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DEARDEN, Andy and RIZVI, H.

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Adapting Participatory and Agile Software Methods to Participatory Rural Development

Andy Dearden

Communication & Computing Research Centre,
Sheffield Hallam University,
Sheffield, S1 1WB, UK
a.m.dearden@shu.ac.uk

Haider Rizvi

Communication & Computing Research Centre,
Sheffield Hallam University,
Sheffield, S1 1WB, UK
h.rizvi@shu.ac.uk

ABSTRACT

This paper presents observations from a project that combines participatory rural development methods with participatory design techniques to support a farmers' co-operative in Madhya Pradesh, India.

Categories and Subject Descriptors

H m [Information Systems, Miscellaneous].

General Terms

Design

Keywords

Participatory Design, International Development, IT for Development, Capacity Building

1. INTRODUCTION

In this paper, we report on a project working with a rural farmers' co-operative in Madhya Pradesh, India to improve their 'Agricultural Information Flow System', using an approach that combines a participatory approach to rural community development, with participatory and agile approaches to software design. The aim of the project is not simply to deliver working software of value to the community, but to discover more effective ways in which participatory designers of information and communication technology (ICT) can contribute to international development efforts.

2. BACKGROUND

The Rural e-Services project is a research project funded by the UK Engineering & Physical Sciences Research Council (EPSRC) that is exploring how participatory and agile software design methods may be integrated with participatory approaches to development. Our hypothesis is that by integrating participatory development, participatory design and agile software methods, it is possible to find a mode of working that: supports the creation of useful and innovative systems to contribute to development; and will help the community and collaborating non-governmental

organizations (NGOs), to develop their future capacity to innovate with and deploy ICT after the researchers withdraw.

The project is working with a co-operative of rural farmers in Sironj, and PRADAN, a development NGO that has been supporting the development of the co-operative. Together we are designing a system to support the delivery of multiple 'e-services'. The first service we are developing is concerned with the flow of agricultural information. Future services that could be part of the system include health and microfinance services.

2.1 Terminology

The term development could be overloaded in this paper. Therefore, the paper uses the term Development to refer to community development in the sense of enabling people to improve their livelihoods their opportunities and their life chances. The term 'software making', refers to the activities of the analysis, organisation and/or creation of technical systems. This term thus includes actions both by people who might call themselves 'designers', but also software developers, testers etc.

2.2 What is development?

Without a definition it is not possible to evaluate how alternative approaches to making software might contribute to development. A variety of answers are possible, and increasing gross domestic product (GDP) is only one, very narrow, interpretation. Sen [7] records how the life expectancy for an African-American who has reached the age of 20, is lower than for someone of the same age in China or India. Even avoiding aggregated national measures, income is still a partial measure as correlations between income and happiness are limited [5]. Sen offers 'Development as Freedom' focusing on people's ability to make free choices to further their own interests. Income is a factor, since lack of income limits choice, but is only one dimension. Improving free participation in social debate is also a direct development gain, independent of arguments about the contribution to economic growth. Sen is concerned not only with freedom from externally imposed constraints (such as social restrictions imposed by gender or caste), but also with peoples' sense of agency, skill and confidence. Thus gains in health, education and political freedom are primary ends of development. From this perspective, active participation in projects, contribute directly to development, by enhancing the capabilities of participants.

2.3 Participatory Approaches to Development

If development emphasizes freedom of action, confidence and agency, then external actors must enable, encourage and support people in articulating and promoting their own ends. This is a

delicate task. Most external agents in development are rich, high-status individuals (relative to their hosts). Past experience of such powerful incomers may lead to mistrust, to not articulating felt needs, instead giving answers that the incomer 'wants to hear' in order to derive the objects or finance the external agent has to offer. A project must get beyond this level of interaction to effectively promote actual community interests, rather than reproducing a culture of dependency on others.

The participatory approaches to development, typified by Participatory Rural Appraisal (PRA) [3] seek to address these problems. They provide methods and tools to support dialogue with host communities, including: timelines, chapatti diagrams, community maps, role playing, focus groups etc. However, as Chambers [3] argues, the specific techniques used should be understood as secondary to the orientation and behaviours of practitioners, i.e. the exercise of 'soft skills'. These behaviours are applied to develop deep, trusted relationships, to enable practitioners to facilitate collaborative actions, thus building the capacity of the community to act in their own interests in future.

As Heeks [4] reflects, there are many approaches that can be presented as 'participatory' but in fact involve the exercise of external power to coerce, exclude or manipulate. Oakley [5] presents three distinct levels of participation, namely:

- Level 1: Participation as Contribution: Here participants make a voluntary contribution to a predetermined program in return of some perceived expected benefits.
- Level 2: Participation as Organisation: Here, the external development actor leads the reform or creation of some new organization through a process of participation.
- Level 3: Participation as Empowering: Here participation aims to develop skills and abilities with people to manage their own needs and mobilize resources. Achieving these outcomes requires participants to be engaged at all stages, in particular in defining project objectives and initial plans.

In interactive systems design, even if participatory techniques such as storyboards and paper-prototyping are applied, projects risk operating at level 1, because many core design concepts may be determined before engaging with the community. In many participatory ICT projects participation begins *after* initial framing decisions have been made [7]. The development approaches typified by Chambers [3] aim to operate at level 3. Such an approach must be open to the possibility that the community's desires and needs will provide very limited roles for new technology. Thus, a research project investigating interactive systems design as a contribution to development is fraught with potential contradictions.

3. ADAPTING THE PROJECT

3.1 Establishing the research project

The first thing to note, is that the project was initially established as part of a research programme, in a highly developed country, to investigate technology for development. The rules of the funding body, meant that funding could not be allocated directly to organizations in the developing world. Also, at the meetings that created the partnerships and allocated resources, the host communities were represented only by a representative from an engaged Non-Governmental Organization (NGO). This created an immediate contradiction, because the beneficiaries were not actively engaged in determining goals and plans. However, it was

necessary to define some objectives in advance in order to secure funding. Our solution was to present objectives in terms of methodological questions that might be adapted to different communities with different needs. However, it was still necessary to describe some outline technology that would be designed, so we presented a proposal in terms of providing generic 'e-services' to be provided by rural co-operatives. This generic statement sought to avoid premature commitment to any particular service. However, in negotiating the funding, a line was inserted which suggested that the first such service in a demonstrator system would be in the area of microfinance.

3.2 Selecting working sites

Our first problem was to find a working site where local needs were in line with our initial project objectives. In development, there are significant ethical imperatives to consider. Introducing ICT involves both financial and opportunity costs for participants, and can alter social relations in unpredictable ways.

Initially, we built a relationship with a District Co-operative Central Bank (DCCB) in one part of Maharashtra state. Each DCCB in India works with a large number of Primary Agricultural Co-operative Societies (PACS). This system of DCCBs, and PACS goes back before Indian Independence. Each PACS covers a specific area, and every farmer has a right to join their local PACS. However, many poorer farmers are not members. Our DCCB was engaged in strong microfinance programme and appeared to be an ideal partner for our project. However, although early signs were promising, it became clear that internal issues in the DCCB meant that our project would not be supported. We were thus forced to find new partners.

We drew up a shortlist of possible sites, where local NGOs were already working either with the PACS or with newly established independent co-operatives. Each site was visited and discussions were held with the NGOs to explore the activities, the mix of microfinance and other interventions, the priorities and desires regarding ICT, and about the co-operatives that might work with us. Comparing the sites, we decided that, in larger projects where an NGO was working with DCCBs or groups at District or State level, there was a risk that external political events, or differences in timeframes, could derail our project. On the other hand, if we worked with independent co-operatives, the problems studied and the solutions created may not be transferable to other settings. An additional criterion was the flexibility in partner organisations. In selecting between the final two candidates, we chose the younger of the two organisations, reasoning that this might allow more design flexibility. Our eventual choice was to work with an area where the NGO had an established presence for over 5 years, but where a relatively new community organization was currently growing (about 2 years old).

3.3 Entry to the field

Entry to the field is a very sensitive aspect of participatory development. The quality and strength of relationships, and the expectations established at the start of a project are critical to the outcome and impact of the work. In an environment where the end users are not paying for the development of the software, there is a risk that the end-users will seek to discover and tell software makers 'what they want to hear'. This is a rational strategy, since it can result in the community obtaining valuable assets (e.g. computers, mobile phones etc.) and the community has no

particular reason to trust that by being more open, their gains will increase. On the other hand, previous experiences may have taught them that voicing real concerns does not necessarily lead to needs being met. Only if a deep, trusting relationship is built at the start, can these risks be mitigated.

In this project, entry to the field began as we were short-listing and selecting sites. At this stage we described the aims of our project in general terms, such as investigating how ICT might support participatory community development. Having selected one site, the field researcher met with the NGO and with the farmers co-operative on eleven separate occasions before the formal 'project establishment' discussion was held. The visits explored the general situation of the community, the structure, problems, priorities and plans of the co-operative and the role of key individuals. We believe that this extended process helped us to demonstrate that the project would engage fully with their needs. Face-to-face local contact was supported by formal contact in the form of a letter of intent, explaining the project, from the UK based partner to the partner NGO.

Whilst the general agreement to site the work in Sironj was made in May 2007, the software project establishment meeting, and decisions about the focus for the new software, waited until September 2007, when the project manager visited. Throughout the project, relationships have been managed through a locally accessible, face-to-face contact, together with demonstration of institutional commitment via letters, emails, formal visits, and occasional participation in design discussions via telephone. Although the value of the project manager's direct input is limited by distance, the practitioners in Sironj advised that such engagement demonstrates commitment and helps maintain trust.

3.4 Establishing the software making project

In the software project establishment workshop (September 2007) we aimed to find a focus for software making that met local needs and matched with the commitments made to funders. Initially, we planned to hold this workshop in Sironj so that as many community members as possible could attend. However, on the day before the meeting was due, we heard that the senior manager of the NGO, and the director of the District Poverty Initiative Programme (DPIP) were unable to reach Sironj in time. Therefore, we re-located the meeting to the DPIP offices in the state capital (Bopal). This involved an additional 3-hour journey for community participants, and restricted participation to just 5 farmers, and three NGO officers. We had to trade-off between ensuring the support of key external stakeholders, and maintaining community ownership and control. One factor that entered our calculations was that prior to this meeting, the project team had spent three days on site in and around Sironj but the project manager had not previously met face-to-face with the senior NGO staff or the DPIP director. Thus, the quality of links with these different stakeholders suggested that the external actors required more attention at that particular time.

The meeting was conducted primarily in Hindi. It was necessary to impose this on the external professional participants who on occasions switched to English, excluding the community members. This allowed the (non Hindi speaking) project manager, to concentrate on the non-verbal communications. At one point, the professional participants were enthusing about a particular proposal, but no community representatives had responded to the idea. It is not possible to say whether or not the disjunction would

have been noticed anyway, but being unable to follow the verbal exchange certainly made observation easier.

3.5 Negotiating project goals

The meeting identified a shortlist of possible areas for ICT intervention. The group was encouraged to identify possible projects that could include financial elements. Although we had initially suggested a focus on microfinance, and the NGO was involved in microfinance activities, it became clear that the community representatives saw more value in improving agricultural production. A shortlist of 5 ideas was generated, including two finance options. After that meeting, the ideas were explored and ranked. The software making group (together with advisers) examined the relative complexities that they expected with each idea, exploring both technical issues, and issues relating to external partnerships. For example, one idea concerned the co-op reselling crop and weather insurance, but discussions with experts revealed that insurance companies did not currently plan to provide products that were suitable for the co-op members. This idea was therefore judged to be highly complex. In parallel, the co-op members met to discuss the relative benefit for them in different ideas. Based on the combination of these two rankings, we selected the focus that provided the greatest benefit for the least complexity. The area selected was called an Agricultural Information Flow System. A consequence of this decision was a need to inform and seek approval from representatives of the funding body, for the change of project focus from microfinance to agriculture. Fortunately, the representatives were supportive of our arguments and aims.

4. ADAPTING METHODS

As well as having to adapt the focus of the project, we have also had to adapt our working practice and software making plans.

4.1 The software growing season

In planning the designing, we soon became aware of the agricultural seasons. Just as Brooks [2] identified the mythical man-month, we discovered the mythical farmer-day. During planting and harvest, farming is very labour intensive and co-op members cannot give time to secondary activities such as designing software. Although we compensated farmers for their time (at national minimum wage rates) involvement during these times could only be for short discussions, in the evening, in the villages. At other times, a much higher level of participation was feasible. In Sironj the typical cropping pattern involves two major crops. Soya is planted in early June, before the monsoon, and harvested in September. Then, wheat is planted and harvested in December. The harvest is followed by a religious festival. Consequently, our schedule has been designed so that the main designing work takes place from January to May.

4.2 Rapid development cycles

We adopted an approach based on Extreme Programming (XP) [1], because of its commitment to delivering small elements of functionality on a regular basis. We hypothesized that this regular delivery of partial solutions would help the participants to build up their understanding of the form of the software proposals, and to explore how their working practices could evolve to take advantage of new capabilities.

Our plans use a three week cycle, beginning with a participatory workshop in which 'user-stories' are created and prioritized for

implementation. In week two, a small delegation from the co-op travels to the software makers' location (a 14 hour rail journey each way) for Alpha testing. At the end of week three, the revised software is delivered to Sironj for Beta testing. This trip is then combined with the start of the next software cycle.

4.3 Collecting user stories

In XP, each making cycle begins with a planning game where 'user stories' are written and prioritized. The stories are written in everyday language and describe interactions between a user and the system to meet some identified user goal. Once the stories are sufficiently clear for both users and software makers, the makers estimate the time that will be required to implement the story, and the users then prioritize the stories for making in the next cycle, given the budgetary and time constraints.

To begin developing and prioritising user stories, we conducted a number of meetings in the villages between October and December. These meetings helped to identify ways that information technology might support information flow and helped to mobilize interest in the project. We then organized a major story telling workshop in early January. However, at the, the farmers found it difficult to relate to the story-telling idea. Our first storytelling workshop brought out some interesting life-stories about the value of information and communication to their livelihoods. Stories explored information and advice about agriculture, health, access to support in emergency situations. However, these were generally framed as life stories over a period of months or years, rather than focusing on specific information exchange events. They were useful for creating personas, but were not sufficiently detailed to support software design. To move forward, we introduced cartoons to illustrate more detailed stories. Many Indian newspapers and magazines include cartoon strips and the farmers were familiar with this format. We created line drawings to represent the personas previously identified, as well as images to represent houses, villages, fields etc. The new stories were written by cutting and pasting the images to sheets of flip chart paper, with speech bubbles to present the dialogue. The technique helped to create simpler stories about specific exchanges and conversations. However, we do not yet have stories illustrating detailed interaction between a user and the technical system.

From the stories we were able to select and prioritise features for software making. However, after our first round of making, we discovered that in estimating the cost of implementation and the value to the community, neither the software makers, nor the co-op as customers, were paying enough attention to the time and effort for collecting data required to deploy the software effectively. Thus, the cost/benefit analysis was overlooking an important component. We have addressed this in the next cycle by opening the budget process, so that participants can see clearly how finance is allocated to design, software making, data collection, hardware etc.

5. REFLECTIONS

Our current stage is that the first 'user stories' have been implemented, to create a membership database where the co-op's

agricultural advisor can check information about members their crops and fields when they ask for advice. We are implementing functions to record and replay short multimedia files of advisory conversations that can be accessed from mobile phones held by the 'service providers' (co-op members who act to link the farmers and the central office). Already we can observe that:

- It is possible to combine participatory design and participatory development, but it is difficult to work at Oakley's level 3, with pressures of time and external funding tending to direct work towards level 2 and level 1.
- The project is aiming to implement not just a software system, but a new way of working in the co-op. Therefore, it is important to maintain active engagement of the members, and of all other stakeholders. Relationships are critical.
- The approach of employing a short software making cycle has been valuable in identifying and correcting problems with our methods..
- The innovation of using cartoon strips to develop stories has helped us make some progress. It is clear that some scaffolding is required so that co-op members can create stories that have enough detail to guide software making.

As yet, we cannot say whether our interventions have achieved our objectives.

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