# Implementation as a Trickle-down Process of Knowledge and Technology to a Local Community

Norio OKADA, Michinori HATAYAMA

## Synopsis

Our intent to write this paper is to highlight the potential of information technology (IT) as a powerful tool for assisting with rural decline communities which are featured by the above five items. We make a claim that this requires people to foster the process technology ("implementation technology") of matching the process of rural vitalization with the internalizing process of "implanting IT technology" into their community.  In other words to make IT technology available to the community as a manufactured product is simply not enough and it needs to be accompanied and synchronized by the concurrently developed implementation technology

**Keywords** : Implementation ,Community, Kasology, Cizu City, Information Technology

## 1. Introduction:  New Promising Symptoms of Kaso (Rural Decline) Areas in Japan

Though there are rather downward developments still going on in "kaso" (or "super-sparse" population resulting in rural decline) municipalities in Japan, there are some encouraging symptoms emerging in some kaso municipalities which may likely to become frontier areas taking continued challenges in critical regional issues Japan and other developed countries are currently facing. Let us call such areas "Kaso-Frontier areas". Quite interestingly, there seems to be much of common features among Kaso-Frontier areas. The primary features are itemized as follows:

a. strong leadership by local citizens and/or mayors,
b. self-motivated effort to establish local identity and to recover autonomous decision-making system,
c. high awareness of critical conditions of their areas,
d. community's  capacity to attract and accommodate outsiders' involvement, and
e. community's intellectual facility to accumulate and make full use of "knowledge and technology for community vitalization".

It is also the objective of this paper to make the following claim: the best strategy to turn the situation from unfavorable to favorable is to face the critical conditions of their own and to identify a symptom of undercurrent socio-economic changes of the globe, whatever feeble it may be. If you are the first to spot it, you are quite like to be the first to build up a prototype model of "KASO CHALLENGES". Then if there is an actual need behind, this prototype model will grow naturally and prevail over to other areas including cities and possibly around the world; if not, it will eventually disappear. This is entirely a natural evolutionary selection process which is per se an implementation technology for rural vitalization.

Our intent to write this paper is to highlight the potential of information technology (IT) as a powerful tool for assisting with rural decline communities which are featured by the above five items. We make a claim that this requires people to foster the process technology ("implementation technology") of matching the process of rural vitalization with the internalizing process of "implanting IT technology" into their community.  In other words to make IT technology available to the community as a manufactured product is simply not enough and it needs to be accompanied and synchronized by the concurrently developed implementation technology.

## 2. Chizu and its HIMAWARI SERVICE SYSTEM (HSS)

The town of Chizu (population ca. 10.0000) in Tottori Prefecture, Japan has been a typical "kaso" municipality. This town is also now known to the rest of Japan as a promising "Kaso-Frontier area" (Sugiman, 2002). This Kaso –Challenge is characterized by

(i) Lifestyle changes

(ii) Aging population as new community customers

(iii) Information technology innovation

The Himawari (Sunflower) Service System is a newly evolving social system first developed in Chizu. The system is designed to fill up a niche in social care service for a growing mass of elderly single households particularly common in kaso communities. This innovative social system has turned out to be a success and is now being disseminated to many other kaso municipalities in Japan (Okada, 2000).

This social experiment was started in 1995 in the town of Chizu, Tottori Prefecture, Japan, with an initiative of the local post offices, collaborated by the town office, the central hospital of the town, the agricultural cooperative and the local police. The basic idea was to mobilize the most "available " human resources and to meet the growing social need for a higher level of life/health care welfare services for aged single households and aged handicapped citizens, especially in the mountainous communities of Japan.
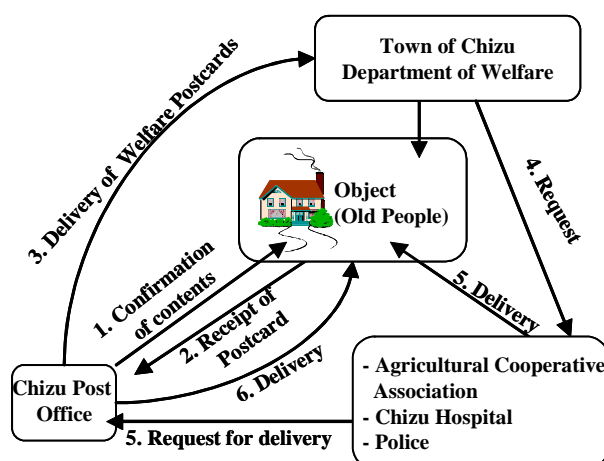


Fig.1 Illustration of Sunflower System

The outline of this system is illustrated by Fig. 1. Since mail persons (letter carriers) are making regular daily rounds to deliver letters or parcels to the local community, it was very natural but in a sense a real challenge for well-motivated postal office leaders to come up with an idea of combining with their regular service a new service to pay a short visit to those elderly single-family households who indicate their

requests by putting up a yellow flag attached to their mailboxes. The color of yellow symbolizes a sunflower. The customers are those elderly single-family households who volunteer to participate in this experiment. Those who provide "welfare–categorized" public services to the customers are the local post offices, the town office, the central hospital, the local agricultural cooperative and the local police. The menu of the visit services includes first of all a casual inspection of the safety of the customers, face-to-face communications by exchanging conversation, and "delivery requests" such as the delivery of medicines from the central hospital, delivery of everyday shopping goods such as foods, stationery, and other miscellaneous goods. In addition to these, the local post offices may act as an agent to meet the needed official procedure to claim the welfare pension. Otherwise they will be asked to appear in the town office to comply with the procedure after they receive a letter of claim issued by the government.

The local police collaborate invisibly in the way that they secure the customers against theft and burglary on patrol, since the yellow flags may indicate even to the strangers that they are elderly/handicapped citizens. Thus all of these services are provided through the teamwork of the collaborating agents.

## 3. From Himawari Service System to Himawari Multi-Intelligence Chizu Service System

In the town of Chizu, continued attempts to extend the Himawari Service System are under way. A promising extension to the Himawari Service System has been proposed by an expert group financially supported by the Ministry of Industry and Trade (MITI). The Himawari Multi-Intelligence Chizu Service System is designed to make town service/life-support information accessible to community people, just by use of ordinary personal computers set up at home or at key service stations. The uniqueness of this system is that (1) user-friendly computer software program packages will be developed, (2) audio-visual information services will be made available to help customers talk to computers without difficulty, and (3) a specially developed GIS (geographical information system) will also be incorporated in this system. The need for introducing this type of GIS system derives from the fact that customers (community people) are sparsely distributed geographically and both the level and quality of community service depends largely on the manner services are provided and consumed at the RIGHT TIME and at the RIGHT PLACE. Kakumoto et al (1999) have proposed a completely unique logic to design and architect GIS so that it

can easily deal with information on both time and geographical space. It is designed to be a highly-distributed, flexibly-integratable system. This new type of GIS is called "RARMIS" and its design concept is well reflected in the above Himawari Multi-Intelligence Chizu Service System.

The Himawari Multi-Intelligence System was experimentally introduced in Chizu as early as March, 2000. It was hoped that eventually this system would be refined to become an essential component of the community communication infrastructure. In reality it reached the stage of "physical implementation" in the town of Chizu. However the success was limited to this extent. As of October, 2002, the system has not been well utilized and adopted by assumed community customers. In this sense the system is currently on the brink of failure in "social implementation."

## 4. Analysis of Bottlenecks in Implementation of Information Technology - Case Study of Chizu -

The Himawari Multi-Intelligence System is designed to make town service/life-support information accessible to community people, who use ordinary personal computers set up at home or at key service stations.

### 4.1 Why and How Himawari Multi-Intelligence System Was Introduced

The development and introduction of Himawari Multi-Intelligence System is chronologically shown in Fig.2:
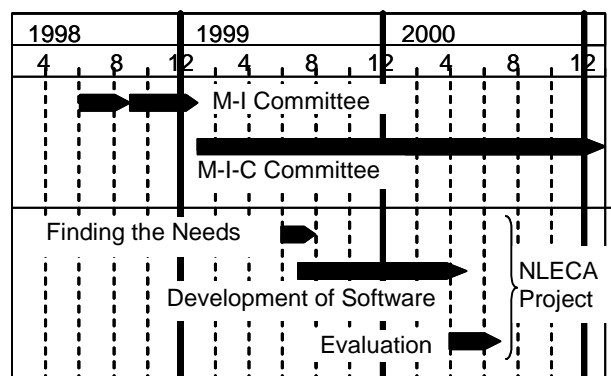


Fig.2 Time Schedule

July, 1998 –

The committee for the electronic local government and community was kicked off by the Chizu municipality. This committee included municipality officials and intellectual advisers (M-I Committee) and met once a month.
September, 1998 –

The committee for the development of the town information system in Chizu was kicked off as an extension of the M-I Committee.
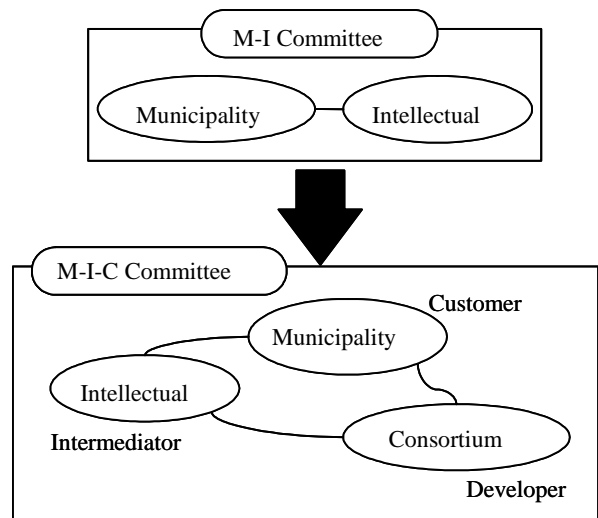


Fig.3 Change from M-I Committee to M-I-C Committee

February, 1999 –

The committee was extended to include a consortium of system makers and developers (M-I-C Committee: see Fig.3) proposed the Himawari Multi-Intelligence System under the grant of Information System Development Project for New Living Environment Creation in Areas (NLECA Project). This is a financial supported provided by the Ministry of Industry and Trade (MITI)
July, 1999 –

Eleven months later, this Himawari Multi-Intelligence System was nominally developed.
August, 2000 –

The NLECA Project ended.

### 4.2 Basic System Specification

The Himawari Multi-Intelligence System is intended to support "village community" activities that are a minimum size of administrative unit in Chizu, as well as administrative service of the municipal government and other service of local shops, welfare organizations, schools, hospitals, etc. The system is physically networked by connecting public telephone communication lines. This system makes use of the spatial temporal GIS called DiMSIS (based on the RARMIS concept) developed by DPRI, Kyoto University and several software developers. This system is designed to meet five services and two core functions as follows:
1) "Village Community" Support Service

This service includes the following three sub-services for "village communities".

- Releasing the information on the "village community'" activities.
- Searching the information on residence living in the "village community"
- Making a request of the town administration services and making reservations for purchasing goods from the local shops

Main users of this service are community residents living in "village communities", and they are supposed to access these services at a community hall within or close to their "village community".

2) Municipality Support Service

This service includes the following three sub-services for municipality.

- Releasing the information on municipal governmental administrative services.
- Searching the information from residents
- Checking the reservation of the administration services by residents

Main users of this service are the town officials and residents living in Chizu, who are supposed to use it at a community hall near their houses.

3) Himawari System Support Service

This service includes the following sub-service for supporting the Himawari System.

- Management of the visiting plans by life/health care helpers, post office workers etc. for elderly person living alone

Main users are post office workers, life/health care center workers and others.

4) Local Shop Support Service

This service includes the following three sub-services for local shops in Chizu.

- Releasing advertising information
- Searching commercial goods
- Accepting purchasing orders of goods at local shops

The residents in Chizu use this service at the community hall near their houses.

5) Data Collection Support Service for Disaster

This service is used in emergency time, to collect the disaster and rescue information by town officials at their workplace (anti-disaster headquarters, evacuation centers, disaster-stricken sites).

- Connecting digital photo data with the point on the map.
- Sending and receiving the digital photo data from a disaster-stricken place

6) Common Function for All Services

- Sending and receiving information
- Visualizing, searching, and printing map information
- Inputting and editing the fundamental geographic information

7) Core Function for Using Spatial Temporal GIS

This function is for management of spatial temporal geographic information.

## 4.3 How It Was Used / How It Was NOT Used

At the last phase of the NLECA Project the system application evaluation by the developer was carried out, with participation by the Chizu town officials, "village communities", social care service organization, and local shops as customers in August, 1999. The results are as follows:

1) "Village Community" Support Service

Users (monitors from "village community") pointed out that information exchange between "village communities" became easily done with image-to-image communication. They found that the frequency of information exchange increased more than before. (Before then, they used to exchange information with other "village community" about once a year.).

2) Local Government Support Service

Users (Chizu town officials) pointed out the following two advantages. Firstly it became possible to send promptly local text based information with maps from the town office to the resident who requests it. Secondly, residences requested several administration services from the community hall located near their house.

3) Himawari System Support Service

Users (social care service organization, post office, etc.) pointed out the following two advantages. Firstly, it became possible to spot easily the position of the house to visit. Secondly, it became possible to share the visiting schedule information between the several sections relative to the Himawari System.

4) Local Shop Support Service

Users (local shop owners) pointed out the following two advantages. Firstly, it became possible to make information on their goods any time. (Before then, information release was so costly that they afforded to publicity announce information on their goods accessible at every month only.) Secondly, since purchase order is made electronically, it became easy for users to make estimates of the totals their purchase in money terms.

5) Data Collection for Disaster Support Service

Users (Chizu town officials) pointed out easiness to acquire the digital photo image data from a disaster-stricken place.

A survey was conducted in August, 2001 as to the latest use of the five services in Himawari Multi-Intelligence System.

1) "Village community" Support Service was not commonly used by community residents. The reason was that the community hall where the computer was set up was not open every day. In addition, their demand was not so much about information exchange between communities, but releasing information about their activities. To meet media demand, some "village communities" made their web page on the internet now.

2) Local Government Support Service was not so much used in the town office. After the NLECA Project, instead of this system, they proposed their service by using the local area network that was installed after the Project.

3) Himawari System Support Service was not used when we checked, and they didn't have another way to achieve this service.

4) Local Shop Support Service was not practically used because resident who wanted to order goods ware allowed using this service at their nearby community hall only, but the community hall was not open every day. Alternatively some local shops opened their original web page on the internet now.

5) Data Collection for Disaster Support Service provided not usable in the town office in the time of the mud slide disaster in Jan, 2002, primarily because this service failed to have the continuity with the normal period services. (Hatayama et al, (1999) has claimed the strength of the RARMIS concept such that any usable information system requires continuity between the normal and emergency time.)

**4.4 Why It Was NOT Used**

We pointed out the following three problems that may explain why the Himawari Multi-Intelligence System was not used in Chizu.

(1) Perception Gaps between Developer and Customer

This problem arises from the development process. The first step to develop a system is making a prototype system. In the process of making such a prototype, some core components are defined and then the other components are assembled by developers. The second step is to determine what may be called the "demand-essential zone" for the final system. This task needs to be achieved by both developers and essential customers mutually communicating their intents and perceptions. The third step is to reassemble the components and make a renewed prototype system. After that the next step

returns back to the second step. In the second step, there may occur quite commonly what may be called perception gaps between the demand-essential and core zone (Fig.4). If the gaps are bridged, this prototype system becomes the final system. But it is difficult for developer and customer to bridge the gaps in a short limited time, so intermediators' advice is effective to shorten to its development time. In the NLECA Project, the committee included an intermediator but was not able to make use of its role.
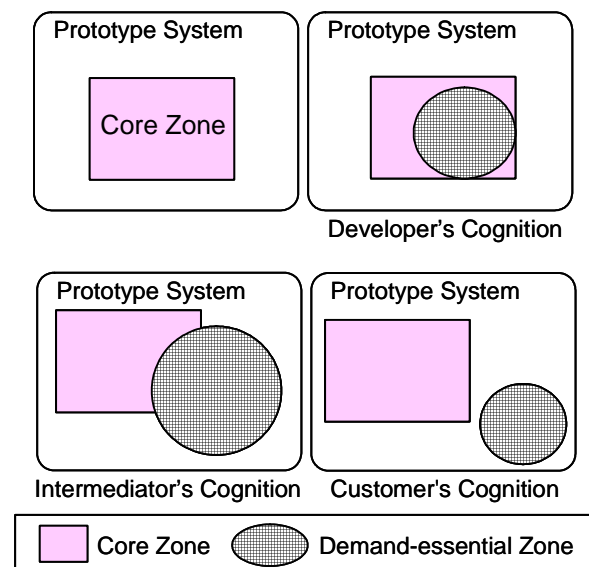


Fig.4 Cognition Gaps of Developer,
and Customer

(2) Bilateral Illiteracy

This problem consists of both "customer illiteracy" and "developer illiteracy". "Customer illiteracy" means the lack of understanding and usability of information technology on the part of customers. "Developer illiteracy" means the lack of understanding and handling of "customer illiteracy", on the part of developers. Importantly, "developer illiteracy" is more crucial than "customer illiteracy", since the former seems lack of attention by IT experts. So for them this kind of problem does not exist.

(3) Lack of Implementation Process Technology

This problem arises from confusions between "engineering implementation" and "social implementation". In other words, it arises from the difference entailed in the interpretation of "implementation". For computer system engineers, "implementation" commonly means making the software, installed and the entire system physically set up. But for potential customers, "implementation" means that the system is properly in place and made usable for them. This is rather a social matter rather than a physical one. In fact it is a time-

consuming process technology - a sort of implanting "technological genes" into society. Unfortunately developers tend to assign a minimum amount of time to this process which requires educational and learning activities on both customers and developers. Characteristically developers are inclined to take command of customers. By analogy they tend to drop down from the heaven by a "parachute". In contrast, the "social implementation" process demands more of "gene implanting technology". By analogy we may refer to this as implanting the society with a "parasite."

## 5. Two-way parallel processes

Another manner to explain the need for resorting to more of "parasite approach (parasiting)" rather than "parachute approach (parachuting)" is to bring in the concept of two-way parallel innovation processes. As depicted in Fig.5, the conventional way of interpreting the innovation process is the upstream-downstream innovation process. In contrast, social implementation technology requires a two-way cycle process to operate so that innovation stream may run and meet from both the developer and society.

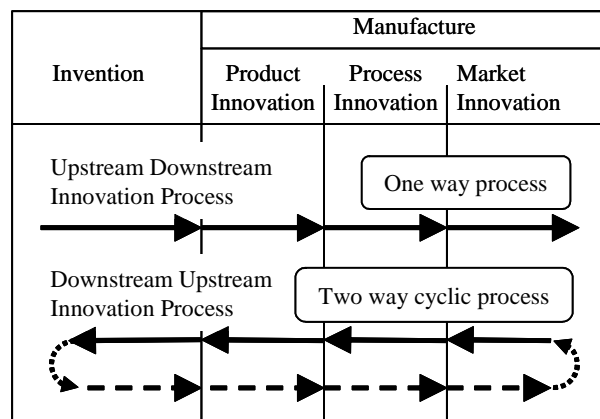| Invention | Manufacture | | |
|---|---|---|---|
| | Product Innovation | Process Innovation | Market Innovation |
| Upstream Downstream Innovation Process | One way process | | |
| Downstream Upstream Innovation Process | Two way cyclic process | | |

Fig.5 Two-Way Parallel Processes

## 6. Student's Challenge - Kawano's Experiment -

In 2001, Kawano, a graduate school student working with the authors took a challenge to revise the already installed (Kawano, 2002) Himawari Multi-Intelligence System. He patiently listened to the mailmen engaged in the Himawari Service and attempted to make original software without map system. The images from both Himawari System Support Services of Himawari Multi-Intelligence System and Kawano's system are shown in Fig.6. Up to date the town officials, post office clerks, and life/health care center workers

are practically using Kawano's system, so as to share the visiting schedule information together.



Image of Himawari System Support Service in Himawari Multi-Intelligence System
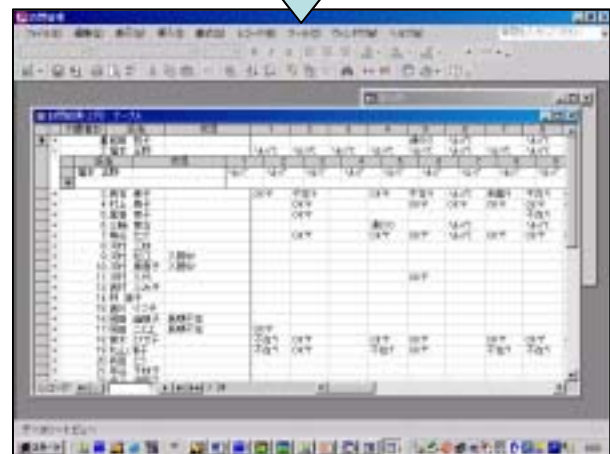


Image of Visit Schedule Management System made by Kawano

Fig.6 Himawari Multi-Intelligence System vs. Kawano's Simple System

Why was Kawano's simple system accepted? Answering the question requires us to address the points made in 4.4. Kawano received the help of Mr. Teratani who is a local postmaster and the promoter of the Himawari System. He surveyed problems related to IT literacy of town officials, post office clerks and life/health care center workers as customers, and then he developed a simple demand-essential service. It is based on Microsoft Access. He had never developed software before then, so he was able to use Microsoft Access only. But all customers had been accustomed to Microsoft Access, so

they successfully managed to use Kawano's system. Accordingly that is the development considering bilateral illiteracy. After the development, he stayed in Chizu for about a month, improved his system and kindly replied all the real uses' questions rose about his system. This activity is considered to be the beginning part of social implementation.

## 7. Himawari Project Meeting --the Next Stage

After Kawano's Experiment, Chizu town office is trying to expand the information sharing system to almost all organizations for welfare in the Chizu area including the post office and life/health care centers as the next step. Once a month a project meeting called Himarari project is held. In this meeting, they are addressing the following three challenges;

(1) To have no senior people that can't receive welfare service because of a difficulty in receiving welfare service information. They must supply the information to service targets.

(2) To enhance their services with input from seniors. They must collect the information from service targets.

(3) To integrate and manage efficiently their services while maintaining high quality service. They must share the information with each other.

## 8. Conclusion

The lessons learned from the above challenge to introduce an IT as a community-support communication system may be summarized as follows:

(1) Physical implementation is just a start of social implementation. To simply set up and install an already manufactured IT system tends to force intentionally or unintentionally potential customers to accept and use it as it is. In fact this enforcement will just threaten them away and resist to use it.

(2) This enforcement approach may be called "parachuting approach" which comes down to the community, is automatically set up there and that is all. This seems to be quite common when IT is now being introduced in kaso communities across Japan. This approach does not work socially and thus not socially implementable.

(3) An alternative approach which is being re-challenged in the town of Chizu based on the failure of the Himawari Multi-Intelligence System in the sense of social implementation is what we may call "parasiting approach." This intends to naturally slip into the community at potential customer levels as if it became a parasite in the community. It makes an entry as a minimum essence and will grow and become refined in situ.

(4) Social implementation as an integrated technology still remains in an underdeveloped stage despite of ever-increasing importance in the real world.

If we intend to develop an integrated technology for "social system innovation," such an attempt being made in Chizu as explained above in this paper offers an excellent platform for testing and refining social implementation technology. For this reason we are determined to follow up on the experiments under way by carrying out comprehensive and interdisciplinary research.

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# 知識技術の地域受容・浸透過程としてみた Implementation Technology

岡田憲夫・畑山満則

## 要　旨

近年，情報技術の発展は目覚しいものがあるが，先端的な技術を用いた大規模な情報システムの公共機関での利用は実現（インプリメンテーション）が難しい．本研究では，鳥取県智頭町におけるひまわり（智）システムの導入過程を具体例として，情報システムのインプリメンテーションを，知識技術の地域への浸透過程として捕らえ，考察を行う．

**キーワード**：　インプリメンテーション，コミュニティ，情報システム，過疎地域