speed and accuracy of these jobs. However, because the connections are one to one, the number of physical connection points has increased, and system operating costs and communications equipment are expected to increase. Additionally, the majority of the advertising transactions between advertising clients, advertising companies and media companies (newspaper companies, broadcasting stations, etc.) are by written documentation, telephone and fax, etc., which involves troublesome and inefficient operations.

Therefore, the aim of this project is to standardise advertising related business transactions, and to have the world standard EDI adopted by participating companies. By promoting the switch to EDI, each company will apply EDI to actual transactions, and extract the effects of increased accuracy and reduced workload and operating costs, in order to achieve BPR throughout the whole advertising industry.

(2) Project outline

In this project, an industry standard transaction business format will be laid out, for the development to EDI through N to N communication, for newspaper advertising transactions between advertisers and newspapers, and television spot commercial transactions between advertisers and broadcasting stations. A centre function to enable N to N store and forward (switching) will be developed and introduced, and PC (DOS/V) and UNIX versions of user communication modules developed for the control of transmission and reception of data between the centre and the participating companies, so that fundamental provisions can be made for an industry EDI.

a. Main development items and technical characteristics

• Standardisation of newspaper advertising transaction messages
The Japan Advertising Agencies Association and the Japan Newspaper Association will each form standardisation groups to study the

creation of an industry standard business format for newspaper advertising transactions between advertising companies and newspaper companies. Both working groups will work on the standardisation of the range of business activities that is the scope of the standardisation, and the data terms, data type, length and coding system, and will draw up standard specification proposals for a model work flow and operating standards, etc., using the standardised transaction business format and EDI. The results, practical usefulness of the standard specifications, as well as the likelihood of their widespread adoption, will be studied by both industry associations, and after adjustments, with the consent of the Japan Advertising Agencies Association and the Japan Newspaper Association this will be made available to the industry as standard specifications.

• Standardisation of television spot commercial transaction messages
The Japan Advertising Agencies Association and the Japan Commercial Broadcasting Federation will each form standardisation groups to study the creation of an industry standard business format for television spot commercial transactions between advertising companies and broadcasting (television) companies. Both working groups will work on the standardisation of the range of business activities that is the scope of the standardisation, and the data terms, data type, length and coding system, and will draw up standard specification proposals for a model work flow and operating standards, etc., using the standardised transaction business format and EDI. The results, practical usefulness of the standard specifications, as well as the

likelihood of their widespread adoption, will be studied by both industry associations, and after adjustments, with the consent of the Japan Advertising Agencies Association and the Japan Commercial Broadcasting Federation this will be made available to the industry as standard specifications.

Taking advantage of these studies into standardisation of newspaper and television related advertising, an organisation will be formed for the permanent and on-going study of the expansion, maintenance, and control of the standard business format, and for the study of the expansion of the scope of EDI transaction work. Further, not limited to newspaper and television, this work will form the base of the creation of a study system for drawing up industry standard business formats for magazines, radio, etc., and standard business formats for transactions between advertising companies and advertising clients.

• EDI business protocol
With the aim of expanding EDI beyond newspaper and television related advertising to encompass a wider transactions in the future, and in consideration of the popularisation, general purpose use, security and operation in Japanese etc., the CII syntax rules, developed by the Japan Information Processing Development Association's Industrial Information Promotion Centre for the promotion of EDI standardisation in Japan, will be developed.

• N to N store and forward (switching) centre function
Development and introduction of an N to N

store and forward (switching) (CII syntax compatible, TCP/IP protocol compatible) EDI centre, as a means of resolving the problems of one to one EDI with regard to the expansion of industry EDI, and ease of access to EDI and security. EDI*Enterprise (GEIS) will be used as the mailbox engine for data exchange and an external module (EDI basic module) developed for CII message sorting, Bankers' Federation data communication management, etc.

The main merits when compared with one to one connection are;

- easy expansion of the EDI transaction work range
- data can be transmitted to and received from the other party outside of operating hours, and even when there are problems
- relief from the troublesome system operation that accompanies an increase in connection terminals (and a reduction in system operation costs)
- reduction of communication equipment
- reduction in communication costs

- Development of user communication module
  Based on the premise that it should be possible to create a module that can be used in common by all companies, to act as a front end processor for data transmission from EDI participating companies to the centre, a PC (DOS/V) version and UNIX version of a communication system that can be used by all companies for communication management will be developed, and matched to the size (processed data quantity) and internal systems of each company.

Its major functions will be:
- interface with the work application systems

of each company
- communication with the EDI centre
- master control
- scheduler function
- communication management
- log management
- utility functions
- CII protocol exchange (using package system)

- Communication protocol
  In view of the potential for popularisation and general purpose use, the transmission (high transmission efficiency) of future advertising materials, and the use of Internet, etc., TCP/IP has been selected. TCP/IP will be the standard for data transmission, using a user communication module, but in consideration of the existing resources of the companies, data exchange with the centre will also be possible using the Bankers' Federation protocol.

- Network
  Because the lines between the centre and the participating companies will be used for business transactions, security is very important, and since the usage will be domestic, in the initial stages, communication will be via closed networks on public leased lines and dedicated lines.

b.   Expected results

With the aim of promoting BPR throughout the industry, an industry standard business format that does not favour any one section of the industry will be established, as well as its operating rules, CII syntax rules will be adopted, user communication modules

developed, an N to N store and forward (switching) developed in order to provide a base that makes EDI easily accessible. Through this, it is expected that the businesses of the participating companies will expand, and that EDI will become available for use in the commercial transactions undertaken by the companies, with the resulting promotion of BPR.

– Accuracy
Each company will be able to incorporate transmitted data 'seamlessly' into its own system, reducing information transmission mistakes and input mistakes during manual operation, thus enabling greater accuracy.

– Reduction of labour
Each company will be able to incorporate transmitted data 'seamlessly' into its own system, reducing the time spent on data input and checking, and handling queries as a result of information transmission errors, which will help to speed up business transactions overall.

– Reduction in costs
The introduction of EDI will enable accurate transmission of information, reducing the necessity and frequency of making telephone calls and sending fax messages to confirm, and reducing the amount of time spent in company on data input. This will also have the result of reducing the amount of paper printouts for checking and confirmation.

Expected results, system-wise

– Stability
Since the other party in the data transmission is not another company, but a centre, fully equipped with an operating system and environment, and by the use of user communication models developed for general purpose use, it is expected that there will be a significant decrease in the amount of communication troubles, etc.

– Openness
Using standard specifications approved by the industry will remove barriers to participation in EDI, so that all companies will be able to enjoy the benefits of EDI, regardless of their size.

– Reduction in costs
The development of a user communication server will allow the reduction of system development costs.

13. Research and Development of Wide Area Authentication Base Technology, and Verification Experiment

1. Aims

In order to provide an environment in which electronic commerce between companies, and on-line shopping by home users can be conducted with a sense of security, it is imperative that authentication using encryption and electronic signature technology, etc., be established, in order to ensure the security of transmissions. The transmission of important information, such as names and addresses, card numbers, etc., is more and more being done by browser software, which automatically encrypts the information. However, with e-mail transmission, etc., the users must exercise their own security management. Users who are not sufficiently aware of the dangers of the Internet may have their information stolen, or have sensitive information overheard by a third party posing as shop staff. Recently, e-mail software that features authentication functions is appearing, but there is no interchangeability between different authentication systems, and the system needs to have the public key of the other party, etc.

In this verification experiment, a function that utilises an authentication that can be used easily by users dispersed over a wide area will be developed, and verified, so that the authentication function can be quickly completed and promoted. Also, the practical application of such a function will require an authentication station, and a pilot station will be operated in order to clarify the functions required of such a scheme, and any attendant problems.

2. Project outline

(1) Development of wide area authentication base technology

In this project, the following three functions will be researched and developed.

- Individual authentication
  This is a basic function wherein the user performs a simple operation to encrypt written data, and to add an electronic signature, and to perform secure communication over the network.

- Proxy authentication
  A manager takes electronic mail transmissions and encrypts them and adds electronic signatures, on the user's behalf, and screens the content of incoming mail to automatically perform the most suitable authentication method for deciphering and authenticating signatures.

- Authentication station
  This is a system wherein a public key authentication list is issued, and the public keys used in the individual authentication and proxy authentication are registered and used to identify the individual.

(2) Verification experiment of the wide area authentication base technology

In order to adapt and improve the developed functions, the verification experiment will focus on the participation of the research groups of universities and hospitals, etc., which are keenly aware of security, and have a degree of awareness and experience of authentication functions. As specific experiment items, importance will be placed on 'developing a high level of quality in the authentication function', and 'realising the authentication station function'.

i   Developing a high level of quality in the authentication function

Among general users, an authentication system involving complicated operations and time required for encrypting and adding electronic signatures is not likely to prove popular.

The current situation, however, is that, in order to perform coded transmission, it is necessary to obtain the other party's public key, and to use an authentication system that matches that of the other party (PEM, PGP, S-MIME, etc.), all of which places extra burden on the user. The verification experiment will focus attention on the current situation, where many and various authentication systems exist side by side, and whether it is possible to reduce the user's burden, and by how much. The proxy authentication function is expected to have the following two capabilities.

(i)   Obtaining the public key of another party that communicates with the authentication station, and attempts to transmit to the user.

(ii)   Having a number of authentication systems built in, and automatically switching systems in response to the other party's system.

Besides verification experiments carried out among users with individual authentication functions, and those with proxy authentication systems, the mail functions of representative commercially available e-mail software and browsers will be tested.

ii.   Realising the authentication station function

The verification experiment aims to establish an authentication station function that has a high degree of reliability and interoperability with other stations. To this end, we are considering an international link up by receiving certification from IPRA, an international authentication station.

The authentication station, in addition to issuing public key certification for each individual user, will be able to issue batch certificates to multiple users, as a proxy authentication capability, enabling much greater efficiency. Also, the WWW will be used to enable users to download prototype software and manuals for the individual authentication and proxy authentication projects, and the authentication station. Verification experiment participants will be able to make their own environment settings, and any problems relating to this will be made clear by the participants' use of the functions, and finally, a system will be established whereby anyone who wishes will be able to obtain the environment for use of the authentication functions.

The verification experiments described above are aimed at;

- the establishment of an internationally recognised authentication station function with a high level of interoperability with other stations,
- authentication functions with operability suited to the user stratum and inter-operable with other authentication systems,
- a diffusion function that will allow anyone who wishes to easily construct a usage environment for authentication functions,

etc., and it is hoped that this work will contribute to the promotion of EC.

14. Computer Network Emergency Response Team Survey and Trial Run

1. Background

With the expansion and spread of the Internet, various kinds of improper Internet access (security threats) have made the possibility of very serious damage a reality. In America, for example, some 2,000 computers connected to the Internet were paralysed by a virus that spread across the network, over 100,000 passwords were systematically stolen, and in 1995, one Kevin Mitnick stole the credit card information of around 20,000 people. Needless to say, the Internet knows no international boundaries, and the possibility of similar incidents occurring Japan is extremely high.

Against this backdrop, if we look at the action that other countries have taken, we find, for instance, that in America, after the Internet Worm incident of 1988, an IRT (Incident Response Team), namely the CERT/CC (Computer Emergency Response Team/ Coordination Centre) was set up with the financial assistance of DARPA, at the Carnegie Melon University. Similar IRT have been set up and are active in countries like Australia and Germany. It is believed that there are about 60 IRT worldwide.

In comparison, though Japan may be said to be an advance computer using nation, there is no real provision of a system to deal with improper access in a neutral and fair manner. If this state of affairs continues, there will be nothing that can be done in the face of such misuse, not only with respect to misuse within Japan, but improper access from Japan to destinations in foreign countries, or originating abroad and aimed at Japan, and the possibility that Japan will find itself alienated from the Internet cannot be denied. Under such conditions, the security, use and development of electronic commerce (EC), is in danger.

2. Aims

Even within Japan, various organisations and network managers, university and company specialists, etc., have been tackling the problem of improper access, each from their own perspective. However, with such individual, transitory efforts there limits. For example, if smooth communication between concerned parties cannot be achieved regularly, information will tend to pile up and lose its effectiveness, and organisations and companies will not be able to cooperate together sufficiently, and effective PR activities cannot be performed. Meanwhile, those who wish to access the Internet improperly are finding more and more advanced and systematic means at their disposal, and those who wish to combat such improper access are having to find more advanced and systematic techniques and systems.

In this project, in order to ensure the security of communication on the Internet, based on the case studies of various other countries, the necessary know how needed to prevent such

improper access will be gathered and accumulated, and then used to create and operate an IRT in Japan, on an experimental basis. In this way, countermeasures against improper access, needed in order to realise secure electronic commerce on the Internet, will be implemented experimentally, and verification experiments will be carried out in order to clarify the form of future permanent mechanisms that will need to be put into place.

3. Project outline

An IRT will be constructed on an experimental basis, and the following experiments carried out.

(1) Collection, storage and publication of security information (improper access countermeasures)

A massive quantity of security related information will be collected and stored, and provided to general users as needs demand. Specifically, the security countermeasure recommendations of IRTs in foreign countries, and various types of security related material distributed among experts, etc., will be collected. This information will be effectively disseminated among general users in a variety of ways, and will be the foundation of improper access prevention in the future.

(2) Construction of the system environment

The computer and network systems essential to the work of the IRT will be constructed. Specifically, this will involve the ensuring of methods of individual communication with general users, the construction of methods of providing information to an unspecified number of users, and clearly defining the information management methods that will support the IRT in its role as an information centre holding many types of security related information.

(3) Collection and storage of information on the legal aspects of the question

Improper access is in many cases somewhat difficult to term clearly as a 'criminal' act, in terms of current legislation. On the other hand, a single mistake may also result in what is clearly a 'criminal' act, so that the implementation of countermeasures involves some rather tricky aspects. By the addition of the study of the legal aspects, the necessary know how can be accumulated so that the IRT will be able to clarify the services that it can provide to the general user, and to avoid the organisation itself becoming embroiled in legal arguments, thus enabling stable operation of the IRT.

(4) Cooperation in the resolution of improper access (Measures for the prevention of the recurrence of improper access)

With regard to instances of individual improper access, by cooperating with the countermeasures taken by general users, the aim is to limit the spread of the damage, and to prevent recurrence. For example, particular methods of improper access can be analyzed, and the security information required in individual cases provided. This will enable the early resolution of instances of improper access in Japan.

(5) Original information

The information collected by the IRT will be investigated and analyzed in detail, and original security information, peculiar to Japan, will be provided. The aim in this case is to provide for the early resolution of security problems peculiar to Japan, and to be able to treat instances of improper access with a local character.

(6) Preparation of cooperative systems, domestically and internationally

Cooperative links with IRT in other countries will be established, and the mechanisms for regular information exchange created. This will be a first step in making a Japanese contribution to the Internet internationally.

(7) Provision of a membership system

In order that the IRT can continue to carry out its activities effectively, it is necessary to have a fuller membership of support for the IRT. The verification experiment will research the membership system, in order to clarify the best format for a future membership organisation, and to clarify the best structure of such an organisation.

15. Verification experiment for the creation of open markets, etc., through the use of electronic notarisation systems

- The functions and concepts of an electronic notarisation centre -

Along with the spread of the Internet and other open networks, a greater volume of important documents are being transmitted via those networks. At the same time, the number of crimes involving use of the network has increased, and there is a need for a safe and reliable network to be developed. In particular, it is an urgent necessity that a robust and reliable network be created for the transmission of electronic information pertaining to money and rights/ protection, such as would be the case with electronic commerce.

Further, a social system that assumes the use of electronic networks, will bring about a shift in the distribution of goods and money to new systems, where simply replacing the conventional systems will not be good enough. Further, the new 'electronic products (electronic publishing, information and programmes, etc.) that create this environment are now being sold, and electronic commerce is about to burst upon us, with all its hidden problems.

This verification experiment will study and verify the realisation of sure protection of digitized information and a secure and highly reliable network, and what kinds of new social system will be needed to create these environments, in an attempt to contribute to the advancement of electronic commerce.

Introduction

If we consider the security of digitized information, there are several problems that come to light. In particular, electronic commercial transactions over an open network like the Internet, have rather vulnerable security and reliability capabilities, in terms of 1) falsification of electronic information, 2) authentication of the sender of the information and 3) impersonation within the network, surreptitious monitoring of information.
We proceed the verification experiment in terms of the following two points in order to solve the above problems.

(1) Electronic notarisation centre verification experiment seen from a technical aspect. As part of the functions that make up the electronic notarisation centre, in addition to the development and testing of electronic authentication and notarisation systems, there will also be development and testing of key management for the encrypting of digitised information and for individual authentication.

(2) Based on the creation of the aforementioned reliable environment, business processes will also be tested and verified. A number of typical applications will be run, and linked to the electronic

authentication centre, and tested. In addition, business in the new network environment, and the flow of electronic information, will be verified and tested.

1. Basic concept of the electronic notarisation centre

An electronic notarisation centre may be described as an electronic information management system, operated by a third party organisation. It is a social/ information system whereby electronic information, such as documents, etc., are registered by several users or a single user, and their contents can be protected against the threat of falsification, deletion, addition, etc., and stored for a fixed period of time. When the user needs authentication of the contents, the facts can be verified.

In order to enable this situation, the electronic notarisation centre has an 'electronic notarisation function (system)', and an 'electronic authentication functions (system)'. The 'electronic authentication system' will be designed so that it can be linked with existing systems. Moreover, the electronic notarisation centre in this verification experiment will be designed and verified on the following fundamental concepts.

(1) Storage of non-erasable electronic information

Theoretically, updated information will be displayed, but in a physical sense, the centre does not have the capability to erase past information. In other words, as a medium, the centre will use a non-erasing recording device,

so that information, once recorded, cannot be physically erased. This will mean that solid information can be stored with respect to problems arising from the operation of the electronic notarisation centre, and transaction histories, and details of amendments, etc., will be reliably notarised.

(2) No connection with contents

Under the current laws, communications operators may not have any connection with the contents of transmissions. Further, the electronic notarisation centre must allow access, provided that there is no offence to public morals and standards, and cannot appoint someone to check each transaction. (In this respect, different from a notary office.)

Therefore, in principle, the electronic notarisation centre has no knowledge whatsoever of the contents of messages logged by the users.

(3) Independence from applications

Globally, the electronic notarisation centre does not exist as a means of preserving the originality of electronic information. In this verification experiment, the supported functions are divided into 'basic functions', to be considered inherent functions of the electronic notarisation centre, and 'extended functions', which are difficult to separate clearly from the applications used.

(4) Authentication of multiple individuals

The following methods will be tested and verified.

- Authentication method
  RAS encryption
  Bitmap signatures

- Recording media
  Contact-less IC cards
  Floppy disks
  PC hard disks

2. Functions and structure of the electronic notarisation system

2.1 Functions of the electronic notarisation system

The items which the electronic notarisation system can verify are as follows:

(Record verification)
Who recorded what, when and under what conditions, etc.

(Historical verification)
To whom was a message sent, who received it, and who gave approval.

(1) Basic functions

- recording
  recording of new documents
- joint recording
  joint recording by several individuals
- checking
  providing the users with recorded information
- search and retrieval
  search and retrieval of items by registration date, or registering person

(2) Extended functions

- delivery

electronic mail to a third party via the electronic notarisation centre
- renewal
  existing records can be replaced with updated records
- addition
  new documents and text can be added to existing records
- signature and seal
  electronic seals and signatures can be affixed to existing records whose contents have been agreed upon.

(3) User management functions

- seal issue
  new electronic seals can be issued
- reporting loss of electronic seal
  should the electronic seal become lost, the lost seal can be invalidated for all future transactions
- seal re-issue
  should the electronic seal become lost, the lost seal can be re-issued

2.2 Encryption and personal authentication

(1) Encryption of transmission data

In order to realise a highly reliable notarisation centre, a secure and reliable network is required. In order to secure safe and reliable transmission of electronic information using open networks such as the Internet, the transmitted data are encrypted. In the experiment, in consideration of the need to encode and decode large volumes of data, the DES system of encryption will be used. (Focusing on the merit of being able to code and decode within a short period of time.)

(2) Encryption keys for personal authentication

In the verification experiment, public key encryption will be used for personal authentication. The code used will be 'RSA'. In personal authentication, since the target text (authentication key) is rather short, in comparison to the data part, the more reliable 'RAS' system will be used, to allow checking of the whole document on the network, and since there is no problem if the coding and decoding takes a little time.

Also, experiments will be carried out on individual authentication using 'electronic signatures'.

2.3 PC networks

As of the end of June, last year, there were over 5.73 million people using PC networks in Japan (survey by the Electronic Network Association), and if Internet users are added to this figure, the result is quite a considerable number. With the spread of personal computers, the number of users of open networks has grown steadily.

The special features of PC networks are that there are access points all over Japan, and that networks can create an original environment, and specialise in their own niches.

Meanwhile, the arrival of Internet has meant that network manufacturers are having to provide compatibility with the Internet, which is fast becoming the de facto world standard. The expansion of the scope of usage on WWW (World Wide Web) is encouraging this demand,

and network companies are likely to shift sooner rather than later from non-protocol based networks to a TCP/IP based Internet environment.

In consideration of future directions, the verification experiments run by this Association will use the Internet, which is supported by the network manufacturers.

3. Business processes in the verification experiment

In order to test and verify the electronic notarisation centre, several types of representative business processes will be tested and verified, as electronic commerce verification projects.

The business processes and case study applications to be used in the verification experiments are explained in outline, below.

(1) Verification of proxy application (Business process 1)

As a representative sample of proxy application work, the submission of public documents will be tested as a case study.

The applicant's application, based on a letter of attorney, will be treated as a proxy application, and the business process followed till the applicant is notified of the decision of the handling authority will be tested and verified.

The experiment will check whether the proxy has actually made the application, and whether the notification of the results has reached the

original applicant. Some application forms focus on the date and time of the application, and the use and operation of a time stamp function in notarisation will be verified.

(2) Verification of reception of applications (Business process 2)

This verification experiment will look at on-line application reception work, as a typical example of reception related work.
Whether the application was properly delivered to the examination centre, and whether it reached the centre by the deadline, etc., will be notarised. The notarisation history and operation coordination related to alterations to application contents (change of examination site, etc.) will be verified.

(3) Verification of consumer protection (Business process 3)

Once electronic commerce is able to be run in a secure environment on open networks, consumers may find themselves in a vulnerable position, particularly with regard to settlement related work. Therefore, we considered the business process from the point of view of the protection of the consumer in electronic commerce transactions. With the cooperation of a certain mall, we will verify the transactions between the mall and the consumers, as a fair third party.

Transactions will be notarised in the business advancement of nonstore sales terminals installed in convenience stores and beauty stores, etc. In particular, in order to support sales by cash, the significance of the notarisation centre in consumer protection is

quite considerable.

(4) Verification of membership management (Business process 4)

As an example of the work involved in the management of a large and specified number of members, with the cooperation of a certain federation, the work involved in the sales of rare books will be verified.

Antique book stores around the world, handling rare books, will be linked by the Internet, and sales information exchanged. The verification experiment will test and verify the on-line shopping of a large and specified number of members.

A particular feature of this process is that handwritten signatures are used as personal authentication. Because it is difficult to distribute IC cards throughout the world, the use of registered signatures of the participants as image information for personal authentication will be verified.

(5) Verification of work involved in cooling off. (Business process 5)

This verification experiment will study the cooling off period after order placement in the on-line shopping for books, operated by a certain company.

Information on publications will be provided to members in highly specific genres, and sales of such publications will be conducted. The reliability of the subsequent cooling off period in the process will be verified.

Further, the practical usefulness of new distribution routes will also be verified.

(6) Verification of work related to the protection of copyrights, etc. (Business process 6)

Centred on a certain publishing group research committee, the electronic notarisation system's business process involved in the protection of copyrights, etc., in electronic publication will be verified, with respect to previously published material, and material digitized and published electronically for the purposes of this verification experiment.

Methods for handling copyrights will be verified in parallel.

(7) Verification of work involved in the transmission of important documents (Business process 7)

In many large companies, important documents are still sent by mail, or using dedicated lines, rather than using the Internet, in spite of its cheapness. This is because of its poor reliability. The notarisation centre will verify reliability in a highly reliable experiment environment that uses encryption and personal authentication.

In this verification experiment, with the cooperation of a certain trading company, the secure and reliable protection of data transmissions between the company and its affiliates and correspondents, and the reliability of transmission, will be verified.

Technical verification will also be conducted, regarding connection to an in-company LAN.

4. Discussion of legal issues, etc.

(1) Legal issues

Commercial transactions are beginning to be carried out on open networks that are still technologically imperfect. In these experiments, verification experiments to resolve these technological problems will be promoted, but there is also a need to reconsider the question from a legal point of view.

For example, the validity of digitized information, etc., has not always been affirmed. In this verification experiment, the pertinent legal issues will be investigated.

(2) Survey of conditions in other countries

America is a step ahead in terms of Internet based technology. Also, advanced development is going on in Europe into electronic settlement technology and the creation of systems. These developments will be studied, and incorporated into the investigation items verification experiment, in order to contribute to a more effective experiment.

Also, the term 'electronic notarisation centre' is rather rare in the world, and this verification experiment will promote the term globally.

16. Development and verification of wide area disaster countermeasure technology for client server systems

(1) Background and aims

One of the lessons learned in the Great Hanshin Earthquake of two years ago was the importance of having backups of information system software assets (including data). When buildings have been destroyed, or are lying on their sides, making them unsafe to enter, and when client server system hardware and software cannot be retrieved, it is particularly difficult to restore the software.

Though information system users may be aware of the importance of the information system, and of the need to make backups, when it comes down to actually discussing backing up the system, the reality is that many balk at the cost. Though many companies did study the question of backing up their system software assets immediately after the disaster, the fact is that there has not been much progress since.

In these days, when information systems are the base of industry, it is surely no exaggeration to say that making backup copies of information system software is as vital to Japanese industry as transport and communication systems, in a country that is so prone to earthquakes.

Since the contents and effect of information system backups are a trade off against the costs involved, Japan as a nation needs to answer questions with regard to the best format for backing up information systems.

Against this background, this project aims to test and verify the backup of software assets of open client server systems, which are expected to increase dramatically in the future, and to propose backup countermeasures for such systems throughout the country.

Another aim of the project is the verification of methods of client server system backup that may be impossible for a single company or department, in terms of technology and manpower, but may be done jointly or industry wide at low cost.

Traditionally, it was usual that individual users, led by individual manufacturers and vendors, would perform their own backup. The aim of this project is to construct a backup system, where possible using a standardised method, in an open, user oriented environment.

(2) Project outline

At the sites, several Windows NT and UNIX machines will be installed and will perform two way backup and recovery with the UNIX machines at the backup centre, via communication lines, and various types of attendant verification experiments will be carried out.

In the experiment, the data generated daily by multiple users (sites) will be transmitted to the backup centre, using a fixed protocol, and will be stored at the centre. Also, in the event of

any irregular event, recovered data will be sent to the sites from the backup centre, and the sites will be set up to perform recovery procedures. The verification experiment will be divided up into around 100 items. Data (software assets) extracted from the site servers will be compressed, encrypted and files transmitted to the backup centre. At the centre, the files will be stored and managed as is, and returned to the sites upon request. At the sites, the returned files will be deciphered, decompressed and restored. At the sites, there will probably not be specialist operators, so that the data backup process will be designed to be as automatic as possible. With regard to the functions shown in the diagram, data extraction, data compression, security encryption, transfer, data storage, file recovery, site management and condition monitoring, including new developments, a broad range of widely used existing software will be evaluated and technically verified.

The aims of the verification experiment include compatibility with an open environment, guaranteed security, reliable backup and as cheap as possible construction and operation.

For this purpose, the hardware and software at the centre will be set so as to ensure connectivity with standard hardware and software widely used at the sites. Also, the technology used will be that which is standard and widely used at the sites, and as far as possible, the latest.

In the final stage of the verification experiment, with the cooperation of several users, actual data exchange with the centre will be carried out, and the system's overall functions and performance assessed in a comprehensive experiment.

The results of the verification experiment will be that systems which use client server systems, such as medium sized company systems and department systems in large company offices, will be protected in the event of a wide area disaster. Such being the case, these results will be of use to those attempting to construct their own independent backup systems, and for those companies that cannot afford the cost of constructing an independent backup system, they will also be of use to those companies who wish to construct a backup system jointly, or as an industry.

17. Verification project for the electronic exchange of technical information in the shipbuilding industry

(1) Background and aims

In the life cycle of a ship, especially at the design stage, vast amounts of technical information pass back and forth between the shipyard and the related companies and classification societies, and also among shipbuilders. Almost all of this technical information is produced electronically, by CAD, word processor software or computer software, etc. But in the final stage, the vast majority of it is printed out in paper form for transmission and storage. For this reason, the transmission of information in this form takes time, and its storage and retrieval incurs many indirect costs. Meanwhile, recently, several shipbuilding companies have been receiving joint orders and forming links with foreign design companies. Supplies of materials from overseas are also increasing, and the exchange of electronic data via networks is becoming increasingly important. Under these conditions, in order to maintain and improve the international competitiveness of the shipbuilding industry, in addition to the sharing of information using in company computers, there needs to be sharing of information between industries, and across company boundaries, and ranging across the whole life cycle of the ship, in order to reduce indirect costs, and thus, to improve white-collar productivity. The aim of the verification experiment is to establish various types of foundation technology for the realisation of 'the sharing of technical information using computer networks'.

(2) Project outline

(a) Experiment outline

DTD standards for representative shipping technical documentation will be drawn up. Also, a two way conversion function for technical documentation compliant with the DTD, and existing data bases and design computing software, and a conversion function for cross type 3D CAD and STEP will be developed. These functions will be used to test for a valid method of exchanging technical documentation, and to test the practical usefulness of cross type 3 D CAD system data exchange. In addition, the verification experiment will verify valid methods of exchange of technical drawings characteristic of the shipping industry, the presentation of design drawings, the possibility of the conversion of inspection and consent work to electronic format, and valid methods of sharing shipping related information.

The specific items of the verification experiment are as follows: Nos. (1) and (2) deal mainly with elemental digitization technology (SGML, STEP and IGSES), while (3) focuses mainly on electronic approval, which is part of CITIS, and practical application technology for sharing electronic information over networks.

(1) Verification of the practical application of exchange functions for technical documentation and technical drawings.

• Verification of the practical application of expression function for the exchange of technical documentation

• Verification of the practical application of a relational data base update function using technical documentation

• Verification of the practical application of a technical documentation update function using a relational data base

• Verification of the practical application of a statement of accounts update function using design computing software output

• Verification of the practical application of a design computing software input data generation function using the data in a statement of accounts

• Verification of the practical application of a technical documentation sharing and exchange function using HTML.

• Verification of a valid exchange method for technical drawing data peculiar to the shipping industry

(2) Verification of the practical application of a CAD and STEP AP203 data conversion function

• Verification of the practical application of a data conversion function between different types of CAD and STEP AP203

(3) Verification of the digitization of the presentation and consent of shipping design drawings, and sharing of shipping related information

• Verification of the digitization of the presentation and inspection and consent of shipping design drawings

• Methods for the electronic sharing of shipping related information

(b) Experiment environment

As shown below, the experiment environment will consist of four servers installed in shipyards and classification societies, linked to one or more client terminals installed at each organisation, across an open network (Internet).

(c) Implementation structure of the verification experiment

A promotion committee, planning section and three working groups will be established. Also, observers from related government departments and organisations will attend.

• WG1: Technical documentation exchange experiment

• WG2: Technical drawings and cross type CAD STEP AP203 data exchange

• WG3: Digitization of design drawings inspection and approval experiment, and shipping related information sharing experiment

(d) Expected results

The target scope of this project is the design stage only of a ship's life cycle, and the technical information handled represents only a fraction of the total, but through this verification experiment, we believe that various types of fundamental technology can be established for the 'digitization of technical information and the use of networks for exchange and sharing of information'. Therefore, we are confident that this experiment represents a major first step towards the realisation of CALS in the shipping industry.

18. CALS in Electronic Equipment and Parts verification experiment

(1) Background and aims

The electronic equipment and parts industry has permeated deeply into the lives of the people, in everything from household use to industrial use, and has contributed in helping to promote the Japanese economy. Japanese ingenuity and diligence with regard to technology, price, delivery and service, and in the face of fierce market competition, produced continuous improvements that resulted in growth surpassing that of Europe and America. However, in recent years, the Europeans and Americans have begun to make a comeback, and faced with growing competition from east Asian countries, it is imperative that we find ways to improve business even further.

In particular, the shortening of the life cycles of products and parts means that parts selection for newly developed machines, and efficiency in design, are the keys. Therefore, it is vitally important that technical information and supply information concerning new parts is available quickly. However, parts information from the manufacturers is traditionally in the form of paper catalogues and technical reports, leading to the following problems.

a) From the point of view of efficiency of production and distribution of printed matter, it is impossible to supply information from the manufacturers in real time.

b) Machinery manufacturers have to be able to store and manage large quantities of the above mentioned catalogues, both from Japan and from abroad, so that they can be accessed easily, and the operation of necessary systems involves management costs.

c) The catalogues of each company differ in layout, the content of the descriptions and the terminology used, so that it is very difficult to make comparisons between parts.

d) Paper catalogues generally do not contain enough information for design, or the information has not been scanned with CAD tools, so that the designer has to re-input the information, which significantly affects design lead time.

In order to resolve these problems, it is necessary to realize the digitization, standardisation and reclamation of information, according to the so-called CALS concept, where parts information is converted into electronic format, standardised, and then this electronic information is used to improve the design of new machinery. However, these activities can not be accomplished by the efforts of one company alone: it requires the cooperation of the whole industry. Therefore, with the cooperation of parts manufacturers and the manufacturers of electronic machinery that uses those parts, the CAD tools vendors that support the design environment and the information distribution vendors that create the information flow, the 'CALS in Electronic Equipment and Parts verification' project was started in order to test and verify the

standardisation and the creation of systems and the production of parts information according to those standards, as well as their effectiveness when actually applied to machine design.

(2) Project outline

In order to achieve the targets described above, the project will form three working groups in each industry for the supply of information, the use of information and the distribution of information. Each group will define the business from its own standpoint, and will draw up proposals of the most desirable standards, and will create and test an operating system. Of course, during the project, there will be on-going discussion between the working groups, and with domestic and overseas standardisation groups.

a)   Information supply working group (WG1)

This working group will comprise ten semiconductor parts manufacturers and 15 general electronic parts manufacturers, and standards will be drawn up for the structure of the complex electronic parts information (a generic term referring to catalogue data in PDF, etc., spec information in SGML. etc., and CAD information) supplied by each manufacturer, the production of those data, and the standard for the systems by which the information is supplied to the users via networks, and systems developed according to these standards. Also, these systems will be used to create actual complex electronic parts information, and their usefulness verified.

b)   Information use working group (WG2)

The group will comprise 15 electronic equipment manufacturers, and CAD vendors, etc., and will draw up standards pertaining to the required types of information, format and use of terminology, from the standpoint of the complex electronic parts information user, and will design a design work flow, using the complex electronic parts information. Then, the group will work on the development of retrieval systems for equipment design using the parts information, and a data link system for use with CAD. Further, the practical usefulness of complex electronic parts information when applied to the design of printed circuit boards for different electronic equipment, such as TVs, cellular telephones, PCs, etc., will be verified.

c)   Information distribution working group (WG3)

This group will be responsible for the maintenance and management of the standards, and will develop inspection systems to check whether there are any mistakes in the descriptions used in parts information, and will develop a comparative search and retrieve function to be used with the information supplied by several parts manufacturers. Also, the group will study the drawing up of value added information as VAR, and produce and test a guide to the assessment of actual data production, and to the overall flow of parts information, and will assess and draw up guidelines for the parts information network.

In the environment that we are trying to create, these activities will not only enable wide ranging simplification of equipment design in

the electronic equipment industry, but will also allow improvement in product quality, and reduction in costs. Also, for the parts suppliers, there will also be the benefit of being able to supply information on their products quickly and at low cost. These kinds of experiments are possible because of the strength of the Japanese semiconductor parts, general electronic parts industry, and the electronic equipment industry in the world, and we believe that they are a major opportunity to display Japanese leadership in the world.

19. CALS in Iron and Steel Equipment (TCALS) Project

Background

The equipment used in the manufacture of iron and steel products has to be able to withstand continuous operation in an extremely severe environment. Also, high levels of equipment performance need to be maintained and improved over a period of 30 years or more, which means that there is a need for an equipment maintenance system that does not rely equipment manufacturers. At a single steelworks there are several hundred equipment maintenance men who struggle with high tech development and greater complexity of equipment, as well as greater loads and deterioration, and who work to maintain and improve equipment. Equipment and maintenance information in a steelworks are characterised as follows.

- Approximately 3 million items of equipment at one steelworks
- A wide range of suppliers of machinery, electrical equipment, measurement instruments and computers, etc.
- Many different types of data format, including documents, technical drawings and images, etc.
- Repeated operation of simultaneous, short term and concentrated tasks all of which makes this field ideally suited to the CALS concept.

The expected effects of CALS

'Research into the practical application of CALS in iron and steel equipment' undertaken by six iron and steel manufacturers, and 11 manufacturers of heavy electrical machinery, industrial equipment, measurement equipment and computers, etc., has been on-going as part of the CALS verification experiment project of the Ministry of International Trade and Industry's project for the promotion of high level electronic commerce among companies, due for completion in fiscal 1997. The aims of the practical application research are, the reform of business processes across industry boundaries in the supply, development and operation of steelworks equipment, using a steelworks plant as a model, focusing on the strengthening of the international competitive power of the Japanese iron and steel industry. The expected benefits are as follows.

- Cost reductions due to simplification of equipment management
- Contributions to equipment operating ratio and to product quality improvements, thanks to qualitative improvements brought about by preventive maintenance
- Increased useful life thanks to the precise implementation of equipment improvements
- CALS promotion effects in a wide range of related industrial fields
- Openness and globalisation resulting from the standardisation of equipment work and data

Fundamentals of the iron and steel equipment CALS system

The most important issue is increasing the efficiency of teamwork between the iron and steel and equipment manufacturers. Therefore, the fundamentals of the system are
- a network to link the iron and steel industry and the equipment manufacturers
- standardisation of equipment management information and an open data base.

The cost of standardisation work, complete digitization of documents and development of related software is high, and these things cannot be accomplished overnight. The standardization of the supply, repair and operation work for a huge quantity of equipment, and equipment management information will require steadfast and continuous effort on the part of the iron and steel companies and equipment manufacturers overall.

As the start of this verification project, as illustrated in Figure 1, an open data base involving 13 iron and steel, machinery, heavy electrical equipment and measurement instrument companies will be constructed in a standardised data format, and directly linked to a dedicated line.

The experiment sites will be located at the major steelworks of NKK, Sumitomo Metal Industries, and Kawasaki Steel, the manufacturing plants of IHI, Toshiba and Yokogawa Denki, and the Iron and Steel CALS Research Centre and NCALS. The experiment sites at the Iron and Steel CALS Research Centre and NCALS will model those companies who do not have an experiment site set up, and the public data base of those companies will be located there.

Standardisation and BPR

One of the keywords of CALS is 'life cycle cost'. This concept states that, considering the overall costs of iron and steel equipment development (construction), supply and operation (maintenance) throughout the life cycle , the organisation, standardisation and digitization of the business procedures and the necessary information for equipment management and the construction of a synthetic system to support this would likely result in comprehensive reductions in costs. In this verification experiment also, as shown in Figure 2, the verification of the feasibility of the application of CALS in the four areas of design, supply, maintenance and operation will be considered first. Then, from the view point of the verification of the feasibility of the reform of business procedures through information sharing and business links across the industry, the theme of inter-company and inter-industry BP, with specification confirmation of heavy electrical equipment in the construction area, spare parts control in the supply area and history management and technical support in the maintenance area, will be taken up.

Implementation details

Specific implementation details are as follows

(1) Comprehensive data base standardisation of an equipment configuration: management system

(2) Design: research into the digitization and sharing of technical documentation

(3) Supply: development and testing of spare parts interchangeability and machinery supply functions

(4) Maintenance: Equipment maintenance links between iron and steel and equipment manufacturers

(5) Operation: Digitisation of replacement repair plans, including parts machining (implemented at own cost)

Development of infrastructure technology

Dispersed data bases that contain all of the above functions will be installed throughout all the participating companies, for efficiency of data registration and update and security management. The dispersed data bases installed within each company will store only that company's data. However, the search function will allow unrestricted access to the data bases of other companies. The dispersed data bases will be linked by a special inter-industry network. This network has the following three technical characteristics.

- Construction of a virtual synthesis of the data base
- Data exchange with multi-vendor software
- Standardisation of network operation management

The first characteristic, virtual synthesis of the data base sever, will allow data search and retrieval from dispersed data bases, just as if the same data base were being operated in the same way. Firstly, a standard data base structure will be established, and the data bases

of the participating companies will be structured with the same format. Next, a data base search agent will be developed and introduced. Figure 3 shows the outline of the virtual synthetic data base. Each data base will have a meta data base, comprising repositories for an equipment designation system, technical drawing, documentation and application work information. Under this data base will be bulk data bases for the storage of actual technical drawing, documentation and application work information. Further, the data base agent that virtually synthesizes the dispersed data bases will be located in the servers and clients, so that several dispersed data bases will be able to be smoothly and efficiently accessed from the client, as if they were a single data base.

In order to realise the second characteristic, data exchange with multi-vendor software, a standard interface (TCALS standard API: FORMAT-X) will be created. This API will be able to be used between the client AP and the data base agent, and between the data base agent and the meta data base (PDM). Figure 4 shows the multi-vendor software that will be used in the CALS in iron and steel equipment system, and their connection relationships. FORMAT-X will contain standardised content, so that it will also be able to be used with the dispersed data base virtual synthesis systems, not only with the TCALS system.

The third characteristic, standardisation of network operation management, will be arranged to match the structure and operation of the verification experiment network illustrated in Figure 5. In addition to specific inter-industry networks that require independent operation, mutual connection with Internet access from public leased lines is also

being considered. Specifically, methods of establishing IP addresses and domain names, configuration management of specific inter-industry networks, and breakdown and performance management methods, route management in the fire walls of the participating companies, connection management methods, registration and authentication of users and application and encryption methods, etc., will be standardised and tested, and arranged as an operating management model for specific inter-industry networks.

20. Introduction to the Plant CALS Project

Background and Outline

In the field of so-called processing plants, such as chemical plants, etc., there is a life cycle of around 30 to 40 years, from the planning, design, construction, operation and maintenance, etc., of the plant, to its eventual demolition. The processes themselves are very complex, and as many different companies and businesses are involved in the process plant industry, the data that is generated to support the processing plant during its life cycle is extremely important, and the establishment of wide ranging data exchange and sharing technology within companies and between companies is essential.

Against this background, ISO has been carrying out data exchange standardisation under the name STEP, and in December, 1994, part of that standardisation was formally enacted as ISO10303. Additionally, the work of enacting other parts of STEP for specific fields, including processing plants, is progressing, and it is expected that many will be formally enacted as ISO10303, within 2 or 3 years.

Also, CALS planning in America is an important element in the construction of the information highway, and the development of EDI (electronic data exchange) for related documentation of American government suppliers is advancing. This trend is evident not only in America, but its spread throughout the industries of the world is an essential condition.

Many different types of businesses are involved in the processing plant industry; plant owners, engineering, plant construction, architecture, equipment manufacture, software, works, maintenance, etc., and it is vital that research and development that spans all of these industries be nurtured.

In the Ministry of International Trade and Industry's Project for the promotion of high level electronic commerce among companies', plans for CALS research for processing plants were drawn up after seeking the advice of experts in the many related fields mentioned above. Then, research according to the plan was approved, and this project was formally inaugurated as the 'Plant CALS Project' in 1996, and commenced research and development activities into the exchange and sharing of processing plant related data.

Research aims and contents

In order to maintain and strengthen the competitive strength of the Japanese processing plant industry, and in order to achieve symbiosis with world industries, research and development will be carried out into the practical application of the data sharing technology and business process integration technology of the new business system, CALS, in the Japanese processing plant industry. In other words, research and verification experiments will be carried out into the exchange and sharing of planning, design, supply, construction, operation and maintenance data, to provide support

throughout the whole life cycle of the plant.

As a result, data will be shared throughout the plant life cycle, and the aim is to establish a base so that activities, whether in company or between companies, will always be carried out efficiently, and based on coordinated and integrated data.

The themes examined by this research are described in outline below.

– Technology for the sharing of process design and operation technology

Under an international cooperative system, within the common specifications for electronic data (ISO10303 STEP), whose development is being undertaken after having collated the advice of experts, development and verification of the following specifications related to process design, plant operation and maintenance will be conducted, in cooperation with foreign countries.
- AP221: Data sharing of processing plant function data and data related to the diagrammatic representation (P&ID, data sheets)
- AP231: Sharing of process design (PFD, process simulation) data
- AP23XYZ: Sharing of plant operation, maintenance and measurement control data

– Technology for the sharing of engineering data

Under an international cooperative system, within the common specifications for electronic data (ISO10303 STEP), whose development is being undertaken after having collated the

advice of experts, development and verification of the following specifications related to engineering will be conducted, in cooperation with foreign countries.
- AP227: Sharing of data related to pipe layout and spatial arrangement of related machinery (3D pipe layout)
- AP225: Sharing of AP227 data related to architectural elements
- AP212: Sharing of data related to electrical design

– Comprehensive verification

The above development results and SGML (general purpose terminology for electronic publishing) and other EDI technology will be incorporated into each stage of the plant life cycle, and a comprehensive verification experiment conducted into data sharing, focusing on the planning, design, supply, construction, operation and maintenance life cycles.

– Plant maintenance service

Information transfer and sharing technology will be developed and a verification experiment conducted so that information can be smoothly relayed between the client (plant owner) receiving the maintenance service, and the remote maintenance service provider, and precise service provided.

21. Automatic CALS project (V-CALS)

(1) Background and aims

• Background

Information systems in the automobile industry began introducing CAD/CAM over 20 years ago. From an early stage, they were used in many companies, and achieved excellent results. However, in the light of the recent trend of more open domestic and overseas markets, it has become necessary to advance with 'the digitization of information transfer between companies', using international standard specifications, in order to promote greater efficiency, and to continue with 'the standardisation of information distribution', in order to achieve comprehensive work efficiency, spanning different business groups.

• Aims

The aims of this project are to contribute to the establishment of international standard specifications, such as STEP, EDI and SGML, etc., through the experimental application and research of CALS related technology to the whole life cycle of automobile production, from the development of automobiles to mass production and maintenance, and based on these, to move toward the establishment of the next generation of digital processes, and to conduct advanced technological development that Japan can announce to the world.

• Significance

V-CALS activities are promoted through the Ministry of International Trade and Industry's Data Processing Promotion Council (IPA), and are based on the Project for the promotion of high level electronic commerce between companies. Specifically, the project belongs to the CALS Technological Research Association (NCALS), responsible for conducting CALS experiments in Japan, and is the largest verification experiment system out of 10 industry projects. Five automobile manufacturers, five information systems companies and around 60 parts manufacturers and others are participating in the project, with close links to external organisations like the Japan Automobile Manufacturers Association (JAMA), and the STEP promotion centre (JSTEP).

(2) Project outline

• WG1 'Digital processes'
  SG11 'Digital processes verification experiment'

In order to verify the validity of digital processes in the automobile industry, current CALS technology will be applied to automobile development, and a verification experiment conducted. The companies participating in the experiment will form a virtual enterprise, and will conduct all manner of development activities, such as design review and notification of design changes, etc., electronically, over the network. The experiment aims to clarify the validity of digital processes, as well as identifying current issues, and to clarify the information system base that will be required in the future.

  SG12 'Verification experiment for the establishment of next generation PDM

technology'

This verification experiment will study the best format for digital processes in future automobile development, and the requisite conditions for comprehensive information technology, which will form the base of such processes. Also, verification experiments will be conducted into the vitally important nucleus IT elemental technology, and its feasibility verified. These studies and experiments will clarify the system requirements and tool specifications necessary to realise digital processe in automobile design work.

• WG2 'STEP standardization support and verification experiment'

Sharing and long term storage of CAD and other product model data will be enabled, across company boundaries, and the practical application of the international standard STEP will be promoted in order to create the fundamental base for digital processes. In the V-CALS project, in particular, standards for automobile application specifications (AP214) will be drawn up, and assessment and verification experiments for STEP conducted, accelerating Japan's efforts to apply STEP practically, linked with worldwide trends towards practical application.

• WG3 'EDI verification experiment'

A verification experiment will be conducted into data exchange between companies, based on the 'JAMA- EDI standard', covering information from the ordering of mass production parts to 'payment', and assessment and verification experiments will be conducted for new communication protocols to replace the Bankers' Federation protocol. The aim is the early introduction of automobile industry EDI,

using the 'JAMA- EDI standard', and the establishment and spread of a secure and reliably developed base. Further, through the standardisation and verification of new EDI information transmission rules (communication protocol), using an open network, the form of the information infrastructure that will be the foundation of the next generation EDI, and the procedures for its realization, will be established.

• WG4 'SGML'

SG41 'Service information network system verification experiment'

Service materials issued by Japanese automobile manufacturers to maintenance companies will be digitized according to international standards, and a data base constructed. Virtual operation will be conducted, assuming automobile manufacturers, future information centres and maintenance operators. The problems involved with current 'service materials' (books and papers) will be resolved, and the necessary requirements for an information system that can promote the provision and use of 'service information' that is easy to handle and cheap for the service companies will be clarified.

SG42 'Legal information data base system verification experiment system'

Legal information relating to the automobile industry in Japan will be digitized according to international standard specifications, and a bilingual data base constructed in Japanese and English. Further, research into an information supply system using communication information networks, and the development of a hypothetical system, will be carried out. Hypothetical operation of the system, assuming

usage centred around automobile companies, will be conducted. Through these activities, likely problems occurring in the practical operation of a 'legal information data base system' and the research and assessment of the practical application will be clarified.

Att: Ministry of International Trade and Industry Machinery and Information Industries Bureau, Digitisation Policy Department

The following is our project outline (materials) enclosed for your perusal.

22. Space CALS Project

(1) Background and Aims

The space industry is expected to grow to become one of the key industries of the 21st century. The space industry may be divided into three broad categories. The first category is related to 'the transportation of goods into space', and is represented by rocket manufacture, etc. The second category is related to 'the manufacture of goods that will operate in space for a fixed period of time', and is characterised by the production of satellites. The third category relates to 'earth-bound services using equipment that operates in space'. Characteristic examples of such earth-bound services would be satellite communication services and GPS navigation services, etc. A narrow interpretation of the space industry would refer to the first two categories. In these fields, as in other industrial fields, we are entering an age of international price competition, and in order to grow in the future to become a key industry in the 21st century, efficiency will need to be significantly improved.

This project will target the satellite manufacturing industry, and will apply CALS methods to the exchange and coordination of technical interface information, particularly at the design stage, and verify whether these methods can be realized more simply and effectively.

(2) Project outline

At the satellite design stage, many types of equipment that will be carried in the satellite have to be procured from the manufacturers (domestic and foreign specialist manufacturers) and integrated into the satellite, and a satellite design process adopted in accordance with the project purpose. With regard to the payload, some of the equipment already exists, but there are many instruments that have to be newly developed for a particular project, or customized accordingly. The technical interface information for previous satellite production projects has been largely exchanged in paper format, as technical information called ICD (Interface Control Documentation and Drawing). Another type of information that is also vitally important at the design stage is the telemetry command information that is used to monitor and control the equipment working in space remotely, from the Earth, and this also is always exchanged in paper format. (Telemetry command information is always attached to ICD.)

The main aims of this project will be to digitize all ICD and telemetry command information, and technical notices that are used to coordinate technical information, and to digitise technical data and coordination processes at the design stage, so that the necessary technical coordination and management at the joint design phase can be achieved more simply and effectively.

The standards to be used for the digitization of ICD, telemetry command information and technical notices, and the draft industry standard rules and standards for the management of

electronic data were laid down in fiscal 1996.

ICD are the parameter tables which describe the characteristics of the equipment carried in the satellite. Even if the instrument in question is the satellite's black box, once individual ICD are logged for each instrument, the information can be used to design a satellite mounted with those instruments. ICD information is a type of product catalogue.

The component elements of ICD, rather than structured sentences, are information subsets with tags. Also, ICD is a multi-media document, with information that cannot be displayed in the form of text and figures shown with CAD technical drawings, pictures, photographs and circuit diagrams, etc.

Technical notices consist of queries, responses and management information, and have a very simple construction. Also, as with ICD, they are multi-media documents. Information that cannot be accurately expressed using only text can be shown with attached CAD technical drawings, pictures, photographs, circuit drawings, etc. The characteristic feature of the technical notice is the back and forth action of question and answer. Depending on the

situation, the technical notice may have the same validity as a contract document, and so consideration has to be given to questions of security and approval. The technical notice can also be digitized as an SGML document.

Telemetry command information may be used in the future as a data base source for satellite operation software. The data produced at the design stage are used throughout the whole life cycle of a satellite product. Therefore, from the point of view of improved efficiency, the data need to be directly entered into a data base that can be used with software, so that it can be viewed by all related companies. In this respect, a different digitizing approach is required from the other two documents. A data base system and WWW server will be linked, and telemetry command producers and users will use an Internet browser to directly log the electronic data into the data base system, or to view the data.

In fiscal 1997, following these standards, each company will draw up its own data processing environment for ICD, telemetry command data and technical notices, and exchange it with others. Assessment and revision of the standards is scheduled.

23. Construction Cad Data Exchange Consortium

(1) Background and Aims

Construction production is a wide field that involves many industries and related parties, from the client, designer and contractor to the manufacturers of many types of materials and equipment. Also, the length of the life cycle, from design to management, is unrivaled. In this kind of industrial structure, the CAD system continues to spread as a design manufacturing tool that is indispensable to productivity. However, as there is currently not enough interchangeability among systems, most of them are used on a stand alone basis. Therefore, it is usual for data to be input, output and then re-input among different CAD systems, and the isolation of information is becoming typical.

With an awareness of these problems, this project aims to establish elemental technology that will enable the exchange and sharing of electronic design manufacturing data, for the purposes of the promotion of information development and improvement of productivity in the construction industry, and in so doing, to contribute to the improvement of productivity, not only in the construction industry, but in related industries as well.

(2) Project outline

This verification experiment is comprised of those themes which demand quick resolution in actual work, and others which need to be considered in the mid to long term.

Themes which demand quick resolution may be broadly divided into a) construction related issues, concerning the design and work on the structural materials of a building, such as pillars, beams, walls and floors, etc., b) carrier equipment related issues such as pipes and ducts to be installed in buildings, and air conditioning hygiene related issues such as the design and operation of air conditioners, refrigerators, etc., c) electrical issues related to the design and operation of wiring and electrical lighting equipment, etc. to be installed in buildings and d) issues which span all fields, from a) to c). In each of these areas, there are particular issues that need to be addressed as priority items. Verification experiments will be conducted into the types of data exchange described below, as priority items, as well as the development of elemental technology that emphasizes standardisation for the exchange of construction manufacturing information as electronic data among different CAD systems, etc., and the provision of different types of tools

(a) Construction field
  - Data concerning lists of tools
  - Data concerning specification tables
  - Data concerning openings, based on construction models

(b) Air conditioning hygiene field
  - Air conditioning and hygiene equipment data accompanying properties relating to carrier equipment (pipes and ducts, etc.)
  - Library data accompanying properties and external diagrams of equipment.

(c) Electrical equipment field
  • Data relating to standard symbols for electrical equipment
  • Data related to list format design documents in the electrical equipment field

(d) Fields spanning (a) to (c)
  • General adjustment diagram data

With regard to issues that need to be considered over the mid to long term, the project will tackle technical development in order to enable use of the following standards, whose development is being undertaken by ISO/STEP, in the Japanese construction field. As the development of AP106, AP228 and AP230 is still incomplete, even within ISO, in addition to evaluating the use of these standards within Japan, we hope to present a report reflecting business conditions in Japan to the ISO, and thus make an international contribution to the development of STEP. As AP225 is expected to achieve international standardisation comparatively quickly, in addition to verification of the data exchange technology, we will attempt to produce and develop the necessary standards.

(a) AP106 (Basic model rules covering all of the following AP, and focusing on the construction industry as a whole.
(b) AP225(Rules concerning the exterior form of buildings)
(c) AP228 (Rules concerning air conditioning equipment work)
(d) AP230 (Rules concerning steel frame work)

It is expected that the results of this project will contribute to the realization of the environment in which all kinds of design manufacturing information that is currently partitioned among different types of CAD systems, etc., is able to be exchanged as electronic data.

24. Verification experiment for the development of aircraft design, production and operation support systems

(1) Background and aims

Japan's aircraft fuselage companies, when the Boeing 777 passenger aircraft was being developed, carried out design using shared data, and gained valuable experience about the effects and the topic of the use of a CALS-like system. Also, with the Defense Agency aiming for 100% digitization by the year 2005, work on CALS needs to include responses to the development of Defense Agency aircraft.

The development of the 777 was carried out simultaneously in Japan and America. A centre computer was installed in Japan as the HUB, and large IBM computers at Boeing's offices in Seattle, America, and five companies in Japan, were connected to the HUB via a dedicated line, and using encryption devices. Also, as a CAD system, all companies used the same CATIA and a system developed by Boeing (since returned) for 100% digitization of design data, and carried out 3 dimensional assembly simulation at the design stage. As a result, the design period was able to be reduced by around 30%, and assembly faults were cut by 70%. In comparison, the following issues also became apparent.

o When the use of the same CAD system is presupposed, it is difficult to use data prepared by engine and equipment companies using different CAD systems. Also, companies to which outside orders can be made are limited.

- The network uses dedicated systems and dedicated lines between specific companies, and the technology and costs involved in the construction and operation make it difficult for many companies to participate.
- The design data were managed centrally by Boeing, and these were copied and managed separately in Japan. The result was a staggering amount of data management work.
- As all of the work involved the use of large computers, the computer load was concentrated at peak times, creating a bottleneck in the assimilation of design work.

This project aims to resolve these issues, and to develop and conduct verification experiments on a system that can be applied to the development of civil and military aircraft, with Japan as the nucleus of development. Figure 1 illustrates the main processes in the development and operation of aircraft. Of these, this project will target basic planning, basic design and detailed design, with other themes being dealt with at al later date.

(2) Project Outline

This project seeks to achieve the following, in order to resolve past problems.

- The network should be open, and use public leased lines (ISDN), so that many and different companies can easily access at will.
- To enable cooperation with companies all

over the world, the system should be global, and assume use of the CALS standard STEP, in addition to CATIA.

- Design data should be managed by the producing company, with the Index only centrally managed, so as to achieve unitary integrated management, and to reduce data management costs.
- Assembly simulations, etc., should be for use on workstations, with computer equipment able to be flexibly adjusted according to the volume of work.
- Technical documentation should be digitized in order to reduce the costs of long term maintenance and management.

The expected results are that, like the results gained from the development of the 777, the design period will be shortened, and the number of faults in assembly greatly reduced by having fewer design changes, and reducing the life cycle cost. Also, while the development of Defence Agency aircraft will still undergo design inspection under the control of the Defence Agency, the sharing of know how between the Defence Agency and the developers will be important. The use of 3D CAD and electronic technical documentation will allow feedback at an earlier stage.

Figure 2 illustrates the main functions of the system, and their outlines are as follows.

(1) Assembly simulation function
Parts are selected for assembly simulation, and interference checks carried out. When interference occurs, this function provides support for correction action among the designers.

(2) Standard product library function
Standard product data will not be created at the time of design, but will be managed in a library, so that they can be retrieved as needed.

(3) Engine and equipment model simplification function
Solid data produced by the engine and equipment companies for engine and equipment design will be simplified, which will reduce the load on computers, and enable the data to be used in simulations.

(4) Cross system design data exchange function
With the exception of CATIA, solid data produced on different types of CAD systems can be exchanged via STEP (AP203).

(5) Dispersed data integrated management function
Indexes of design data managed by each company, using PDM data bases on work stations, can be managed in the PDM data base of a central work station. This will allow any company to quickly access required design data via the network.

(6) Digitization of technical documentation
Electronic technical documentation have certain demerits in terms of format management when compared with paper, in that the identification of the location of changes and verifying updates by comparing old and new versions is difficult. To overcome these problems, this function uses SGML to manage

composite documents in component units of text, illustrations and images.

(7) Network function

An inter-server communication function for the implementation of verification experiments on the data exchanges in the above mentioned functions.

The verification experiments will involve the implementation of the production and management of design drawings, manufacturing drawings and technical documentation (instruction manuals, etc.) at the basic planning, basic design and detailed design stages of the aircraft development processes shown in Figure 1, and the functions developed by this system development will be employed by designers and draughtsmen in their work processes, and the working time compared with that of conventional work time, in order to verify improvements to work efficiency.

25. Software CALS Project

(1) Background and Aims

In the software industry, while the internal environments of mainly major software developers are undergoing individual development, including the use of networks, the development procedures and development tools environments are still peculiar to individual companies and inter-company connection is still at the level of e-mail. Meanwhile, software development is still done on the basis of single product order production, with no reclamation, and large and small to medium enterprises alike are caught up in lots of collective work, and are bound by inefficient development systems. The fact is that Japanese companies trail quite significantly behind the American and European software industries in this respect.

In order to correct this situation, to revitalise the industry and improve competitive strength, it is necessary to overcome the barriers of different environments, while maintaining inter-company network security, and to share software development information, software products and environment, based on standardisation, and to create a base where software development projects can proceed efficiently. The recent developments of networks, typically using the Internet and PCs or work stations, downsizing, multi media, open technology, etc., have made the construction of such a base all the more feasible, and the base needs to be constructed and experiments carried out into its validity.

Through the construction of a base that will enable the sharing of software development information, software products and environments, through a network with guaranteed security, based on standards, software companies with different cultures, environments and protocols will be able develop software more efficiently, and this verification experiment will examine and verify the process.

The target will be the establishment of a base, in order to share software information via a network, and to realize open and global software supply, and to improve software production agility and to strengthen and improve software technology.

(2) Project outline

Along with the following three experiments, the necessary tools will be developed, and environment created.

(A) Experiment for cooperative problem solving in a wide area dispersed environment

The experiment will examine the feasibility of, and draw out sample issues relating to the question of whether companies with different cultures, and from different geographical locations, can use networks to conduct software development related bidding, credit forming, contracts and specification adjustments, etc., without the problems of coordinating development terms. To this end, with regard to supply using Internet, and the appointment of contract terms based on standard discussion

structure, protocol and language, work assessment and discussion of problems arising during development, etc., protocols will be laid down, based on the gIBIS* method and Modus Operandi method, and a trial experiment conducted.

(B) Experiment for dispersed software development by virtual companies

The experiment will examine the feasibility of, and draw out sample issues relating to the question of whether companies with different environments and development protocols, without changing these environments and development protocols, can allocate software development work over the network, and carry out development work without any problems. Taking the waterfall type development that is currently the most common as a model, a working style where work relationships are as independent of each other as possible will be assumed, and trial runs of dispersed software development and maintenance by product and management data exchange and sharing methods based on standard specifications such as SGML, CDIF, etc., will be carried out. The experiment will set forth exchange standards and working procedures for design data and documentation related to software development, and will test and verify their appropriateness, using the tools developed in (D).

(C) Experiment for the development of an assembly type system in an object parts environment

Ready made parts will be mutually supplied, based on object oriented technology, and in each of the various environments, specialised participants will proceed with cooperative work

over the network, and will conduct verification of the feasibility of the assembly type system development used to develop the target systems. The experiment will take product typing development, based on component ware, as its model, and assume a working setup where working relationships are as close as possible (large room style),and conduct trial cooperative development of software by the system of exchanging messages in response to objects.

(D) Development of tools for Software CALS, and construction of environment

Based on the SGML, CDIF, DXL and SLCP** standards, etc., tools such as a project management data, etc., standard conversion function for software products such as required specifications and designs, etc., a data sharing (CITIS) function via WWW, Internet based member authentication and information security function, inter-company decision making function , etc., will be developed on a common base, and verification experiments applied in order to test and verify their effectiveness. Also, object parts based on CORBA and OLE will be integrated for use in the assembly type system development experiment, and an experiment environment constructed in order to support cooperative work. Development will proceed incrementally, and (A) to (C), above, will be applied sequentially.

(NB)

gIBIS ...... a method of structuring discussion and arranging graphically. : Graphic Issue Based Information System

SGML .... ISO documentation standard: Standard Generalized Markup Language

CDIF ...... CASE data exchange format now under discussion by ISO: CASE Data Interchange Format

DXL .... Tree structured chart notation language now under discussion by ISO: Diagram eXchange Language for tree structured charts

SCLP ... ISO software process model: Software Life Cycle Process

26. Development of STEP

1. System Outline

(1) Purpose and Objective

Although the STEP (Standard for the Exchange of Product model data) initial version was released in December, 1994, there has not been sufficient effort made toward practical application. No one opposes STEP*s objectives; the importance of representation and exchange of information. However, the industrial world has not found an effective method for taking full advantage of the available techniques.

STEP has achieved theoretical perfection as an information model. On the other hand, it does not provide for sufficient functions for ease-of-use, specifically, from the point of view of a mounting system.

This development project aims to provide these functions, and has the purpose of mounting the STEP Exchange System to make possible the practical use of STEP.

(2) Outline

There is no doubt that improving the efficiency of the development of mounted system will accelerate the practical use of STEP. Although it is clear that easy mounting is important, Step's functionality in this area is weak. In a word, to accelerate the ability to use STEP, offering an Application Program Interface (hereafter referred to as API) is essential.

System development of STEP's common software which is independent from STEP Application Protocol (hereafter refers to AP) for different industries and businesses should be pursued from the point of view of accelerating the practical application of STEP.

(3) Overall Structure

The overall system consists of the following functions in order to organize an environment for effectively constructing the STEP Exchange System, and to establish practicality and efficiency in the construction of a detailed system, such as a CAD data exchange and the use of STEP data for PDM:
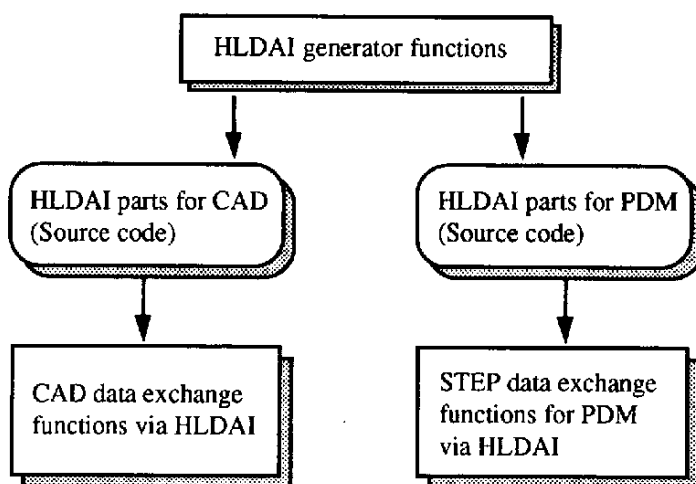
- HLDAI generator functions
- CAD data exchange functions via HLDAI
- STEP data application functions for PDM via HLDAI

Figure 1.1 Overall Structure illustrates the structure and the relationship of functions.

2 Program Outline

(1) Purpose and Objective

Focusing on the imperfections of the current STEP API which have caused difficulty in mounting the STEP Exchange System, the aim is to develop and offer a High Level Data Access Interface (hereafter refers to HLDAI) and to organize an environment for constructing the STEP Exchange System more effectively, and has as its purpose establishing the

Figure 1 Overall Structure

(A) HLDAI Generator Functions

This function automatically generates an API capable of operating STEP data (hereafter referred to as HLDAI parts) for each ENTITY of APM. By developing the HLDAI parts automatic generator, which is independent from STEP AP and Application Program, this aims for ease in mounting STEP.

(B) CAD Data Exchange Functions via HLDAI

This function exchanges data between CAD and AP 202. This function aims to establish a function that exchanges data between CAD and AP202 using HLDAI parts for CAD, which have been generated using the HLDAI generator.

(C) STEP Data Application Functions for PDM via HLDAI

This function manages and utilizes product structure information by using the STEP database (AP203 AIM data). This function aims to establish a function that manages and utilizes product structure information using HLDAI parts for PDM, which has been generated using the HLDAI generator.

(2) Outline Explanation

(A) HLDAI Generator Functions

This function analyzes input, HLDAI definition source (APM schema definition source, AIM schema definition source, APM -> AIM mapping definition source, and AIM -> APM mapping definition source) which is coded in EXPRESS language and Mapping language, and generates a source code, HLDAI parts

(HLDAI main parts, HLDAI schema parts, HLDAI mapping parts) which performs the conversion between the APM instance and the AIM instance, and which performs the AIM instance operation process in the STEP database.

(B) CAD Data Exchange Functions via HLDAI

This function stores CAD data into the STEP database after loading the CAD data from a file and converting the data in AP202 AIM data, and outputs AP202 AIM data after loading the AIM data from the STEP database and converting the data into CAD data.

(C) STEP Data Application Functions for PDM via HLDAI

This function is called by a user, receives the product structure management information including the part name, attribute, and structure as entered by a user at the operation screen, generates AP203 data according to the information, creates, searches and updates the STEP database, and displays the results on the user's operation screen.

Additionally, this function receives file input-output instructions including data name and file name entered by a user at the operation screen, loads AP208 data from the STEP database according to the instructions, and outputs the data in the file with Part21 format. Or, according to the instructions, inputs a Part21 format file, and stores it in the STEP database.

Also, this function receives the product structure management information entered by a user, passes the information to existing functions of PDM system, creates, searches, and updates the existing database, and displays the results on the user's operation screen.

To determine where the data for each part exists, including the part name and / or attribute, either in the STEP database or the existing database, there are two ways; one is through user input at search, and the other is by automatic evaluation via this function. To manage AP203 data in the PDM system, the function consists of the AP203 management functions of the existing PDM.

(3) Applied Development Objects

The following are the applied development objects:

(A) HLDAI generator functions

   (a) EXPRESS language analysis
   (b) Mapping language analysis
   (c) Compiler
   (d) HLDAI main parts generator
   (e) HLDAI schema parts generator
   (f) HLDAI mapping parts generator

(B) CAD data exchange functions via HLDAI

   (a) CAD data GET functions
   (b) CAD -> APM converter
   (c) APM data PUT
   (d) APM data GET
   (e) APM -> CAD converter
   (f) CAD data PUT
   (g) HLDAI functions for AP202 CAD

(C) STEP Data Application Functions for
    PDM via HLDAI

   (a)   Structure management user interface
   (b)   Total data management
   (c)   STEP data control
   (d)   STEP server system control
   (e)   Data operation service
   (f)   HLDAI functions for AP203 PDM
   (g)   Utilities

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