Rural e-services: Participatory co-design of Sustainable Software and Business Systems in Rural Co-operatives

Andy Dearden, Xiaolan Fu, Paul Matthews (Investigators)

With Subodh Gupta (Saral Services), Dr Sebastian Wills

Part 1: Track Records

Dr Andy Dearden, Sheffield Hallam University

Dr Dearden has been investigating methods for interactive systems design for 15 years. His work explores user participation in design, with a particular emphasis on the needs of civil society. He has: investigated the possibility of using design patterns in HCI to support user participation in design (Dearden & Finlay, 2006); was principal investigator on the paperCHASTE project (GR/R87918) developing tools for remote users, with basic browser technology, to participate in the early stages of systems design. He recently edited a special issue of Interacting with Computers on 'Design for Civil Society'. He was principal investigator in the Design for the 21st Century Cluster "Technology and Social Action" (EP/C514114/1), bringing together artists, designers and technologists exploring technology in civil society settings. He is communications chair of the British HCI Group, a member of the Design Research Society and Computer Professionals for Social Responsibility.

Dr Xiaolan Fu, University of Oxford

Dr Fu is University Lecturer at the Department of International Development. She is principal investigator of EPSRC project (EP/D503973/1) on 'The role of management practices in closing the productivity gap' and principal investigator and researcher of a series of projects funded by: UN Conference on Trade and Development (UNCTAD), Department of Trade and Industry, UK Trade & Investment, regional institute for innovation (i10) and the People's Bank of China. She has particular experience in economic issues relating to developing economies and eight years' first-hand work experience in China. She has published on innovation economics, SMEs and entrepreneurship, the linkage between management, innovation and productivity, technology transfer and spill over, township and village enterprises (TVEs), and regional economic development. She was recently awarded the 2005 "European Best Paper Award" by the European Commission, Gate2Growth Network.

Paul Matthews, Overseas Development Institute

Paul Matthews is engaged as Knowledge Management IT Officer at the Overseas Development Institute. His interests and expertise include knowledge management and IT in international development, collaboration and information architecture / retrieval. He is currently participating in a DTI funded project to improve Knowledge Management within ODI and is providing technical inputs relating to collaboration and networking into the DFID funded Civil Society Partnerships Programme. Additional current work consists of a study of information sharing between development agencies. Prior to ODI, Paul spent three years as an information systems consultant at the Food and Agriculture Organisation of the United Nations (FAO) in Rome. He has also worked as an ICT and project monitoring and evaluation consultant on EC and DFID funded natural resource management projects in Indonesia, the Philippines and Nepal as well as in IT in the UK private sector.

Collaborators

- Mr Subodh Gupta of Saral Services, an NGO promoting ICT applications in the social sector in India. Saral have extensive links to key academic institutions in India including: IIIT (Hyderabad), Indian Institute of Science (IISC, Bangalore), Institute of Development and Research in Banking Technology (IDRBT), IIT Kharagpur, as well as major players in the Indian Microfinance sector (Co-ops 2020, Sa-dhan (www.sa-dhan.org), BASIX, Indian Institute of Management in Ahmedabad). The board of Saral services includes: Dr VP Gulati - previously director of IDRBT; Dr. P.J Narayanan and Mr. Gupta both are from IIT (Kharagpur); Dr Narayanan is currently an associate professor at IIIT (Hyderabad); Dr. Sankar Dutta -previously a fellow of IIM (Ahmedabad); and Mr Gupta who has previously worked closely with BASIX, Co-ops 2020 and Sa-dhan. Mr. Umesh Rai, currently doing Phd at IISc, Bangalore;

Dr. Bhimashankarm, Head of Indian Statistical Institute, Hyderabad; Ms. Vasundhara, did fundamental work for cooperatives through Cooperative Development Foundation (CDF), Hyderabad.

- Dr Sebastian Wills acting in a private capacity will bring expertise in designing and evaluating hardware and network solutions for developing world contexts. Dr Wills CV is attached to this proposal.

Selected publications

Naghsh A. M., Dearden A., Ozcan M. B. "Investigating Annotation in Electronic Paper-Prototypes." To appear in, Harrison, M.D. (ed) Proceedings of DSVIS, 2005. Springer, LNCS.

Dearden A. & Finlay, J., 2006. Pattern Languages in HCI: a critical review. In *Human-Computer Interaction,* 21(1).

Dearden, A., 2006. Design as a conversation with Digital Materials, *Design Studies*, 27(3) May 2006.

Cosh, A., Fu, X. and Hughes, A. (2005) 'How much does informality in management matter for SME innovation?' Winner of the European Commission, Gate2Growth Academic Network 2005 "European Best Paper" Award.

Fu, X. and Balasubramanyam, V.N. (2005) 'Exports, foreign direct investment and employment: the case of China', *The World Economy*, vol. 28, no. 4, pp607-625.

Fu, X. (2005) 'Exports, technical progress and productivity growth in a transition economy: a non-parametric approach for China', *Applied Economics*, vol. 37. no. 7, pp725-239.

Cosh, A., Fu, X. and Hughes, A. (2004) 'Entrepreneurship, innovation and innovation potential: benchmarking performance in the regions'. Paper presented at the Cambridge-MIT Institute Competitiveness Forum, Cambridge, 2004.

Fu, X. (2004) 'Exports, Foreign Direct Investment and Economic Development in China', *Palgrave Macmillan*.

Fu, X. (2004) 'Limited linkages from growth engines and regional disparities in China', *Journal of Comparative Economics*, vol 32, no.1, pp148-164.

Cosh, A., Fu, X. and Hughes, A. (2003) 'Innovatability of manufacturing SMEs in the East of England', *Report for the i10 MAPSME Plus project*.

Fu, X. and Balasubramanyam, V.N. (2003) 'Township and village enterprises in China', *Journal of Development Studies* vol. 39, no. 4, pp27-46.

Research Context

Cultural Communication & Computing Research Institute, Sheffield Hallam University brings together internationally recognised researchers in Art & Design, Communications Studies and Computing. It is a leading UK centre for design research (rated 5 in the 2001 RAE). The environment encourages novel interdisciplinary collaboration with recent projects examining: interactive mediaeval poetry, technology in social action organisations, digital jewellery, medical prosthetics (now being used in NASA's robotics programme), smart media for e-Inclusion and electronic paper-prototyping. It works with national and international partners as well as local government and voluntary sector groups on e-Inclusion issues.

University of Oxford has strengths across many areas of engineering and social and natural science. The Department of International Development (Queen Elizabeth House) provides a focus for the University's research and teaching on development studies. As one of the world's leading research centres on development studies, its objective is to conduct high level research which advances understanding of the complex economic, social and political processes of change in countries in the poorer parts of the world and to educate students to understand these processes in a multi-disciplinary perspective. Research at QEH concerns International and National Economic Development; Human Development, Gender and the Environment; and States, Markets and Politics: Africa & South Asia.

Overseas Development Institute (ODI) is Britain's leading independent think-tank on international development and humanitarian issues. Its mission is to inspire and inform policy and practice which lead to the reduction of poverty, the alleviation of suffering and the achievement of sustainable livelihoods in developing countries. ODI has experience of partnering with NGOs and government in India on development research. Additionally, the Research and Policy in Development Group (RAPID) have recently completed work linking ICTs to livelihood approaches to development (for the Food and Agriculture of the United Nations and the UK Department for International Development). Relevant institutional resources include Prof. John Farrington, who has led major studies on livelihoods, local government reform, public investment and service delivery in India, and Robert Chapman, who has key experience in policy research in ICT for development including field research in Tamil Nadu and Karnataka on the 'hub and spoke' e-village model and biovillage concept pioneered by the M.S.Swaminathan Research Foundation and private sector low cost ICT solution providers in Bangalore, Karnataka.

Rural e-finance: Participatory co-design of Sustainable Software and Business Systems for Rural Co-operatives

Part 2: Case for Support

Aims and objectives

This project will explore how techniques from the fields of participatory design of Information & Communications Technologies (ICT), agile ICT development and participatory rural appraisal can be combined to support the (locally based) development of sustainable software and business systems for use by networks of rural village co-operatives. Our objectives to achieve this aim are:

- To unify & relate methods from rural development, sustainable business modelling, and ICT design;
- To understand the specific needs and problems of rural cooperatives and how these can be met through ICTs;
- To find ways of undertaking ICT for Development that contribute to building innovation capacity in beneficiary communities;
- To create innovative sustainable business models for ICT supported services delivery and information inequality reduction in disadvantaged communities;
- To disseminate the methods and findings to academic and practitioner communities
- To explore the transfer of lessons learnt from one community to others (e.g. India to China).

Background and rationale

A large body of work emphasises the need to empower host communities of economic development projects to design and control those projects (Chambers, 1991, Anderson et al., 1999, ActionAid, 2005). Many development projects in recent years are making use of ICT as part of their plan (ITID, 2003 - 5). However, relations between these methods and participatory methods used for ICT design (Greenbaum & Kyng, 1991; Schuler & Namioka, 1993), or emerging practices such as agile methods (Boehm, 2002; Beck et al., 2001) and extreme programming (Beck, 1999), have not been explored.

Despite the similarities in perspective between participatory ICT design in the developed world and the requirements of international development projects, there are also important specificities in applying participatory approaches to development. Some factors in software development include:

1. Collaborative design activities must be sensitive to the high costs of face-to-face working between developed and developing countries, but also to the limitations of available communications networks, which limit the frequent review practices that are common in agile methods.

2. Establishing effective partnership working in development projects may be very difficult, requiring significant time periods, because of the enormous disparities in perceived status between host communities and designers.

3. Developing world projects involve cultural and language barriers, which are more extreme than those encountered in projects in the developed world.

4. The institutional arrangements and historical context that surround international development can easily distort project priorities and result in inappropriate decisions.

Thus, ICT design for development raises specific challenges to existing software development methods. By investigating these challenges in a practical action research setting, this project will identify methods for use in design for development, but may also provide insights and new ways of working that could add value to software practice in the developed world.

There are additional issues that must be considered when using participatory design of ICT systems in economic development, rather than simply to meet the needs of a (financially secure) customer:

5. In economic development projects a key goal is to enhance the long term capability of host communities *after the project ends*. This is not built into existing software design methods and needs new thinking.

6. Using ICT in development requires analysis of sustainability at multiple levels: technical, financial, human and organisational. Thus, participants must widen the analysis and design space to account for: local economic conditions, infrastructure such as power supply and technical support, political structures, and financial resources (World Bank, 2002; Dossani et al., 2005).

The setting for this project is the development of software and business systems to support micro-finance co-operatives in rural India. Cooperatives play a key role in sustainable development as they guarantee local participation (Uphoff, 1992). In developing countries, particularly in Asia, large numbers of cooperatives exist offering services in agriculture, banking, credit, fishing and housing. In India in 1999, for instance, there were an estimated 503,962 cooperatives, with a membership of over 200 million people (NCUI, 1999). ICTs can enable cooperatives to expand their customer base, extend their reach into underserved areas and lower transaction costs (WRI, 2004). Nevertheless, the Digital Divide necessitates new models of access to the content and services available. (Rao, 2004).

There are many projects that set out to use ICT to support rural communities and co-operatives, but few are making the impact that they could because of their small scale and lack of sustainable business models. Sustainability has been a long-standing issue in ICT for development projects (World Bank, 2002), and the development of sustainable business models has increasingly come under spotlight (Rout, 2002; Kumar, 2004; Singh, 2003; John, 2004). However, there is little evidence about the sustainability of community-driven approaches. The debate on the roles of public and private sectors in ICT supported development plans is still on-going (World Bank, 2002). The role of social entrepreneurship in bridging the digital divide also awaits exploration, although policy makers and politicians are becoming increasingly aware of the potential of such models. All this leaves major gap in literature and 'best practices' identification.

This project is novel in combining the participatory design of ICT systems with designing sustainable business models. By addressing these inter-dependent dimensions, the project will contribute to software and economic development methods in both the developing and the developed world.
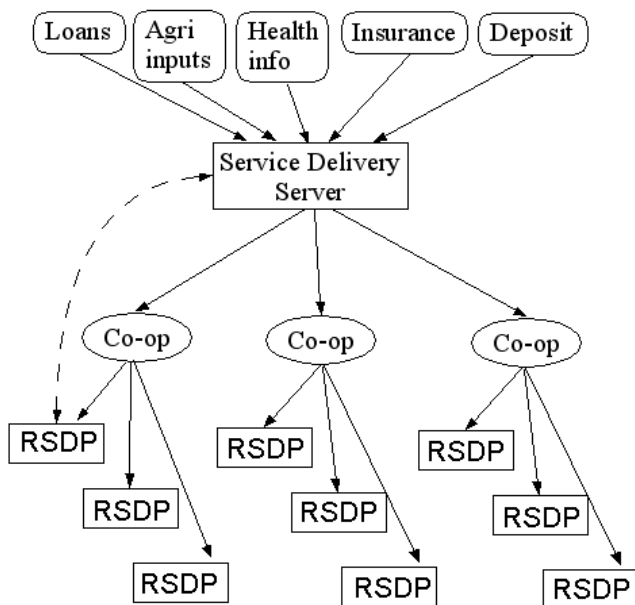

Figure 1: Delivering multiple services to 'remote service delivery points'

To test our methods we shall undertake an action research project with Saral Services (an NGO working with Indian microfinance co-ops) and a network of co-operatives in India (to be identified in collaboration with Saral). The project will design and prototype an innovative model for service delivery allowing co-ops in one village (collaborating with co-operative banks or other institutions) to deliver services to users located in other villages remote from the co-op centre. This structure is problematic in rural India because of: the limited communications infrastructure; the limited literacy skills of many intended beneficiaries; and the difficulty of developing appropriate authentication and accountability mechanisms to protect both parties to financial transactions. The concept demonstrator will utilise existing tools (e.g. mobile phones or other devices that are available / affordable in the target market) to provide the technical platform for the 'remote service delivery points' (RSDPs) that we envisage. Figure 1 shows a possible structure for the system.

"A successful innovation demands an innovative business model at least as much as it requires an innovative product offering" (Chesbrough, 2003). The business model provides a link between technology innovations and economic and social outcomes. Innovative ICT-supported service delivery system, by small rural organisations in particular, demands stronger support from an appropriate sustainable business model to maintain its financial and institutional sustainability. In the context of ICT for Development in the rural communities of developing countries, there have been considerable projects operated by self-help groups, cooperatives and private entrepreneurs. Sustainability of these projects, however, remains a central issue that needs further exploration.

In this project, we shall demonstrate the feasibility of the concept by:

1. identifying factors and practices that support / inhibit innovation in designing, implementing and using ICT in the context of systems development in developing countries;

2. developing new approaches to participatory ICT design that takes into account: the problems of working in developing countries, the need for sustainable business models and the goal of promoting long term innovation capability;

3. testing these approaches by using them in a case-study in which we develop a demonstrator system that allows one financial service (e.g.loans) to be delivered by a co-op to one set of rural villages using available communications technologies; and

4. developing business models that show how such a service model (probably based around multiple services) can be made sustainable taking into account the costs and capabilities of the proposed technical infrastructure.

Research design and methods

The research plan mixes review of existing literature, evaluation of past collaboration models, development of new proposals and reflective action research.

WP 1: Analysis of ICT development in cooperatives [ODI, Saral, months 1 - 2]

We shall review existing projects to identify key success factors in ICT projects in rural co-operatives/ Extra funds for fieldwork relating to this may be obtained by ODI. We shall publish results of this work as an ODI Working Paper. This work will be led by ODI.

WP 2: Situation assessment / relationship building [SHU, Saral, Months 3 – 6]

We shall use ethnography and contextual enquiry (led by the post-doc at SHU) to explore differences between the Indian and developed world software development contexts. This activity will help to build relationships across the team and between the team and beneficiary communities.

WP 3: Literature review [SHU, O, ODI, Saral, Months 3 - 8]

We shall conduct a multi-disciplinary review of existing relevant research and projects examining: participatory methods in ICT design; participatory methods in development; sustainable business models for services delivery in collective enterprises and SMEs; and local economic development.

WP 4: Methods development [SHU, Saral, Months 6 - 14]

We shall select methods and techniques from the existing literature, adapting them in response to our analysis of context, and evolve new techniques as necessary. The post-doc at SHU will lead this work, adapting methods to take into account outputs form WP 5. The output will be a draft methods handbook.

WP 5: Business model analysis [O, Months 9 - 14]

The post-doc at Oxford will analyse the existing business models of ICT-supported service delivery in small enterprises, critical factors that affect successful ICT applications in micro-finance (based on outputs of WP 1 and econometric modelling), and existing organisational infrastructure and ICT in rural communities. Emphasis will be placed on incentive scheme design, ownership, governance and organisational structure of rural cooperatives in India and elsewhere (e.g. China). Thus we will identify and report on best business practices for integrating ICT in micro-finance.

WP 6: Participatory analysis and design [SHU, Saral, Months 12-18]

We shall use and refine the methods developed in WP 4 using action research to develop designs and prototypes for remote financial service delivery by rural co-ops. The designs will take into account existing, readily available hardware and systems, and the findings from business modelling in WP 5.

WP 7: Business model development [O, Saral, Months 16 – 19]

Based on work in WP 6 and 7 we shall develop a sustainable business model to facilitate the sustainable deployment of the software system designed in WP5 in a rural area. Special emphasis will be placed on a) comparing the role of social vs. private entrepreneurship, b) incentive design through ownership and governance arrangement, c) comparing the traditional close business model vs. an open business model, and d) the role of multinational enterprises (MNEs). Special attention will be placed on the complex social and economic settings in rural India. The potential to generalise the new business model to a wider eco-geographical context (e.g. China) will be explored.

WP 8: Demonstrator development and deployment [SHU, Saral, Months 17 – 26]

We shall develop the prototype and deploy it to demonstrate the feasibility of this medium for delivering one financial service (e.g. loans) to users remote from the co-op centre, connected using basic and affordable communication technologies (e.g. mobile phones and similar devices) and are sustainable in this context. The methods handbook will be reviewed in the light of field experiences.

WP 9: Co-funding and 'gearing-up' [ODI, Saral, Months 13 - 18]

We shall work to extend the project, in order to evaluate the scalability and transferability of the methods to larger systems in Indian microfinance and in other countries. We shall engage directly with partners such as ActionAid, VSO, the Indian 'Coops 2020' group and NGOs with interests in participatory methods and / or ICT in development. Timing of this package allows us to establish clear progress before seeking further funding. Paul Matthews at ODI will lead this work.

WP 10: Review and evaluation [ODI, Dr Sebastian Wills, Months 1 – 30]

We shall maintain a regular review of the project. Additionally, we plan specific review activities at key stages. In months 10 – 12 we shall devise an evaluation framework for assessing the impact of the project. In months 16 – 18 we shall agree an internal participatory evaluation scheme for assessing local usefulness of project outputs with the beneficiary communities. We shall use this framework in Months 26 - 28 to evaluate the demonstration system. Dr Wills will undertake the technical evaluation of the demonstrator in context in months 28 - 30. Paul Matthews will lead evaluation of the overall impact of the scheme.

WP 11: Project management [SHU, ODI, O , Months 1 - 30]

Dr Dearden will act as Project Leader. Project management will be co-ordinated by a steering group consisting of Dr Dearden, Dr Fu, Paul Matthews, and representatives of the sub-contracting partners (Subodh Gupta from Saral services & Dr Sebastian Wills). Dr Dearden will lead the literature review, participatory methods development and technical design and development (WP 2, 3, 4, 6 & 8). Dr Fu will lead the business modelling (WP 5 & 7). Mr Matthews will lead analysis of previous projects, gearing up and evaluation (WP 1, 9 & 10). The team will meet on-line at least once every 2 months, and face-to-face at least twice per year. The team will also draw on the wider BGDD sandpit network for informal review of work on a regular basis.

Outputs and Deliverables

Literature review; Existing Projects review; Methods description & papers; Needs analysis statement; Design concepts documents & related papers; Prototype designs; Concept demonstrator in a single co-op; Sustainable business model & related papers; Demonstrator evaluation reports & related papers; Methods Evaluation report & related papers; Methods Handbook; Project report.

Adventure, novelty and timeliness

The proposed research is novel and timely in attempting participatory co-design of software and business models in a developing world setting, taking into account modern software development approaches such as agile methods. It is adventurous in requiring multi-disciplinary input ranging from business modelling, through software development practice to participatory design methods.

Research Impact and Relevance to Beneficiaries

The key beneficiaries of this work are:

1. Indian Microfinance co-operatives who will be provided with new tools and business models to support their extension and development;

2. Developing world systems development organisations who will gain new methods and insights for participatory co-design of systems;
3. Researchers and practitioners in participatory methods for ICT design (both in the developing and developed world) who will gain innovative participatory methods;
4. Researchers and practitioners in business planning for social entrepreneurship who will benefit from new business models developed in the context of this project;
5. Policy makers funding ICT related economic development projects.

Project impact will be enhanced by close co-operation with Indian research institutes, e.g. IIIT (Hyderabad), Indian Institute of Science (ISC, Bangalore), Institute of Development and Research in Banking Technology (IDRBT), IIT Kharagpur, and major players in the Indian Microfinance sector (Co-ops 2020, Sa-dhan (www.sa-dhan.org), BASIX, Indian Institute of Management in Armahdabad). Saral already has established working relationships with all these organisations.

Outcomes and Sustainability

The outcomes will be feasible prototypes and a demonstrator, together with compatible business models to enable microfinance co-operatives to extend the range and flexibility of their services in rural India, together with new methodologies for co-design of software systems and sustainable business models. At the end of three years, the prototypes should be at a point where they can be successfully commercialised by other actors. Our approach should also result in improving the capacity of the participant communities to innovate in both their use of information and communication technology and in future business development.

Justification of resources

Staffing

Sheffield Hallam University: We require a post-doctoral researcher in participatory ICT design and development methods for 20 months (WP 2, 3, 4, & 5). The researcher will need experience in at least one of the relevant domains (participatory ICT design and / or participatory rural analysis). He / she will need to conduct independent field work in India. Our costings allow for appointment up to point 26 on the pay scale to allow us to appoint a researcher with up to 3 years post-doctoral experience. We require the services of an administrator (10%) at Sheffield Hallam University to assist in managing international contracts for goods and services in India.

Oxford University: We require a post-doctoral researcher for 12 months in the area of sustainable business modelling. We require an experienced researcher in this role because of the complex and novel nature of the work. The post-doc will deliver the bulk of WP 5 & 7 in collaboration with Dr Fu.

Investigator time: We have budgeted for investigator time during the 30 month life of the project. The PI at SHU will allocate 10% of their time over the project life. The PI at Oxford will allocate 10% of their time for 12 months to support WP 5 and 7, and 5% of their time to the project over the rest of the project's life. Mr Paul Matthews will allocate 80 days over the course of the project to support WPs 1, 9 and 10.

Consultancy

Saral Services: We require £47500 to support software analysis, design and development effort in India. The work will be managed through subcontracts with Saral Services. Mr Subodh Kumar Gupta will be the primary contact at Saral devoting 24% of his time to the project for 30 months (£15000). Saral will: contribute to the literature and project reviews, as well as managing software development effort for prototypes and designs (1 person year of professional developer effort £12000). Saral require suitable hardware & software for this work and for field trials of prototypes (£6000). Saral will co-ordinate design workshops including translation services (£1200), venue costs and costs for co-ops participating in the design effort (£4800). £3500 is budgeted to cover regular field visits. Saral will also be managing efforts contributed by students and staff from a variety of Indian Universities and research institutes (£5000). These costs have been embedded in the Je-S submission for Sheffield Hallam.

Dr Sebastian Wills: We require specialist input from subcontracting researcher Dr Sebastian Wills. Dr Wills has particular experience in the design and deployment of hardware and network technologies in developing world contexts. Dr Wills will provide an external review and formative feedback on relevant technical issues as part of work package 8. Dr Wills will act as a subcontractor to Oxford University.

Other expenses

Equipment: We require £3500 for equipment to support the field work. Both post-doc researchers will need a tablet PC, a portable audio recorder and a digital camera. The methods post-doc will require video recording equipment.

Travel: £1850 to cover costs of project meetings in the UK over the life of the project spread between the partners. £13500 to cover costs field work costs and evaluation exercises in India. £8700 to cover dissemination of work at international workshops and conferences over the life of the project.

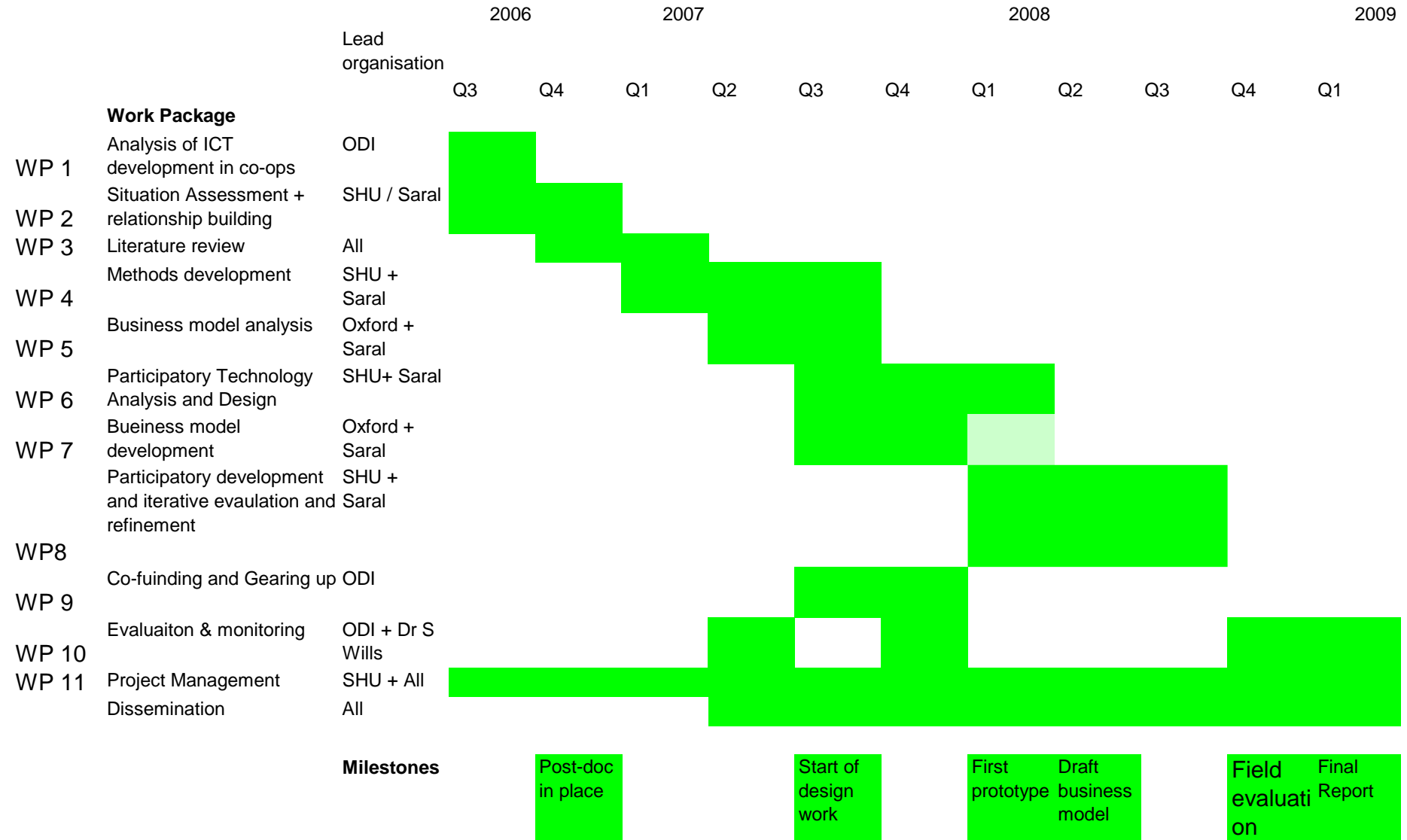The total budget is £361,324 and annex 2 sets out the division of these funds.

Dissemination and Exploitation

Dissemination routes includes professional and academic journals and conferences in multiple domains, including: Participatory Design, Human-Computer Interaction, Software Engineering, ICT for Development, Management Studies, Innovation Management, and International Development. ODI will lead dissemination to practitioners, including the UK DFID, World Bank Development Gateway, Open Knowledge Network. All reports (subject to copyright constraints) will be lodged on a project website linked from ODI.

References

Anderson, J. Van Crowder, L. Dion, D & Truelove, W., 1999. *Applying the lessons of participatory communication and training to rural telecentres*. UN Food and Agriculture Organisation
http://www.fao.org/WAICENT/FAOINFO/SUSTDEV/CDdirect/CDan0010.html

Beardon, H., Munyampeta, F., Rout S. & Maiso Williams, Grace, 2005. ICT for Development, Empowerment or Exploitation. ActionAid. Available from www.reflect-action.org

Beck, K. 1999. *Extreme Programming Explained*, Addison Wesley.

Beck et al., 2001. Manifesto for Agile Software Development. www.agilemanifesto.org

Boehm, B. 2002. Get Ready for Agile Methods, with Care. *IEEE Computer*, January 2002, 64 – 69.

Chambers, R. 1992. *Rural Appraisal: Rapid, Relaxed, and Participatory*. Institute of Development Studies Discussion Paper 311. Sussex: HELP.

Chesbrough, H.W., 2003. *Open Innovation: the New Imperative for Creating and Profiting from Technology*. Harvard Business School Press, Massachusetts, USA.

Dossani, R., Misra, D.C. and Jhaveri, R. (2005). 'Enabling ICT for rural India'. Asia-Pacific Research Center, Stanford University, memo.

Greenbaum, J. & Kyng, M, 1991. *Design at Work* Laurence Erlbaum Associates

ITID, 2003 - 5. *Information Technologies and International Development*, MIT Press Journals.

Kumar, R. (2004). 'eChoupals: a study on the financial sustainability of village internet centers in rural Madhya Pradesh', Information Technologies & International Development, vol, 2, no. 1, 45-73.

National Cooperative Union of India (NCUI) *Cooperative Statistics: Indian Cooperative Movement At a Glance - all cooperatives-1998-1999* Available at: http://ncui.nic.in/stat.htm

Rao, M (2004) Micro-Finance And ICTs: Exploring Mutual Benefits And Synergy, Orbicom (UNESCO) Available at: http://www.orbicom.uqam.ca/in_focus/columns/en/archives/2004_avril.html

Rout, P. A. (2002). 'Digital homes – for richer for poorer, who are they for?', BT Techonology Journal, vol. 20, no 2, 96-105.

Schuler, D. & Namioka, A, 1993. Participatory Design: Principles and Practices. Laurence Erlbaum Associates.

Singh, A. (2003). 'Information and communication technologies (ICT) and sustainable development', Development Alternatives, New Delhi, India, memo.

St. John, C. (2004). 'What works: the humanitarian divide. A Cambodian 'nonprofit company' peddles digitization – with a social edge'. Stanford Social Innovation Review, Stanford Graduate School of Business.

Uphoff, N. (1992) *Local Institutions and Participation for Sustainable Development* IIED, Agriculture Biodiversity and Livelihoods Available at: http://www.iied.org/pubs/pdf/full/6045IIED.pdf

World Bank (2002). 'Extension and rural development – converging views on institutional approaches?', Workshop summary, World Bank and the United States Agency for International Development, November, 2002, Washington, DC.

World Resources Institute (2004) *Lessons from the Field: ICTs in Microfinance* Digital Dividend Publications and Analysis. Available at: http://www.digitaldividend.org/pubs/pubs_05_overview_microfinance.htm

Annex1: Project Plan

		Lead organisation	2006		2007				2008				2009
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
	Work Package												
WP 1	Analysis of ICT development in co-ops	ODI											
WP 2	Situation Assessment + relationship building	SHU / Saral											
WP 3	Literature review	All											
WP 4	Methods development	SHU + Saral											
WP 5	Business model analysis	Oxford + Saral											
WP 6	Participatory Technology Analysis and Design	SHU+ Saral											
WP 7	Bueiness model development	Oxford + Saral											
WP8	Participatory development and iterative evaualion and refinement	SHU + Saral											
WP 9	Co-fuinding and Gearing up	ODI											
WP 10	Evaluaiton & monitoring	ODI + Dr S Wills											
WP 11	Project Management	SHU + All											
	Dissemination	All											

Milestones	Post-doc in place		Start of design work		First prototype	Draft business model		Field evaluation	Final Report

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Annex 2. Resource Summary

Item	Costs	Comments
PI time (Andy Dearden, SHU, 10% for 30 months)	12,571	PI at SHU & project lead
Administration (10% for 30 months)	5,166	To support contract management with Indian partners.
Post-doc researcher (20 months) SHU	45,686	Primary staffing for WP2, 3, & 4. Co-ordinating with India for WP 6 and 8.
Indirect costs (SHU)	76,000	
Estates costs (SHU)	13,054	
PI Time (Xiaolan Fu, Oxford, 5% 10% - 5%)	9,463	PI at Oxford leading on WP 5 & 7. Contributing to WP 3, 10 & 11
Post-doc researcher, (12 months) Oxford,	30,212	Working primary on WP3, 10 & 11.
Indirect costs (Oxford)	51,443	
Estates costs (Oxford)	6,877	
PI Time (Paul Matthews , ODI) 80 days	19604	PI at ODI. Critical input to WP1, WP 3, WP9, WP10
Indirect costs (ODI)	13,582	
Estates costs (ODI)	2,264	
Sub-contract 1 Field Evaluation, Dr Sebastian Wills	6,000	Advice on hardware / network issues
Sub-contract 2: Software development, & field work India (Saral Services)	47,500	NGO providing domain knowledge, field information, managing design & software development. Includes some travel costs
Equipment	3,500	Tablet PCs & recording equipment for post-doc's field work
Field work travel	13,500	We estimate 8 person visits to India from the UK will be required over the project life.
Project meeting costs	1,850	
Dissemination Travel	5,000	To cover dissemination costs
TOTAL	**363,272**	

Annex 3: Response to critiques offered in the sandpit

Learning from existing collaborations. The project design has been adapted. Work package 4 will aim to analyse successful models and shape the methodology development and the design of the action research component.

Value of ICT for rural microfinance co-operatives. Existing co-operatives offer limited services (deposits and small personal loans) to a single village. Our initial concept is an extensible framework to allow co-operatives to offer a rich range of services (e.g. health information, insurance, agricultural trading) to multiple villages. The demand for these has been identified from previous experience of our partner organisation (Saral Services) in India.

Budget for software development in India. The budget for the software development in India has been cut by 66%. Only a 'proof of concept' will be completed in this project. WP 7 (gearing up) has been introduced to seek funds to take the ideas to full implementation.

Role and capabilities of PhD students. We have changed the plan from a PhD student to a post-doctoral researcher for a shorter time to ensure we have the necessary competencies in the early design phases of the project.

Link between methods research and software development. The methods researchers in the UK will be participating directly in participatory needs analysis and design activities, in collaboration with researchers in Indian universities (IIIT, IIT Bombay, NID etc.). The methods will be validated using the software development as an action research context.

Too ESRC / what's the engineering? The aim is an integrated design and development approach for ICTs. This falls in the EPSRC domain of software and systems engineering.

Need for special hardware in this setting. Within the resources requested, we cannot support new hardware production. The assumption will be to work with existing platforms.

Addressing infrastructure issues: training, support, and power-supply. This has been addressed as part of the sustainable business modelling to be tackled within the PhD.

Why develop software when so much is already out there. The designs will use existing software and integration methods wherever possible, but tackle a new problem.

Why is ICT required? We intend to use ICT where appropriate, but not when not required.

Where is the innovation in technology? The main technological innovation will in developing software frameworks that could support sustainable and extensible microfinance services.

Response to mentors comments

These collaborations are already being created many times over in numerous emerging and developing economies. Why not study these existing collaborations which are real and are being driven by market forces? Rather than artificially trying to create a partnership for the purposes of research rather than an existing need? Rather than developing a methodology for a specific co11aboration – why not identify 30+ existing collaborations and explore key success factors, how needs are being met, how ability to use ICT is improved and how it improves ability to innovate Also it should look at what impact the collaboration is delivering in addition to the existing alternatives that don't use ICT? How does ICT make a real improvement – both in value to the recipient and in the companies providing the ICT. Is there a financia1 incentive in all cases for some or all collaborators? These factors are critical for economic sustainability

Response: A review of existing projects is built into the current work plan. We are also explicitly addressing the sustainability issue in the whole project. Our aim is to create sustainable economic systems and a scalable, sustainable approach to the software development.

Additionally, it reminds me of my PhD tutor taking great delight in ripping apart my original proposal and telling me in no uncertain terms that I was "boiling the ocean" - there needs to be considerably more focus (both geographically and scope) ... so to specific points:

- There are numerous examples from all corners of the World, perhaps the group should consider: what are the different collaboration models (if any) and what are the levers/drivers (such as government policy laissez-faire, market forces, regulatory impacts etc.) and how/why are they different?
- what are the determinants of success and are the specific to certain geographies (perhaps hypothesis to be derived from the above analysis)

Response: Again, our review & gearing up work packages address this.

- What are the lessons from the things so far (if successful – why? etc.) What are the other options to an ICT approach

Response: Our ICT approach is needs driven - existing networks of co-ops in India are asking for this. The aim is to consider both human organisational arrangements and technical arrangements

- look at how one sector-uses another to cause disruption or create new markets

Response: these issues will be considered in developing the sustainable business models

- I don't think North/South is the 'new block'

Response: removed references to North / South.

Self assessment against sandpit criteria

Participatory approach

This project puts participation as a central theme.

Engaging institutions in the developing world

We plan to contact academic institutions in India to involve faculty and students in fieldwork and participatory design. The fund for consultancy services permits flexibility to draw on their expertise as necessary during the project. Saral services already have established working relationships with relevant institutions.

Involvement of motivated students

We shall involve UK students in developing simple prototypes, in unit testing and alpha testing of systems during development. We hope to establish ongoing relationships between students in UK and Indian universities to exchange information related to the project domain.