SOCIAL IMPLEMENTATION PROCESS ANALYSIS OF INTEGRATED GIS WITH RARMIS CONCEPT TO LOCAL GOVERNMENTS AND REGIONAL COMMUNITY*

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1. Introduction

Through the experience with disaster and recovery support activities obtained as a result of Great Hanshin Earthquake, we have been developing an information system that can use after immediately the disaster in local governments and their surrounding, such as regional communities or NPOs, and studying implementation processes to them. RARMIS (Risk-Adaptive Regional Management Information System) concept is an output of these activities. In the concept for disaster risk management we proposed an information system which has these three features; (1) continuity between emergency and routine use, (2) independence and decentralization, and (3) integrated space and time information. In order to realize technical features, i.e. (2) and (3), of RARMIS concept, a spatial temporal geographical database schema, KIWI+, and a spatial temporal GIS, DiMSIS, have been developed (Kakumoto, S, et al., 1999). On the other hand, we have been trying feasibility study on introduction of information system which meets RARMIS concept to several local governments (Hatayama, M, et al., 1999, Hatayama, M, et al., 2003). In this paper we show some cases and discuss a methodology on implementation process of advanced information system.

2. Check points on social implementation process of advanced IT system

I pointed out an existence of following three problems during social implementation stage of advanced IT system (in this article we assume GIS)(Okada, N and Hatayama, M, 2002, 2003).

(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.1). 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.

(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

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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."

3. Two way processes - Parasiting and Parachuting

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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. 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.

4. Implementation process analysis from case studies

We try to evaluate 6 implementation cases of DiMSIS from our proposal model.

(1) Characteristics of 6 implementation cases

[Case 1] Kobe city case in Hyogo, Japan

Trigger events: disaster response work after Great Hanshin Earthquake in 1995, annual disaster drills, external finacial support, making update city guide map and welfare guide map, usage of disaster prevention and welfare communities

Initial Target section: Machidukuri Suishin section, Nagata ward, Kobe city

Current customers: officials of Machidukuri Suishin section in Nagata ward, regional communities in Nagata ward and Higashinada ward.

Assumed customers: officials of Nagata Ward Office, officials of Kobe City Office, regional community in Kobecity

(Parasiting) Booster staffs: officials who have used GIS in Machidukuri Suishin section

Technical Intermediator staffs: Kakumoto, Hatayama

Software developer: Hatayama

Estimation of headquarters: none

External financial support: one from Department of Trade and Industry

Current status: Parasaiting is in progress. Motivation of officials in Machidukuri suishin section is on the downside. But usages of community for disaster prevention are increasing.

[Case 2] Fuchu-machi case in Toyama, Japan

Trigger events: study session on integrated GIS, disaster drill, consolidation of municipalities

Initial Target section: Revenue Department

Current customers: officials of Fuchu-machi Office

Assumed customers: officials of Toyama City Office

(Parasiting) Booster staffs: Local Finance and Planing Division

Technical Intermediator staff: s Kakumoto, head of one of developer companies

Software developer: some software vendor companies

Estimation of headquarters: good

External financial support: none

Current status: Initial objects have achieved. But after then by consolidation of municipalities Fuchu-machi was a part of Toyama City. The system is working in Fuchu brunch office but don't expand to Toyama City.

[Case 3] Duzce city case in Turkey

Trigger events: disaster reconstruction work after Turkey Duzce Earthquake in 1999 and 2000

Initial Target section: Water Supply Department

Current customers: officials of some divisions

Assumed customers: officials of Duzce City Office

(Parasiting) Booster staffs: Information Division

Technical Intermediator staffs: Kakumoto, Hatayama, head of Information Division

Software developer: Information Division

Estimation of headquarters: good

External financial support: none

Current status: Latest mayor value this system and encollege to use all divisions. But they are stopping their development according to the request of Turkey government.

[Case 4] Chizu-cho case in Tottori, Japan

Trigger events: study session on an electrical

government system, external financial support, consolidation of municipalities
Initial Target section: civic counter, regional communities
Current customers: none
Assumed customers: none
(Parasiting) Booster staffs: Planning and Strategy Division
Technical Intermediator staffs: Kakumoto, head of one of developer companies
Software developer: some software vendor companies
Estimation of headquarters: none
External financial support: one from Department of Trade and Industry
Current status: Sustanable usage was not able to achieve. One of function of this system was reconstruct without GIS.

[Case 5] Kiyotake-cho case in Miyazaki, Japan

Trigger events: study session on an integrated GIS, response activity of avian influenza,
Initial Target section: Water Supply Division, Disaster Prevention Section
Current customers: Water Supply Division, Disaster Prevention Section
Assumed customers: Kiyotake-cho Office
(Parasiting) Booster staffs: Policy Planning Division
Technical Intermediator staffs: Kakumoto
Software developer: EDM(Kakumoto)
Estimation of headquarters: good
External financial support: none
Current status: In the introduction stage, they had a opportunity of responce of pandemic disease, avian influenza. Booster staff carried out some meeting to explain their current status and correspondence activity to local residents using GIS. This activity achieved a successful outcome, so the system upgraded more than before from the view point of disaster reactance.

[Case 6] Engaru-cho case in Hokkaido, Japan

Trigger events: e-study session on GIS with both officials and local vendor, employment of full-time expart, consolidation of municipalities
Initial Target section: Revenue Division, Disaster Prevention Section
Current customers: Revenue Division, Health and Welfare Section
Assumed customers: Engaru-cho Office (main and bruches)
(Parasiting) Booster staffs: Information Management and Local Administration Division
Technical Intermediator staffs: Kakumoto, Asano, Yoshikawa, expart official
Software developer: EDM(Kakumoto)
Estimation of headquarters: good
External financial support: none
Current status: For sustainable support, they employed an expert. He graduated Yoshikawa's laboratory and was a temporal researcher in Asano's laboratory. He took part in several introduction cases as a support member or data-entry operator.

(2) Discussion

Characteristics of 6 implementation cases are summarized in Fig. 2.

(a) Sustainable usage

It is important for sustainable usage to continue booster staffs' motivation. It is one of fundamental factors for parasaiting. For this point we need to consider these two issues, funding and success experiments. About the former issue I think maintenance cost is more important than initial one, because in case 1 and 4 in spite of getting big financial support for initial stages, most of the output have no longer used. In case 2, 3, 5, 6 target local governments have some maintenance cost and in case 1 nagata ward have a continuous maintenance support from technical Intermediator staff instead of cost. One of the latter instances assumes disaster or crisis response. In case 1, 3, they have earthquake disaster experience and in case 4 it have crisis reactance experience.

(b) Expansion of usage

It seems that the important points are existence of experts and/or headquarters' understanding.
In case 3 and 6 they have one or more experts themselves. In case 2, 3, 5, and 6 headquarter evaluate their activities highly.

5. Conclusion

In this paper we show 6 introduction cases of GIS to local government and its surrounds from the view point of social implementation process of advanced information system.

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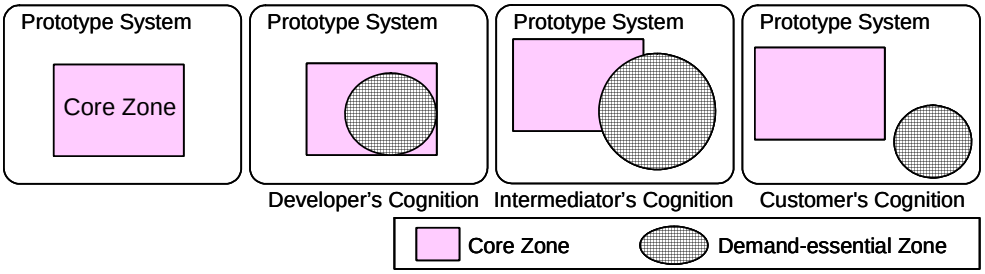

Fig.1 Cognition Gaps of Developer, Intermediater, and Customer

	case1	case2	case3	case4	case5	case6
Positive Trigger events:	◎	○	◎	○	◎	○
Negative Trigger events:	○	○	○	◎	○	×
Initial Target section:	Civic Counter	Revenue Department	Water Supply Department	Civic counter Communities	Water Supply Div., DP sec.	Revenue Dept. DP section
Current customers:	Ward officials, Communities	officials of Branch Office	officials of divisions	—	Water Supply Div., DP sec.	Revenue Div., Health and Welfare Sect.
Assumed customers:	City officials Community	officials of City Office	officials of City Office	—	Main Office	Main and Braches Offices
(Parasiting) Booster staffs:	Ward Officials	Local Finance and Planning Division	Information Division	Planning and Strategy Division	Policy Planning Division	Information Manag. and Admin. Div.
Technical Intermediator staffs:	R	R,V	R,O	R,V	R	R,O
Software developer: R:researchers O:officials V:vendors	R,V	V	R,O	V	R	R
Estimation of headquarters:	—	—	◎	—	—	◎
External financial support:	○	×	×	○	×	×
Current status:	↗	↗	↗	↘	↗	↗

Fig.2 Comparison of 6 Case Studies