ABSTRACTS OF FULL PAPERS

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1. IT as an institutional actor in developing countries

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Abstract
This paper discusses IT as an institutional actor, which comprises artefacts and techniques as well as industries, legislation, and is supported by powerful 'rational myths' about its value in contemporary society. Moreover, it suggests that IT has been gaining strength by its alliance with other powerful institutions. In the advanced industrialized societies the most prevalent such alliance is 'management', as a way of thinking about organizations and organizing, as practicing organizational governance, and as an industry in its own right. In developing countries IT is often aligned with the powerful institution of 'development', which is seen here as an ideology supported by a network of international organizations, professionals and industries. The paper demonstrates this particular concept of IT with examples taken from the literature of IS in developing countries. It then discusses the significance of this perspective for IS research and points out some consequences for practice.

2. ICTs and Development: Convergence or Divergence for Developing Countries?

Richard Heeks[1] & Charles Kenny[2]

Abstract
"The potential of the modern information age seems overshadowed at every turn by the ancient forces that separate the rich from the poor." (Dertouzos 1999)

If IFIP WG9.4 debate on ICTs and development has drawn from any discipline, it has tended to be sociology. This paper attempts to broaden the debate by drawing on economic evidence to ask: will ICTs support economic convergence or divergences between developing and industrialised countries?

In an overall sense, technology is fundamental to development. However, ICTs – while having an uncertain impact on growth – are currently a force for global economic divergence rather than

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convergence. They diffuse more slowly in developing countries than industrialised countries, and they bring fewer benefits and greater costs to developing countries than industrialised countries.

This does not present an argument against adoption of ICTs by developing countries. Rather, it presents an argument for focus on particular applications and investment priorities.

3. Information village: Bridging the digital divide in rural India

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Abstract
Information systems in rural contexts in developing countries are severely resource challenged. However, they hold phenomenal potential to enable incremental as well as radical changes in the way of rural life. We report on one such initiative at the Information Village program by the M.S. Swaminathan Research Foundation (MSSRF) from a neo-humanistic perspective. The objective of this paper is to present the challenges to and responses associated with replicating and sustaining IT-interventions in resource challenged rural contexts. This paper is based on a larger and more detailed study conducted for the MSSRF. While responding to the questions posed by the program implementers, our study forms a response to the need for strengthening the empirical base in reporting IS implementations that are emancipatory in character. Data extracted from the in-depth case study are used to show how resource-challenged information systems necessarily have to incorporate multiple paradigms in their development, use and sustenance. In addition to this contribution to theory, we conclude by presenting implications for practice based on the importance of collaboration at multiple levels for bridging the digital divide.

Keywords: sustainability, digital divide, rural information system

4. The Global Digital Divide and Mobile Business Models: Identifying Viable Patterns of e-Development

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Abstract
Capabilities of accessing, delivering, and exchanging information in digital forms vary greatly across rich and poor nations. Mobile networks have lower fixed and operating costs, are geographically flexible, and do not require electricity to operate. Thus, they can reach quickly into regions where fixed networks are slow to emerge and thus offer the potential to bridge the global digital divide. The ultimate success of these "mobile e-Development" or MED models, however, will depend on a variety of contextual factors shaped by specific aspects of technology, economy, politics, regulation, and culture. This paper provides insights into the mechanisms by which these contextual factors are likely to influence the penetration and the degree and types of mobile phone use. Two cases are presented to illustrate how environmental forces are shaping the development of mobile markets in Asian countries.

5. Booktowns and the network society: new perspectives on developing rural enterprise

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Abstract. This paper reports from the BookTownNet project which involved five rural villages, facing the threat of marginalization, they established the BookTown network. They have developed an Internet based infrastructure to support a network organisation. We find that the use of the Internet both locally and between the booktowns has strengthened communication and collaboration, whereby creating a better basis for the small bookshops to be competitive in the information society. Our data indicates that although the booktown infrastructure and support systems have been important for the bookshops ability to implement and use the new technical solutions, this has been insufficient for stimulating the organisational changes in all booktowns. Therefore it would seem that the characteristics of the regional and local innovation systems have had a greater impact in stimulating organisational innovations than external, ICT-mediated support, at least in a short-term perspective.

We believe that these findings are relevant for similar efforts in building networks between small enterprises, also in developing countries. This implies that one should give priority to strengthening the local innovation system through interplay with the technical infrastructure and the local institutional capacity.

Keywords: information systems, innovation, diffusion, infrastructure, network organisations, small rural enterprises

6. Measuring the Impact of Information and Communication Technologies on Small Business Development in Developing Countries

Dietrich Mueller-Falcke

Abstract:

The aim of this paper is to propose easy to adopt quantitative methods to measure the impact of ICTs on small enterprises in developing countries. The positive impact of ICTs on this sector of the economy is widely claimed but empirical evidence is scarce. Testing quantitative indicators, such as productivity, poses strong requirements on the data at hand. Other effects assigned to ICTs are of qualitative nature and difficult to quantify. It is therefore proposed to concentrate on easy observable measures, such as labour profitability, turnover and wages that can be used as proxies for more general, quantifiable performance indicators. Moreover, it is proposed to examine the

entrepreneurs' perceptions of technology effects as a means to identify the impact on technology performance.

These proposed measures are tested for a sample of Indian small-scale enterprises. It is shown, that the majority of ICT users see a positive impact on competitiveness and administrative efficiency. The positive perception is, however, only partly mirrored by hard data. Analysing enterprise performance data reveals no general positive effect on productivity, productivity growth, wages and employment. However, significant relations between technology use and labour productivity, size and turnover growth is observed.

7. Moving Up The Value Chain Using Alliance-Induced Learning: A Case Study

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ABSTRACT
Companies use alliances to learn from partners. This learning can be used as the impetus to move up the value chain by introducing products using proprietary technology. The study describes the efforts of Wipro Corporation, an Indian technology firm, to move up the value chain using alliances with U.S. firms.

8. Application Of A Model For Improving Ict Management In Developing Countries: A Case Study

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ABSTRACT

A theoretical framework of situational and complexity factors associated with the diffusion information and communication technology is presented in this paper, in which we adopt the modelling approach to describe ICT related issues in public universities in Kenya. The factors that characterize much of the developing world where the infusion of ICT has been growing rapidly include age, size, and location, level of computer literacy and communication infrastructure. We also present a 4-function model designed to improve an ICT situation in a given organization from one level to another. A case study where this model was applied is also described and the practical implications of the results of the application are given. The results from the case study indicate that the model can be a useful and practical tool to managing ICT effectively and efficiently, not only in public universities, but also in other organizations in Kenya and other developing countries.

9. Can Information and Communications Technology Applications Contribute to Poverty Reduction? Lessons from Rural India

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Abstract
Information and Communications Technology (ICT) can reduce poverty by improving poor people's access to education, health, government and financial services. ICT can also help small farmers and artisans by connecting them to markets. It is clear that in rural India –as well as in much of the developing world– realization of this potential is not guaranteed. Low-cost access to information infrastructure is a necessary prerequisite for the successful use of ICT by the poor, but it is not sufficient. The implementation of ICT projects needs to be performed by organizations and individuals who have the appropriate incentives to work with marginalized groups. As this paper attests, these intermediaries are best suited to promote local ownership and poor people's participation, as well as the availability of content that responds to the most pressing information needs of the community.

10. Critical View Of E-Governance Challenges For Developing Countries.

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ABSTRACT

Complex problems of ICT deployment for e-governance in developing countries are discussed, following recent developments in Albania and reflecting on global issues. Due to political implications of e-governance, ICT are not simply a tool for democratization. Deployment of ICT may increase the discrimination of certain populations and communities. The public administration is in the center of e-governance processes. The structure and function of public administration interface with citizens would be decisive for the future of e-governance. NGOs are expected to play a crucial role in such interfaces. Openness of public administration information systems depends on institution building and decentralization processes in developing countries, and deployment of ICT must be considered as a consequence of institution building.

11. Now and Then: Internet use in research in sub-Saharan Africa

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Abstract

Internet is increasingly being used to support the work of the research scientists in sub-Saharan Africa and it is changing the ways in which research is being carried out. This article discusses some of the activities before and after connectivity to the Internet in six research organisations in sub-Saharan Africa. We explored Internet use in literature access, communication, collaboration and coordination. The benefits are seen to be improved access to current literature and reduction in searching time and cost, faster communication, ease of collaboration and improved coordination. However, Internet is not fully deployed, due to problems in basic infrastructures, partially insufficient IT expertise, and inadequate funding. Based on this study, we recommend cooperation among research organisations and exploration of cheaper sustainable alternatives in addressing the problems.

12. Career Anchors : A Case of Indian Software Professionals

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Abstract:

The concept of organizational commitment has enjoyed a great deal of research interest in the past two decades. The sustained interest in this area came from the recognition that human assets are the most important assets for the organizations development. This is particularly true for knowledge-based industries. The career anchors as a subject of research gained importance as a sub set of research on organizational commitment. Management of software professionals has consistently ranked among the top concerns of MIS management. Similarly from the employee's perspective, the lack of attention to careers and career planning appears to be a key problem facing I/S personnel. However, what becomes very clear, when we consider the literature on DP/MIS careers in the light of the broader literature on organizational careers, is how little is known of the career dynamics of IS personnel. Worse, what is regarded by many as "known" may be very misleading. Studies with broader outlooks, which include the internal career orientations of IS personnel and which examine DP as an occupational community are critical. This paper attempts to identify the career orientation of software professionals in India from the career anchor point of view. The career anchor is significant because it influences career choices, affects decisions to move from one job to another, shapes what individuals are looking for in life, determines their views of the future, influences the selection of specific occupations and work settings, and affects their reactions to work experiences. An understanding of career anchors, which define the internal career will help IT organizations in managing the fit between internal and external careers of software professionals. The study used administering questionnaire on 66 software professions. The results of the study indicate that the dominant career anchors for Indian software professional are pure challenge, managerial competence, lifestyle and service. This suggests that technical/functional competence is not an important career anchor for software professionals in Indian context in contrast to the earlier studies in other countries. The study also suggests that work experience, age and salary can result into significant difference in career anchors of Indian software professionals, but the strength of this difference is at the best marginal. The IT companies in India can use the dominant career anchors of Indian software professionals as identified in this study to frame compatible HR policies to improve their commitment level and satisfaction with their career.

<u>**Key Words**</u>: Career Anchor, Software Professionals

13. The Development Of An Information System For District Hospitals
A case study from the Eastern Cape Province, South Africa

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Abstract

Various authors have called for greater attention to the "social and behavioural aspects of Information systems". Through the use of a case study in the Eastern Cape Province of South

Africa, the development of a Primary Health Care Dataset (PHCDS) will be described. The case study will highlight a process, which was then adapted to enable the development of a District Hospital Essential Dataset (DHEDS). Lessons learnt from these processes, and experiences encountered will be used to reflect on the literature relating to the importance of adopting a holistic approach to the development of IS rather than the traditional reductionistic view which is still so often used in organisations. This is also a story about the difference between a system based on a positivist-empiricist paradigm, and one that adopts a hermeneutic approach, having as its aim the development of capacity to understand, interpret, and utilise information to improve services.

The paper will begin with a brief review of the literature. This will be followed by a section describing the context in which the case study is presented. The development of the PHCDS will be described, and will be followed by a description of the process utilised in the development of the DHEDS. A discussion section will then highlight important lessons learnt, and relate them once again to the relevant literature.

14. ICT and Development: East is East and West is West and Never the Twain Shall Meet?

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Abstract
Huge amount of investment in information and communication technologies (ICTs) in developing countries, mainly through aid and assistance from donor agencies, have failed to realise the dream of helping these countries achieve national development. We argue that this is attributable to two main reasons: flawed conceptualisation of basic concepts of ICT, development, and the interrelationship between the two, and ill-formulated development intervention strategies. In this paper, we suggest alternative conceptualisations of these concepts and examine a policy document of a specific donor agency – Norway's NORAD - to illustrate our contentions. In light of our analysis, we offer some insights for ICT and national development.

ABSTRACTS OF RESEARCH IN PROGRESS PAPERS

1. Knowledge Perspectives On Ict And Development: What The Theory Of Knowledge Can Add

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February 2002

ABSTRACT
Knowledge is often invoked as a key concept in explaining the potential of information and communication technology (ICT) to deliver development goals, and in justifying ICT-based interventions at many levels in developing countries. Yet theory in this field remains fragmented and often somewhat ad hoc in nature. This paper argues that there are benefits to be gained from more explicit engagement with the concept of knowledge and with work on knowledge in other disciplines. A more secure conceptual foundation can help to prevent higher-level theorising misconstruing the phenomenon of knowledge (for example, by oversimplifying it) and therefore misconstruing the kinds of interventions that are effective. Conceptual insight can also help to ground ideas that are intuitively appealing but that currently exist as disparate and unsubstantiated assertions. Further, it may lead to new research possibilities and greater opportunities for interdisciplinary working. I argue that one place to start in improving our knowledge of knowledge is with epistemology and cognitive psychology, both of which have a substantial history of studying knowledge directly. Although work in these areas is often highly technical I try to show how they can contribute useful insights to our understanding of ICT as tools for knowledge interventions in the developing world. In particular I argue that three dimensions – informational, epistemic and conceptual – emerge as critical to any consideration of knowledge, and that the conceptual and the epistemic have so far received little attention in the literature on ICT and development. The final section of the paper suggests some implications of taking seriously these two dimensions, concluding that more explicit engagement with foundational matters has both theoretical and practical benefits.

2. Building Networks to Support GIS for Land Management in India: Past Learnings and Future Challenges

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Abstract
Serious attempts at using modern computer-based technologies such as GIS in management of degraded lands in India have been made since the early 90's. Despite initial setbacks and resistance experienced at the field level, the long-term policy initiative and vision to inscribe these technologies in development processes have been continued, and some indications of "success" are now discernible. The present case is drawn from the ongoing study of the efforts and their outcome in one district located in the State of Andhra Pradesh. An attempt is made to understand and present the dynamics of these processes from the perspective of organizational context and transformations.

3. Communication & Information Technology Policy: A Multiple Perspective Strategy For Development

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Abstract
With the globalisation of the world economy, Latin American countries are finding that maintaining adequate Communication and Information Technology (C&IT) policies is a critical factor in development. This research explores the argument that developing countries (DC) need effective and good quality C&IT policies as a strategy for socio-economic growth. It focuses on Venezuela and attempts to gain an understanding of the current and potential impact of national C&IT policies and strategies in the globalisation process. It also discusses some key policy implications that governments of developing countries, in environments similar to Venezuela, may need to address.

A multiple perspective interpretative methodology is used in order to understand the complexities of effective C&IT policies to attract C&IT investment and achieve socio-economic growth in a Less Developed Nation. Consequently, the study of Venezuelan government C&IT policy needs to be based on an approach that emphasises a multiple level of analysis encompassing the levels of the individual, society, organisation, and technology (stakeholders to be understood in the overall setting of C&IT policy-making in Venezuela). I further argue that a shift is needed towards a wider concept of policy design. The traditional design perspective reflects a rather 'prescriptive' view, while I propose that an 'objective-customer oriented' view which encompasses, social, political, technical, ethical and other issues, is both necessary and desirable.

Keywords: **C&IT national policy, developing countries, information technology, Venezuela**

4. Designing Health Information Resources Across Diverse Cultural Contexts: A Case Study and Work-in-Progress

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Abstract
We present a case study about the work-in-progress of the Health Information Project, an international collaboration among women in the health professions and health informatics to create an interactive website as an information resource for adolescents regarding reproductive health and nutrition. The case study is concerned with the design of autonomous health information resources, especially but not exclusively those based on modern ICTs, across diverse cultures and socio-economic settings within developing and developed countries. The project has significance given that teenagers have been identified as a neglected group in need of health information resources for autonomy and self-realization, and that the health and well-being of adolescents is especially critical to the socio-economic development of developing countries. The project is not only concerned with IS design and ICTs but also with conceptual and interactional resources with which we may address complex questions entailed in working with difference, diversity, and conflict in cross-cultural communication and use of information resources and technologies across cultures with sharply contrasting traditions, norms and constraints.

5. A human rights based approach to the development of a community information system for the care of orphans and vulnerable children in South Africa

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Abstract:

This paper analyses the implications of adopting a human rights based approach to the design of a community information system for the care of orphans and vulnerable children (OVC's) in South Africa. A human rights approach entails adopting a different perspective on how we view

information and what information we choose to view. It addresses the questions of 'Who counts reality?' and as a result 'Whose reality counts?'.

This approach has far reaching implications for participation and capacity development in the design of information systems. It reinforces Pelle Ehn's view (1993) of democratic participation and skill enhancement in system design, but goes somewhat further. The human rights approach means that this approach is an obligation on the part of the government and that there is the need to go beyond skill enhancement to capacity development.

In adopting a human rights approach to system design community voices can be heard in terms of their needs, interests, and expectations. It further enables community members to hold government accountable, assess the extent to which public programmes are fulfilling the rights of the child and take action as necessary. South Africa, given its constitution and legislation, are willing, but also obligated to hear these voices and to take action to fulfil the rights of all citizens.

The paper focuses on orphans and vulnerable children as being most at risk in terms of social service delivery, but also as the least visible members of society in our current information systems.

6. Sustainable Telecentres? Two Cases from India

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Abstract
The telecentre movement is gaining momentum in the developing world as governments and donor agencies turn their attention to the digital divide. Telecentres are seen as community resources that offer access to information and communication technologies for inducing development among marginalised populations with little hope of otherwise participating in the benefits of the information revolution that the developed world is now enjoying. Whilst promising outcomes are emerging, most telecentre initiatives in Asia are still experimental and are supported by agencies external to the communities they serve. Stakeholders and observers frequently question the sustainability of telecentres, especially those in rural areas where telecommunications and electricity are problematic and expensive. With the vast majority of Asians living in rural communities, telecentre sustainability becomes a critical concern for connecting them to the wired world. Yet sustainability in development has multiple dimensions. This paper briefly examines the concept of sustainability and highlights the key aspect of financial sustainability for telecentres in the context of two case studies from India. Conclusions indicate that financial sustainability for development-oriented telecentres appears possible under specified conditions.

7. Using Health Information for Local Action: Facilitating Organisational Change in South Africa

Norah Stoops, Louisa Williamson, Jorn Braa

Abstract

South Africa initiated a national District Health Information System (DHIS) rollout strategy in the latter half of 1999. Experience has demonstrated that the implementation of an information system as a vehicle for the delivery of accountability in the management of health services, demands organisational change within a framework of human resource development and technical support.

Strategies for promoting organizational change and sustainability of DHIS implementation lie in the shift in focus from input and process indicators to one based on output and outcome indicators. A strategy for monitoring the progress of implementation was developed. The measure of organisational change is evaluated in terms of 3 levels of information systems development and use. The progress of implementation is monitored through an assessment of a district in terms of the extent to which the data handling processes within the information cycle are integrated into management decision-making structures. Two case studies illustrate the how the rollout process has been implemented in various provinces.

The aim of training, to empower facility and district staff to use locally generated information to improve coverage and quality of primary health care services, can only be realized if training and innovation for change are supported by an appropriate infrastructure. Experience has demonstrated that this process is slow, with ongoing training and support as key strategies.

The appeal of HISP software, a locally developed application system lies in its user acceptance. While computers form a vital tool in providing easily accessible information for decision-making, their use must not be seen as a panacea for all information problems in primary health care services. The social processes of human resource development, changing organisational infrastructure and the use of ongoing evaluation rather than those of technical infrastructure are seen as key mechanism to facilitate this change.

8. Telecentre experience in Mozambique: A Case of using information and communication technology (ICT) in a rural Community

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Maputo, 2002-20-01

Abstract

This paper describes a case study based on the first experience of introduction of ICT in rural community in Mozambique. The paper examines the events and issues experienced by different actors in two districts in Mozambique during the course of initiation and implementation of the Telecentre initiative. This article presents the results of the study undertaken in Manhiça and Namaacha Telecentres, during 14-26 August 2000. The main objective of this study was to assess

how the two Telecentres were functioning a year after they had been established and draw some viewpoints about the role of Telecentre in the improvement of the life of the community members living in these two districts.

9. A Systemic Framework for the Evaluation of Rural Telecommunications Infrastructure in South Africa

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Abstract: The evaluation of telecommunications infrastructure in rural areas is a complex and messy problem that involves many tangible and intangible factors. Some of them are technical in nature while others are soft, involving social, cultural and political aspects of the problem. Evaluation of the infrastructure is a necessary step in assessing the impact of telecommunications on development or any future plans for deployment of new facilities. The evaluation of such infrastructure requires, *inter alia*, societal intervention. Since societies reflect a multiplicity and diversity of values and goals, the evaluation should reflect that. One such aspect is the fact that we are dealing with rural communities that are disadvantaged in terms of telecommunication and other service provision. This underlies the need to consider the evaluation process from multiple perspectives, explore methodologies that will facilitate participation and engagement, and include improvement of the plight of the disadvantaged. This paper proposes a framework for the evaluation of rural telecommunications in a regional context. As such, telecommunications is viewed not just as an engineering phenomenon, but also as an economic and social phenomenon. Its complexity requires the use of a mix of methods in a complementary manner. The evaluation framework is based on a combination of the strengths of Soft Systems Methodology, Critical Systems Thinking and the Analytic Hierarchy Process. An experimental implementation of the framework showed its relevance to rural telecommunications development.

10 Village Area Network, Bohechio

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Abstract
A Village Area Network (VAN) is a pervasive wireless digital network providing fixed and mobile information and communication services to rural developing communities. The goal of a VAN is to provide services and capabilities that enhance the economic development of rural village communities, as well as raise living, medical, and educational standards. A VAN was deployed in April of 2001 throughout the rural community of Bohechio, located in the Dominican Republic. Centered around a LINCOS multipurpose community telecenter, the VAN covers a radius of 1000 meters, cost less than $20,000 USD, and provides access for mobile and fixed wireless devices and services at internal speeds of 11 Megabits per second.

Preliminary results suggest that the VAN provides a platform for applications that can improve agriculture, entertainment, employment, medicine, and education in the area, as well as provide basic internet access (browsing and email) and telephony for residents of the community. Research is ongoing into innovative education systems, agricultural support environments, voice communication systems, and low-cost antennas.

11. Mapping the Micro-Foundations of Informational Development:Linking Software Processes, Products and Industries to Global Trends

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Abstract
The technical and production structures of information industries, the mechanisms that translate information into new products and power, remain opaque. Without defining these micro-foundational patterns, simple questions — what is information, how is it produced, is this production structure significantly unique — remain unanswered, limiting analysis of information-based development generally, and evaluation of higher-level "information" theories specifically. Opening the "black box" of software outlines these production practices in one of the central industries of the coming decades, helping explain its social and economic impact and locating its evolution within broader global economic patterns.

Software is a unique informational practice that draws on socially structured domain-knowledge as its central resource. This clarifies the importance of information and design in an informational environment, as well as signals the impact of digital architectures in structuring new patterns of social interaction. These informational patterns are embedded in software both technically and through the development process, resulting in a strong cohesion between production, product and industry structures. The expansion of software process and products throughout society raises the impact of these unique patterns in shaping future economic and social structures in multiple industries, locations and institutions.

Detailing the informational patterns in software opens a path to consider an ideal-typology of informational production. Such an ideal-type helps define terms and hypotheses that capture both unique differences and general patterns in an informational environment. Ignoring such patterns limits our understanding and analysis of the broader social transformations in the global environment. Failing to recognize these processes limits the space for social debate, policy and action around the establishment and evolution of new digital architectures at the locus of their development.

12. Information Systems Development In Nigerian Software Companies: The Industry Survey

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Abstract
This paper presents the results of a survey on information system development (ISD) in Nigerian software companies. The research set out to identify the factors that affect development practice, the development activities, the method(s) and tools employed in the Nigerian software industry, the type of education received and other relevant factors in such settings. Specifically, the research questions are as follows:
- How can the software industry, and ISD in particular, make a significant positive impact on the development of Nigerian society?
- How can Nigerian universities facilitate the software industry to make such an impact?

The software development work practice in Nigeria has been studied as a model for Sub-Saharan Africa. Three methods (Action Research in a case setting, an in-depth case study in two selected Software companies and Survey of Software companies) were employed to study the whole chain of ISD services in Nigeria. This paper focuses on the survey part, which gives a panoramic view of the ISD practice in Nigeria.

The software industry was found technically and methodologically capable to develop appropriate software products. There is, however, a gap between the practice and the educational system. Although the software companies have been able to develop many of the necessary skills on the job, there is a need to expand information systems education in the universities. The challenge facing these companies is the influx of foreign packages with which these companies cannot really compete for financial reasons.

13. Software Production in Developing and Emerging Countries through International Outsourcing

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Abstract
This study examines and analyses how the software production through international outsourcing process is executed. This research was carried out by reviewing literature, interviewing of and consulting with researchers and practitioners and analyzing case companies, which have executed the various phases of outsourcing process. This study contributes both in terms of theory and practice. At the theoretical level, it provides a framework of international software production through outsourcing that can be used as a basis for further research. The study identifies various factors that are creating barriers to international outsourcing and mechanisms for controlling the risks of outsourcing projects. It describes in detail one case company as an example of the software production through international outsourcing. At the practical level, the framework can guide managers in international software production through outsourcing process, effectively and efficiently.

14. Software Export Success Factors and Strategies in Developing and Transitional Economies

Richard Heeks[3] & Brian Nicholson[4]

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2002

Abstract
Many developing and transitional economies (DTEs) have become active or interested in software exports. This paper analyses the experiences of the three largest exporters – India, Ireland and Israel. It develops a 'Software Export Success Model' on the basis of that analysis. It uses the model to investigate current strengths and weaknesses of three 'second-tier' exporters: Russia, the Philippines, and China. It then draws some conclusions about recommended actions for these and other would-be software exporting nations.

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15. Outsourcing in Information Systems Development Projects in Banking Sector: Concepts, Principles and Opinion The experience of Banco de Moçambique

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Esselina Macome

ABSTRACT
The term outsourcing is generically used to indicate purchase from a third party of goods and services [Jones, 1998]. Over the last years, it has become one of the tools in the management of purchase of goods and services in the field of Information Systems and Information Technology (IS/IT).

Outsourcing has adopted over its existence diversified concepts and pragmatism in its use particularly from the beginning of the 90s. This is because in the past, financial aspects were viewed being the main reasons for an institution to adopt an *outsourcing* policy. However, today strategic factors like concentration of resources in core business activities, competitive advantage, social and technical aspects among others have become determining factors for the adoption of outsourcing rather than cost reduction [Lacity & Hirschheim, 2000].

Outsourcing is a complex and polemic issue in special for developing countries as it is the case of Mozambique where some aspects of outsourcing need to be improved. One of the reasons for adopting outsourcing in IS/IT field is the fact that it allows access to the best technology and talent at a low cost. In the case of Mozambique this goal is very difficult to achieve because the local market of IS/IT is still poor, making the outsourcing issue more complex.

This paper presents the result of a case study done in the banking sector in Mozambique.

The case study presented in this paper intends to show the experience of Mozambican Central Banking in outsourcing process taking into consideration the conditions of the country's economy. It is believed that it can serve as a lesson for similar institutions that adopt outsourcing as a model for the management of Information System Development Projects (ISDP) in the context of Developing Countries.

The case study brings up a conclusion that an institution must carefully analyze the market environment and ensure that all members of the organization fully understand why the institution is adopting outsourcing for IS/IT as well as that the organization possesses contract management skills.

16. Accountability and ICT Development Discourses

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Abstract
The rhetoric used in strategy and policy documents for information and communication technology (ICT) is overwhelmingly monolithic – no matter if it is formulated in economically rich or poor countries or in international organisations. ICT has become a mantra for economic development – on the global as well as the local level.

The emphasis on global ICT development has changed over the years and moved from infrastructure through regulatory issues, application areas, content and knowledge creation to empowerment. Stressing the focus on implementation gives us opportunities to go beyond the rhetoric and phase realities of the postcolonial situations of women and men in low-income countries. Implementation of ICT, which secures cultural and economical sustainability, is not possible without relating accountable for the reality- producing aspects of ICT (reinforcing the resource gaps or starting to close them).

This paper addresses questions concerning dominating discourses and signs of subordinate ones in ICT policies and strategies in the areas of encounter between economically rich and poor countries. How is it possible in this context to make space for the lives lived by women and men in nationally situated ICT implementations?

17. Precursor To The Diffusion Of Ict's For Africa's Least Developed Countries: Policy, Teledensity And Internet Diffusion.

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Abstract
The Digital Divide between the developed countries and some parts of Africa seems to be drawing closer, especially, for many northern and southern African countries in terms of information and communications technology. These countries are experiencing tremendous growth in use of computers, Internet connectivity, wireless communications and many other related technologies. However, the same is not true for Africa's least developed countries (ldcs) that are still greatly behind other regions of the world in terms of the level of basic telecommunications infrastructure such as teledensity (number of main telephone lines for every one hundred inhabitants). While it is true that Africa's ldcs have some Internet presence, it seems to be limited only to the urban elite. These countries may therefore not be in the position to exploit most of the benefits the Internet can offer. This study suggests that an adequate tele-density infrastructure, an appropriate policy framework, wealth, the number of pc's or access to one, low telephone and internet charges, literacy, as well as training and awareness are the precursor to the diffusion of various information and communications technologies. Furthermore this study proposes a set of strategies that Africa's ldcs should consider as steps to improve growth of their tele-density.
Keywords: Digital Divide, Teledensity, Telecommunications Infrastructure, Internet, Least Developed Countries, Africa.

18. Information Technology in Nepal: The Need For A Comprehensive Strategy

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Abstract
This paper is about the national information technology (IT) strategy of Nepal. The researcher is concerned that Nepal's strategy needs to consider more than just what Mitroff and Linstone [1993] call the 'technical perspective.' Rather, it needs to address the deeper organisational, cultural and personal issues. Specifically, this paper explores the argument that Nepal's national IT strategy needs to be based on more sociological research into cultural, personal and institutional issues. To capture the social, political and cultural dimensions of information technology acquisition process, the analytical framework of this research is grounded on the interpretative approaches. The framework is based on the premise that to gain an in-depth understanding of the ways in which the technology acquisition process takes place in organisations requires analysing it from various perspectives: socio-economic and political situations; the policies and strategies; the roles, interrelationships, approaches and mechanism of different stakeholders involved in acquisition process; and the organisations and managements that govern the process. I think that the strategies likely to succeed are those that aim to enhance national capabilities, including IT education, investment in communication infrastructure, and support for institutional development. The case of the implementation of a computerised Value Added Tax (VAT) in Nepal is presented to draw out some of the relevant issues.

Key Words: Information Technology (IT), National Capabilities, Developing Countries, National Strategy, and Nepal

19. Risky Business – A Case Study on Information Systems Development in Nigeria

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Abstract

The role of information technology (IT) for socio-economic development has been agreed to be remarkable by several authors, especially in industrialized countries. The expectations of IT in developing countries have been high, but the real benefits and the positive impacts have been somewhat disappointing. The technology transfer to Africa has been too dependent on the external factors, like international aid donors, and emphasized on technology itself. The more important task is to produce, manage and deliver relevant information systems appropriately within Africa, for African people. In other words, there is a need for locally developed information systems, which are based on local needs and structures. In addition, the development should be done by using appropriate methods for African context. Very little empirical research has been conducted on the work practice of software engineering and information systems development in developing countries. In INDEHELA-Methods project we have studied the practice of information systems development (ISD) in Nigerian software companies. This has been done in two parts, one aiming at a 'landscape view' using a survey, and the other at 'in-depth portrays' using case studies in different companies. We have also conducted a risk study in order to find out most common risk factors in software development projects. In this paper, we present one case as an example of systems development work in Nigeria. We analyse the factors that make it different compared to industrialized countries, also in terms of risks. We also discuss the case in light of the results we have obtained through the survey.

20. ICTs, e-learning, and simulations: bringing knowledge-intensive management to Asian agriculture.

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Abstract

In developing Asia, agriculture is one of the most important economic sectors as well as the principle employer. Currently, Asian agriculture is under pressure from growing populations, increasing affluence, a dwindling natural resource base, and globalisation. Asian farmers need to improve their economic performance, increase profits and production, and move towards sustainable agriculture.

Previous advances in agriculture have come through improvements in traditional inputs, but future improvements will rely on intelligently used information to better manage agricultural production. Knowledge-intensive management (KIM) can improve profits, production, and sustainability in the agricultural sector. Until human resource development and Information and Communication Technology (ICT) infrastructure is sufficient to deliver knowledge-intensive management skills to farmers, the information and skills can be delivered to agricultural professionals, who in turn can help farmers access the information and skills they need for better management.

ICTs can be used to deliver knowledge-intensive management skills to agricultural professionals through e-learning. e-learning is a flexible form of education that allows participants with different schedules in different locations to interact and learn in a collaborative, online environment. One tool of e-learning is simulation, which allows real-world phenomena to be simplified and mimicked on screen. Users can experiment in an interactive environment in order to learn complex or difficult concepts.

For example, pesticide resistance management is a complex phenomenon that can be taught using simulation. By guiding users through a series of exercises, and allowing users the opportunity to experiment, a pesticide resistance simulation can be a valuable tool for learning this concept. As part of an e-learning package that is delivered via ICTs to agricultural professionals in developing Asia, such a simulation can help farmers better manage agriculture in the face of current challenges.

21. Affordable Technologies For Enriching Education In Developing Countries

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ABSTRACT
ICT will be the major driving force of the global economy and academic development in this millennium. The Internet age has radically changed the way educational institutions use technology. Youths in developing countries need to be educated in preparation for this challenge. With this acceleration of Information Technology use in Academic Institutions, we find ourselves faced with the constant challenge of balancing services, costs, and outcome. The gap between our budgets and the cost of acquiring and maintaining IT is widening year after year. So Lowering the Total Cost of Application ownership (TCA) has now become an important task. Recent technologies like Thin Client Paradigm and Application Service Providing are found to be more promising to lower TCA. The key objectives of this paper are:(a) to highlight Government key policy and regulatory issues relating to the use of ICT for education and learning.(b) to examine the recent technologies for the implementation of ICT for education and learning.

Keywords: developing countries; ICT; TCA; legacy PCs; thin client; WBTs; ASP.

22. e-Based and Contact-Based Computing Studies for Tanzania: Action Research from Challenges via Changes to Chances

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Abstract

Knowledge and skills in computing, or the academic discipline of Computer Science, are a prerequisite for mastering information and communication technologies. Therefore, in order to boost the characteristic of a viable community which utilises ICT in a functional, even creative way, it is essential to arrange education in fundamentals of computing, not only its applications. Challenges arise when this kind of education is carried out in the context of a developing country. First of all, the shortage of competent teachers makes the use of educational technology a necessity. Secondly, the curricular differences in primary and secondary education compared to the students' preparedness in industrialised countries imply that a traditional academic program in computing does not usually fit in the reality of a developing country. Thirdly, cultural differences in issues like the mode and goals of learning or a student's allocating time between various activities have consequences, which a Western educational designer is hardly aware of or even prepared for. Fourthly, the expectations from the environment where an ICT professional is supposed to work after her education vary a lot, as well as remuneration which they might be able to offer.

In our scheme, two Tanzanian students with an earlier attained Bachelor degree in business came to study Computer Science to a Finnish university for two years, with a goal to get a Master's level education in computing. As a part of their training, they were supposed to work out electronic material on preliminary Computer Science, preferably rooted in their own cultural background – this was assumed to guarantee the continuation of the educational program in Tanzania and transfer of skills and knowledge acquired. They were throughout their studies advised by Finnish peer students. The study period in Finland was preceded by a two months' orientation to programming and Finnish culture; this introduction took place in Tanzania.

According to our experiences, designing (computing) studies targeted for another culture, in particular on the other side of the digital divide, needs constant reiteration. Observed challenges change during the process; but the updates turn into new chances – which again will be reborn as novel challenges. The need for this kind of action research approach applies also to the creation of learning materials. We got yet another indication of the need of designing educational material with its future users.

Keywords: Virtual studies of ICT and Computer Science, Cultural perspective, Ethics of computing, Computer Science curriculum in developing countries, Contextual computing, Action research.

23. Digital Learning and Education: Opportunities and Some Issues of Integration and Management

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The present paper argues for the need of introducing technology-based instruction (TBI) into our curricula at all levels of education. TBI, it has been argued, allows students to augment regular curriculum with current information and relate to the study of real world events. It was hypothesised that students, who were taught using TBI, would be able to connect instruction to other real world problems in a better manner and would achieve much better standards of learning than those who were taught using traditional instructional methods alone, as they imbibe more sophisticated language linkage skills, conceptual knowledge and higher order thinking. The dynamic characteristics that concretise digital learning (DL) and its various advantages such as random accessibility, possibility of multi-level exploration, ease of manipulation, creative use and self-paced learning were used in an experiment to quantitatively demonstrate the advantages of TBI in an actual instructional setting. The educational implications of the experiment, that is, the role of DL as a possible link to improve conceptual knowledge and language linkage were then explored. Finally, steps of technology infusion were identified and issues in effective management and instruction, curricular needs, aspects of classroom management were reflected upon.

24. An investigation into community development imperatives brought about by the recent establishment of a local area network and access to the Internet at a rural South African community education center

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Abstract
This paper reports on research in progress of a study undertaken at a rural South African community education center. The study uses Action Research to investigate the community development imperatives brought about by the recent establishment of a Local Area Network (LAN) and access to the Internet at the community center. We are finding the study to be both enriching in insight and meaningfully contributive to community development. The paper contains a description of the research context, the research purpose and questions, the philosophical foundations, the use of theory and the research method. The research design and interpreted interim results of the early part of the study are presented.

25. Clinical Laboratory Information System in Mozambique:The great challenge

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Abstract

Many information systems in developing countries need to function in a context characterized by serious limitations imposed by reasons of poverty, inadequate infrastructure and human skills shortage. Clinical laboratory information systems are also no exception to this condition, and this paper illustrates some of the complexities that are inherent in the functioning of these systems in peripheral areas in health districts in Mozambique. The health sector provides a salient mirror for reflecting upon the significant role of work practices in producing problems in quality of data, in information flows and in information management. We identify and analyse constraints in current district laboratory information systems that pose challenges for management of information and for achieving quality assurance of laboratory data. Furthermore, we suggest how understanding information systems as social systems situated within complex "actor-networks" generates, extends and contributes to insights into problems and challenges that health officials have to confront with the functioning of these systems. The analysis is based on ongoing empirical research being conducted in Gaza province (one of the southern Mozambican provinces) in June-July 2001, as part of a three-year longitudinal study (2001-2004), carried out jointly with the Mozambican Ministry of Health. The overall aim is to contribute to improve the functioning of the laboratories by strengthening the laboratory information system and its integration with the District Health System.

26. Vaccination coverage is still a big issue: an information systems perspective on Expanded Program on Immunization in Mozambique

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ABSTRACT

Information systems are crucial to district health management. However, districts exist in specific contexts that affect its performance. The present article addresses constraints emerging out of these contexts using the Expanded Program on Immunisation (EPI) in a developing country (Mozambique) for illustration and discussion. EPI serves as a common link between district health authorities that are committed to the goal of universal coverage (or minimum coverage targets). The focus is on the processes involved up to the administration of vaccines to clients. The study is a longitudinal case study based on empirical material collected during the periods of June, July 2000 and February 2001 in Niassa, Inhambane and Maputo province. Actor Network Theory (ANT) is proposed for analysis of the case in a dynamic way using information systems perspective. The findings show that for adequate inscription measures there is the need for a more participative enrolment of different actors on all dimensions of delivery and usage of services. The main constraining factors to the translation process have been the missed opportunities to vaccinate, a defective cold chain and misuse of population data. The present article is part of an ongoing research in NHS in Mozambique

27. Transfer of public sector information systems between developing countries: south-south cooperation

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Abstract

Technology transfer from north to south has been studied in several research projects. This paper describes a case of transfer of technology from one developing country to another. It describes the process of selection, installation, assimilation and adaptation of a district health information system for Mozambique based on the South African health information system. While north-south transfer has been hampered by problems related to economic and cultural differences, one might hope that south-south transfer avoids these problems. The case shows that also transfer between two neighbour countries in the south entails problems of assimilation and adaptation. A model of donor-funded transfer is adapted to fit the observed case.

28. The status of health management and information management in the Mozambican health districts: overview and preliminary findings

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ABSTRACT

An old tradition in the Mozambican health system is the appointment of doctors to perform both clinical and managerial tasks in the health districts. As a consequence, a paradox embedded with conflict and potential arises when we take into account the often neglected but essential role of the districts in the health information system and the diverging perspectives of medical duty and management responsibility. Although doctors might be comfortable with clinical data, there might be problems with the collection and use of health managerial information therefore putting at stake the critical role of the health sector in the larger socio-economical development of the country. In addition, with the health sector reform and the deployment of ICT, news forms of pressure and intensification are brought to the paradox. In this paper we provide a descriptive and analytical account of the relationship between health management and health information in the typical Mozambican health district. The place of information as a tool for health management and as an indicator of the doctor's personal interest and involvement with the district setting is also discussed.

29. The Internet As A Tool To Provide Feedback To International Aid Organisations on Projects in the Developing Countries.

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Abstract.
The purpose of this study is to highlight the use of the Internet to improve the reliability of information supplied to Aid organisations [IMF/World Bank; UN] from official sources in developing countries. I argue that local people's confidential feedback on projects via the Internet would improve the effective utilisation of Aid from the Western world. Developing countries need good two-way flow of public information on project progress. The use of the Internet's potential(s) in a way that will benefit society at large and in particular vulnerable groups will be examined within a wider framework of the

actual needs and existing facilities of these communities. An interpretive evidence collection method will be used through questioning and interviews with stakeholder groups validated by observation where possible. How useful and in what areas the Internet will be applied to benefit social development will be explored. This research should also highlight the pragmatics of giving local people an international voice.

ABSTRACT

Information systems are crucial to district health management. However, districts exist in specific contexts that affect its performance. The present article addresses constraints emerging out of these contexts using the Expanded Program on Immunisation (EPI) in a developing country (Mozambique) for illustration and discussion. EPI serves as a common link between district health authorities that are committed to the goal of universal coverage (or minimum coverage targets). The focus is on the processes involved up to the administration of vaccines to clients. The study is a longitudinal case study based on empirical material collected during the periods of June, July 2000 and February 2001 in Niassa, Inhambane and Maputo province. Actor Network Theory (ANT) is proposed for analysis of the case in a dynamic way using information systems perspective. The findings show that for adequate inscription measures there is the need for a more participative enrolment of different actors on all dimensions of delivery and usage of services. The main constraining factors to the translation process have been the missed opportunities to vaccinate, a defective cold chain and misuse of population data. The present article is part of an ongoing research in NHS in Mozambique.