"Gramin Swachalit Soochna Kendra": A User Centered Approach for the Design of Information Kiosk for Rural Population in Indian Milieu

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ABSTRACT
In this paper we discuss our efforts towards solving the issues related to human media interaction involved in the design of user interface for an information system that would benefit occupations and livelihoods of people living in rural areas. The system (prototype) was an outcome of the Graduate Year Project at HCI & Usability Lab, Dept. of Design Indian Institute of Technology Guwahati. The system uses tactile Touch-Screen kiosk as a medium to broadcast knowledge and facilitate information among the rural users, specifically, farmers, traders, academicians and government officials. In order to support illiterate and multilingual users, the content was developed using local metaphors (images/icons), multilingual text and audio-visual assistance. The system virtually implements and takes into account the study and analysis of the problems based on previous similar efforts. The paper addresses the usefulness of audiovisual assistance and the benefits of using a Touch Screen in lieu of conventional PC monitors (as in existing systems). It also addresses the issue of financial sustainability of the system.

Keywords
Touch-Screen, Information System Design, Navigation, Audio-Visual, Information Kiosk, GSSK (Gramin Swachalit Soochna Kendra).

ACM Classification Keywords
HCI (Human Computer Interaction), GUI (Graphical User Interface), UCD (User Centered Design).

INTRODUCTION
In India, villages are typically isolated from the rest of urban areas. It is quite difficult to bring about any significant change in the life style of rural people. Especially any technological advancement is hardly acceptable to the village people due to their traditional way of living. For example new-age facilities like public ATMs, Information Kiosks and Phone booths etc. are very popular among urban population but find limited usage in the villages. Certain demographic and geographical factors also make installation of such facilities quite difficult in rural areas. Day to day components of activity in a village include farming, craftwork, primary education, entertainment (plays, dramas etc.). For the successful functioning of these activities, villagers need information. Basic information needs of villagers include weather conditions, local transportation and timings, educational information, social awareness, medical facility, information about trade/local fares etc.

UNDERSTANDING A TYPICAL INDIAN VILLAGE

Information Exchange in Present Context
It is necessary to understand the present scenario of information exchange in rural settings to be able to complement it using the new technology. There are influential people in the villages like doctors, teachers, rich farmers and the elderly who are trusted sources of information for the village. These are the people accessible to almost all the villagers and can influence individual and group decisions. Presently, much of the communication in rural areas is restricted to geographically close locations, the nearby towns and villages. For this intra and inter village communication, 'word of mouth' information exchange is most widely used (1). People gather at public places like local market, bus stop etc. and discuss various issues concerning them. This is also the place where social consensus is made and decisions taken. However inaccuracy is a major problem with this communication system.

Apart from this, post-mail and telephone is other means of communication in villages:
Postal service provides a relatively inexpensive means of communication and is popular in Indian villages because of its outreach. Before the telephone became accessible in these areas post was the only mean of long distance communication. The service became successful because

anyone having a house has an address, making the communication system available to the masses. Most of the written communication done by the illiterate (2) population like filling up government forms, Insurance formalities, and even writing letters is through agents/middlemen. This can be attributed to low literacy levels, unfamiliarity with the "official" language used and lack of information resources.

The introduction of PCO changed the communication scenario in rural India. It brought about economic benefits. Families whose members moved away to school or new jobs could stay in contact with each other over the phone. Perhaps high cost is the only factor hampering its extensive use by the rural users.

Need of Information Kiosks in Villages

In rural India, more than half of India's villages lack telephone connectivity (3), let alone Internet access. The lack of information and communication infrastructure results in people having to waste time and money; chasing information and government officials. Lack of clarity in processes, and corruption and mismanagement in systems and operations, is rampant. The inaccessibility of information affects the rural poor more than other sectors of the community. Similarly, lack of market information (on commodity prices, various input suppliers, etc.) leads to loss of income and exploitation of rural entrepreneurs by middlemen. Such exploitation and losses further marginalize small and marginal farmers and village artisans. The implications of this scenario on the rural people are three-fold (3):

- Loss of Income
- Loss of Time
- Loss of Opportunity

In this context, Information and Communication Technologies (ICTs) can play a significant role in making information available at a reasonable cost. ICTs promise to provide innovative solutions to the problems of poverty and inequality by accelerating development and introducing transparency into systems and operations.

PREVIOUS EFFORTS & ONGOING WORK

It becomes necessary to mention the previous efforts and the live projects on this theme. Presently, more than a dozen such projects are going on in India. The major partners in these projects are NGOs, Profit/Non-Profit Institutions, Government agencies, Local/State Government and Some International Funding Agencies. A few successful projects are mentioned:

- In Maharashtra (4), in Warana village, such an Information Kiosk is being set up to suite the needs of sugarcane farmers. This system is supposed to cater the needs of 70 more villages around Warana (5).
- The Drishtee (erstwhile Gyandoot) (6) project of Dhar district in Madhya Pradesh (4): The project was launched on January 1, 2000 with the installation of a low cost rural Intranet covering 20 village information kiosks in five Blocks of the district.
- 'Vivekanand Gramin Gyan Kendra' (7) - opened at the Dhandhar village near Pilani on 25th September 2005. The Kendra was started by *My India*, which is a voluntary organization formed by students.
- I-shakti (8) – implemented by Hindustan Lever Limited in 13 states is one of the most successful ventures (see Fig. 1).

Figure 1. A classic Desktop based rural information system

OUR APPROACH

User Survey

An initial user survey was done with the nearby village people in the vicinity of Guwahati city. Persona (9) of each subject was developed. The survey was carried out with 10 subjects. An initial draft of questionnaire was prepared so as to gather the basic information. The questionnaire mainly consisted of the demographic and knowledge based questions like:

- Age, education, average income.
- Living alone/nuclear family.
- Main earner in the family, chief source of income.
- Amenities (drinking water, electricity etc.) available in their village.
- Prior experience with computers.
- How they perceive technical gadgets (Expensive, Unusable, Scared of using it etc.).
- Their preferred medium of interaction like video, audio, images text etc.
- Information they require most frequently.
- Their choice of color for visual elements etc.
- Language they prefer as a medium of communication.

Findings

The questionnaire results accounts for the following findings:

The nature of the information displayed over the kiosk should be:

1. Crude and easily understandable i.e. even for an absolutely uninformed person for e.g. village's elder people.
2. The amount of information displayed should be minimal so that the user is not scared or irritated.
3. The icons or symbols to be used for the graphics should be well communicable to the masses and should be crude in form so that they are easily perceivable.
4. Interactive media audio / video streaming should be done so as to accelerate the process of communication and to aid physically handicapped.
5. There should be a proper introduction/training program for each village in which such a system is to be installed.
6. Navigation should not be complex; it should be very easy and basic.
7. Modules should be language independent.

The system

An overview of Usage

The system was designed to allow a unidirectional information flow. The users are allowed to read and carry information supplied to them in the form of paper printouts. The basic characteristics of the system are no different from that of a present system. Briefly the system could be depicted as in the Fig. 3.

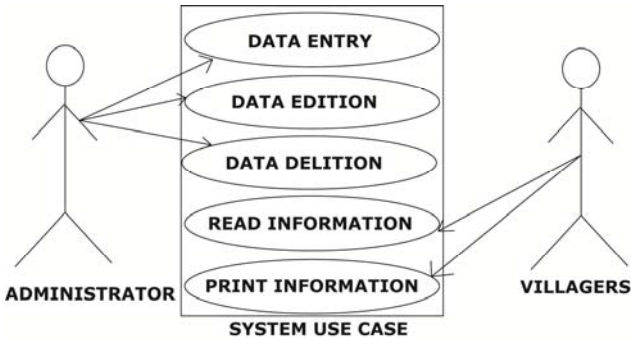

Figure 3. A top level system Use Case

Information Design

Based on Initial User Analysis, the following areas were classified as the most basic & necessary information needs of local village people:

1. Weather
2. Modes of Transportation
3. Market prices
4. Education (results, courses, opportunities etc.)
5. Recreational sources
6. Social gatherings and festivals
7. Primary Health Care
8. Literary and awareness programs

Figure 2. A Touch Screen Kiosk

Designing the Interaction

Interaction is more or less platform (hardware) dependent. Based on the inferences from the user questionnaire, it was concluded that a Touch Screen kiosk (Fig. 2) would be most well suited as it provides (10):

- High Speed
- Control of Speed
- Continuous Movement
- Directness: direction, distance, speed.
- Direct manipulation (11)
- Requires Low Training Effort (suited for novices)
- Easy to use (as compared to a mouse)
- Keyboard is not required.
- Best suited for pointing and clicking gestures
- Best suited where no or very less text input is required.

Visual Interface

The visual elements of the interface (Fig. 4) were reduced to 3 levels of hierarchy:

1. Background Image at the Primary Level.
2. Interaction Elements – Buttons, Sound, Volume etc. at the Secondary Level.

3. Text and Readable data at the Tertiary level.

Figure 4. A screen shot of GSSK depicting information.

Hindi (being the national language) was chosen for displaying the information so that the kiosk could be easily tested at several different places other than the local state.

Navigation

On each screen 11 basic buttons were provided for navigation. 8 buttons on the right hand side of screen for the basic information needs – weather, agriculture, travel, healthcare, market, education, entertainment/recreation (Fig. 5) and announcements. Other buttons were provided at the bottom for user's control actions namely- print, exit, back/front and sound volume.

Figure 5. Screenshot for information regarding entertainment & recreation

Media

Considering the diverse demographic record of users, it was decided that the content should be Audio Visual i.e. there should be a proper modality of text to speech conversion as the user navigates through the system. This modality was implemented in the prototype by pre-recording the voice since at the time of prototype development a text to speech converter for Hindi was not available. Also, the content should be language independent i.e. the kiosk should display information in the language of the locality in which it is to be installed. It was proposed that each state's predominant language should be used for this purpose i.e. for Gujarat – Gujarati, Maharashtra – Marathi and for Northern States like Madhya Pradesh, Delhi, etc. the language used should be Hindi as the local language in these states resembles different Hindi's accents.

Learnability

As the user starts to interact with the system, it tells the user through a series of animations regarding the physical location of the village. Splash screen appears educating the user regarding his country, state of residence, and village location on the map in about 8 seconds (see fig. 6). The text to speech engine running in the background further educates the user in his local language regarding the system's function and how to use it.

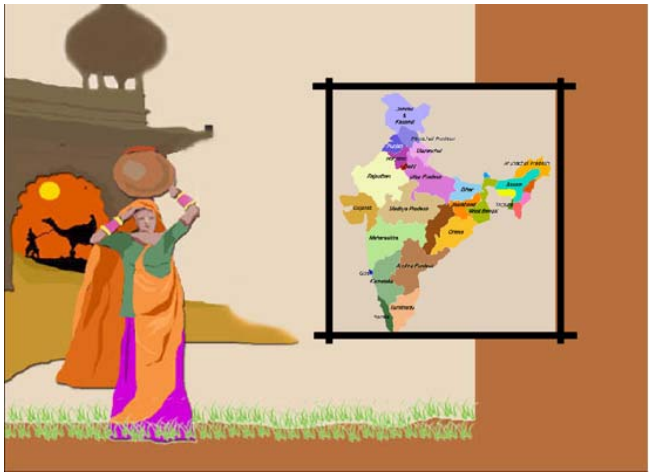

Figure 6. Splash Screen depicting map of India

Sustainability

The issue of financial sustainability is still a major area of concern for most of the present similar projects. We propose that the financial means should be collected through regular display of promotional material like advertisements, posters etc. on the screen. Various organizations having their target consumers as village people could be of immense help in this regard.

Proposed Installation Options

A) Panchayat (12) ownership: Kiosks will be established in the village Panchayat buildings. They will be maintained and controlled by Panchayats.

Advantages:

- Responsibility in the hands of credible organization.
- Well suited for people from outside the village for eg. in case of maintenance etc.
- Mobilize communication between common villager and Panchayats.
- Effective communication between Panchayats and Local Government

B) Individual Ownership: A local person becomes a kiosk owner and takes it up as a self employment opportunity, preferably financed by some of the government sponsored schemes. The kiosk owner is also trained to handle this service while catering to his or her customers. This is the case when the kiosk system will penetrate into the grassroots.

Advantages:

- A source of job production and income for a common villager.
- Confidence building among common village people.
- Kiosks may increase in number depending upon requirement of the local people.
- Relieves the Panchayat from taking whole and sole responsibility of the kiosk.

BENEFITS OF USING OUR SYSTEM

There are numerous benefits of such a system:

- Local rural youth act as entrepreneurs, running these information kiosks along commercial lines. They will come forward to start new centers as private enterprises.
- Updated information regarding beneficiaries of social security pension, beneficiaries of rural development schemes, information regarding government grants given to village committees, public distributions, data on families below the poverty line, etc. are all available on the Intranet, which makes the government functioning more transparent. The information could always be increased as per requirements in future.
- Self-service kiosks reduce costs by lowering employee headcount. Improves customer retention rate. Reduced costs for basic service levels. Reduces waiting in line by customer. The operators at the information kiosks will come from the grassroots, and will have a great faith in the potential of ICT to improve the standard of living of their community, especially of the rural youth. Most operators have the capability of teaching computer skills and software to children and youth, and would be willing to provide training, if given the necessary incentives.
- If successful as projected in future, it could also be used to make auction facilities available to farmers and villagers for land, agricultural machinery, equipment, and other durable commodities. Also, e-governance, voting, surveys etc. could be done.

TECHNICAL ISSUES INVOLVED

A) Electricity:

In a majority of villages in India, still no progress has been made to deliver the required electrical power. There is a regular problem of power cut offs. For this, it is suggested to use a generator on case of power cut offs.

B) Connectivity:

Permanent LAN (Local Area Network) or WLL (Wireless Local Loop) is necessary for facilitating any such kiosk. Presently the most suitable technology for this is corDECT (13) developed by TeNet (14) group at IIT Madras (15). This technology is Ideal in the present scenario since it is wireless, affordable and easy to install.

C) Maintenance:

Day to day maintenance and care of the kiosk is necessary to ensure its proper functioning and avoid any damage to tangible component.

CONCLUSION

A majority of the users were optimistic and enthusiastic regarding the installation of the information kiosk. Its usefulness without any doubt has been proved by the success of other ongoing projects. Although, there is a long way to go as there is still an uncertainty regarding the nature of information which has to be represented through this system. With the evident effect of globalization on Indian economy (16), it cannot be stated that people's information needs would not change with time. Efficient use of Touch Screen could improve the present way of interacting with such systems since villagers find traditional desktop computers as uneasy to use (1). Also a Touch Screen supports direct manipulation which is considered to be an effective metaphor for interface design as the system behavior is more predictable than with the interfaces based on autonomous agents (11). One of the major issues here is to build assurance and trust among the local village people. Modalities such as Audio Visual inputs, Text to speech engine and educational media should be incorporated with such systems to develop a sense of familiarity and ease of use among users. It would also assist physically challenged users while using the system. The study was not based on extended use of the application, which would have given deeper insights into the problems faced by the users.

FUTURE WORK & RESEARCH ISSUES

For the future work, it is proposed that:

- Present system represents very basic needs of information for the village people. In future, complex information and interaction methods could be rendered for expert users and for the assistance of foreigners.

- On site usability testing is an area which needs to be done subsequently so as to validate the system's practical feasibility.
- The graphic details of the information presented over the screen could be improved.
- The number of users for the initial survey could be increased from 10 to much more.
- There is a scope for a much deeper inspection of the information required by village people. Moreover, the information could be structured by considering its relative importance.
- In future, provision for text entry could be included so as to mobilize voting processes, bidding etc.

ACKNOWLEDGMENTS

We thank subjects of Amingaon Village, North Guwahati for their invaluable inputs during user survey. We would also like to thank HCI & Usability lab at IIT Guwahati for letting us use their resources without which this project would not have been possible.

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