Applying Scandinavian ISD principles in an African Context: Opportunities and Challenges

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Abstract. The new information and communication Technologies (ICTs) offers a great potential for well-being, education, and liberty for developing countries. However if the countries are unable to benefit from the new technology, problems will accumulate and they will get more behind - as it happened in Africa. Unfortunately, these countries have a vast need for the technology to develop their economies and living standards. We investigate opportunities of applying Scandinavian principles for ISD&I in the context of Africa, through analyzing and comparing two action research projects that have applied two classic approaches; The Trade Unionist (TU) and the Activity Theory approach. We focus specifically on the principles of participation, empowerment, and evolutionary design and discuss how they can help mitigate the challenges, create opportunities and exploit possibilities of ISD&I in this context. Based on this we argue how and why we think the Scandinavian approaches to ISD&I can be useful for the African context and in developing countries in general.[1]

Keywords: Information systems development and implementation, Scandinavian principles, Participation, empowerment and evolutionary design, developing countries specifically African context

1 Introduction

The new information and communication Technologies (ICTs) offers a great potential for well-being, education, and liberty for developed and developing countries alike (Castells 1996; Kabamba 2008). However this crucial role of ICT's in stimulating development is a two-edged sword. On the one hand, it allows countries to jump stages of economic growth by modernizing their systems, and they can increase their competitiveness faster than in the past (Bilas & Frank 2010). On the other hand, however the countries that are unable to benefit from the new technology, will accumulate problems and get more behind - as it happened in Africa (Castells 1996).

[1] To the readers: this paper is under construction. There may be (many ☺) inconsistencies stemming from moving things around – we apologize for that. We would like you to help us develop the idea of the paper. How can we (from this paper "skeleton" provide solid ground for providing principle recommendations for African ISD&I draw from Scandinavian principles?

Although ICTs have the potential to accelerate development, enhance the effectiveness and efficiency of even the highest priority sectors of socio-economic development, such as health care, the global information infrastructure is creating gaps between the rich minority and the poor majority larger and wider than any other socio-economic and cultural phenomena in the history of mankind (Bilas & Frank 2010). For most African countries the digital divide and its implications has to do with their inability to deploy, harness and exploit the developmental opportunities of the emerging technological revolution and thereby advance the process of their socio-economic development Bilas & Frank (2010).

Organizational changes driven by ICT and involving information systems development and implementation (ISD&I) is highly challenging because of high complexity and heterogeneous stakeholders. The approaches and principles adopted are quite diverse and vary in different settings (Mursu et al. 2000). Avgerou (1995) emphasized the need to adjust ISD&I practices and approaches according to any given socio-economic, cultural and organizational context and different ISD principles and approaches have actually developed over the years in different parts of the world. However in most cases, IDS&I in Africa involve very complex processes influenced by several factors. The complexity is related to the complexity of the socio-political and economic context of the countries and notably the Sub-Saharan African countries. Prevailing conditions in these countries make it difficult for ISD&I approaches and methods to gain wider acceptance and application and research has shown an overweight of failing attempts of development through IDS&I in developing countries (Avgerou, 2008).

Scholars (such as Avgerou 1995; Braa 1997; Mathiassen & Sheepers 2000; Mursu et al. 2000; Korpela et al) have argued that, African countries could benefit from adopting some of the principles of sound systems development approaches in order to accelerate wider adoption, implementation and utilization of ITC's in an effective way and but also that it is important to take the contextual factors into account when adapting western based ISD&I approaches and methods. They suggest that the Scandinavian approaches to IDS&I can be particularly useful in the African contexts.

The Scandinavian countries have introduced a variety of principles and approaches to guide and influence ISD&I practice and research that take into consideration the Scandinavian contextual values- like homogeneity, well-functioning traditions for handling negotiations and cooperation, and social democracy (Ivari & Lyytinen 1998; Mathiassen & Scheepers 2000). Compared to North American MIS tradition (which mainly focuses on positivistic approaches and objective empirical investigation), the Scandinavian traditions are characterized by their principles of "grass root" approaches as they emphasize IS evolution, user-participation, alternative process models, and they seek varying innovative theoretical foundations for IS and ISD. They also apply mainly anti-positivist and action oriented research approaches (Ivari & Lyytinen 1998, pp. 135).

The Scandinavian critical traditions are hugely influenced by the socio-cultural, economic and infrastructural climate of the Scandinavian countries. For example, the Scandinavian environment is characterized by homogeneity, an established legal framework, high level of technological infrastructure, flat organizational structure, high level of education and skills, and rich societies and still Braa (1996) argued that the principles of the Scandinavian ISD&I approaches could be applied in the contexts

of Africa since the values and principles involve local adaptation of IS, empowerment and the creation of local commitment and ownership through participative process.

So, the question is, if and how the Scandinavian critical ISD&I principles influenced by the values of the homogeneous and non-hierarchical social structure of the Scandinavian countries, can beneficially be applied to inspire and influence ISD&I practices in the African context with its heterogeneous culture and rigid bureaucracies. This paper aims at examining the opportunities and challenges of applying the Scandinavian principles of critical ISD&I research in the African context. We are aware that ISD&I principles and approaches that have been used in Scandinavian countries have been designed with a much more affluent and less constrained setting in mind than with many African contexts. The paper, therefore, aims to answer the following research question:

What are the challenges and opportunities of adopting critical Scandinavian ISD principles in the context of Africa?

To answer this, we have studied two ISD&I projects (i.e. HISP[2] and INDEHELA[3]) that have been working for more than a decade in introducing the Scandinavian critical approaches and principles to ISD&I activities in many African countries. In order to ensure a solid foundation for our discussions and conclusions we analyzing the literature published in leading IS journals from the projects through content analysis of the actual texts based on an analytical framework we have developed around the Scandinavian principles of ISD&I. The framework helped us for each project to display the ISD&I context (including the economic, socio-cultural and infrastructural characteristics'), the values and principles that characterized the project in general and specifically as Scandinavian critical ISD&I (emphasizing the principles of user participation, empowerment, and evolutionary ISD). Based on this rather rigid content analysis, we discuss how the findings can be interpreted to guide coming ISD&I in the African context and in other developing countries as well.

The rest of the paper is organized as follows: section 2 provides an overview of the research context (more specifically the African socio-economic and technological environment), whereas section 3 highlights the Scandinavian ISD&I principles and present the analysis framework. Section 4, deals with the methodological approaches adopted for this research and 5 deals about analysis and discussion of the findings, whereas section 6 provides concluding remarks.

2 Research Context: African socio-economic and technological environment

The Many scholars including (Castells 1996; Kabamba 2008) emphasized the potential for well-being, education, and liberty offered by the new information and

[2] HISP- Health Information Systems program: www.hisp.org

[3]INDEHELA- Informatics development for health in Africa http://www.uku.fi/indehela

communication Technologies (ICTs) for developed and developing countries alike. The crucial role of information and communication technologies in stimulating development is a two-edged sword. On the one hand, it allows countries to jump stages of economic growth by modernizing their systems, and they can increase their competitiveness faster than in the past (Bilas & Frank 2010). On the other hand, however the countries that are unable to benefit from the new technology, will accumulate problems and get more behind - as it happened in Africa (Castells 1996).

Although ICTs have the potential to accelerate development, enhance the effectiveness and efficiency of even the highest priority sectors of socio-economic development, such as health care, the global information infrastructure is creating gaps between the rich minority and the poor majority larger and wider than any other socio-economic and cultural phenomena in the history of mankind (Bilas & Frank 2010).

Most African countries are generally classified as having comparatively less or inadequate access to modern ICT infrastructure and poor access to skilled manpower. But according to Bilas & Frank (2010), for most African countries the digital divide and its implications has more to do with their inability to deploy, harness and exploit the developmental opportunities of the emerging technological revolution and thereby advance the process of their socio-economic development. The conditions in the African context include poor infrastructure and unskilled manpower, different legal cultural, political and social systems; different economic and technical realities; and individual and systemic powerlessness (Kiggundu 1984; Braa 1998). Besides, organizations in most Sub-Saharan African countries are managed as closed systems that are barely responsive to external changes (kiggundu 1985), and they also exhibit dysfunctional modes of conflict management, inter group rivalry, little capacity for openness, trust and the rational expression of feelings, and well established hierarchical and social status barriers (Faucheux et al. 1982). These realities are still prevalent in most organizations of African countries.

Also the UNDP (United Nations Development Program, 2001) and the World Bank (through its Global Information and Communication Technology Department) back this view and argue that the need exists for developing countries to implement national ICT strategies to help them build ‘knowledge societies’ and foster development.

In contemporary development reports, the low diffusion of computers and telecommunications in desolate regions such as sub-Saharan Africa is used as one of the main indications of their plight (Avgerou 2002). Avgerou (2002) also note that “a closer look to consider the way such technology diffusion impacts on the economic, social, and organizational context of specific developing countries tends to reveal rather bleak pictures of `failed` projects, and unused technologies often demoralizing rather than `enabling` development”. So even though ICTs in business organizations around the world converge, the impact of their use may well depend on national culture and the specific characteristics of the economic and organizational environments in which they are embedded. ICT initiatives in developing countries in general and in African context in particular, are also typically characterized by poor infrastructure, inadequate human resources, and lack of an information culture and of basic computer literacy (Walsham et al. 1990).

Heeks (2002) pointed out the following challenges for the implementation and use of IS and ICTs in the context of developing countries:

- The technological infrastructure (telecommunications, networks, electricity) is more limited and/or older.
- Developing country organizations are more hierarchical and more centralized.
- Developing countries have less money.
- In addition, the cost of ICTs is higher than in industrialized countries whereas the cost of labor is less.

However, despite all the challenges listed above, there are indications that these conditions may be gradually changing, and many African countries have in recent years observed a strong increase of adoption of various ICT applications. For example, Spanos et al. (2002) argued that, while developing countries were reluctant to accept information and communication technologies (ICTs) in 1960s and 1970s, in recent years they have come to realize that "ICTs has come to constitute the basis of economic development both at the macro and micro levels, and hence those actors that fail to participate in such developments risk increasing marginalization" (Spanos et al. 2002). As a result, many developing countries are attempting to deploy ICT in various facets of governance. Bodvala (2002) for his part argues that the potential of modern ICTs for public sector application is being increasingly recognized and various developing country governments are in the process of implementing various initiatives ranging from telemedicine to the use of Personal Digital Assistants for data collection to the computerization of district health information systems (DHIS).

In summary the challenges in developing countries and especially in the African context are severe, however the potential of ICT's to enhance and speed socio-economic development is increasingly recognized both at political and donor level of the countries, but the divide between how successful the countries are in engaging ICT's appear wide.

3 Scandinavian Approaches to ISD&I

The Scandinavian schools of ISD&I include a plurality of specific approaches that vary to a large degree "in theories, research approaches, topics and outcomes", but departs substantially from North American MIS tradition which mainly focuses on positivistic approaches and objective empirical investigation (Iivari and Lyytinen 1998). The Scandinavian approaches were established over 2-3 decades of IS research starting in the 1960's when the socio-political history and dynamics of the Scandinavian society (Boland 1998), combined with a rapid and intense utilization of computers formed a fertile environment.

The approaches share common characteristic of being grass root driven and emphasizing IS evolution, of user participation and of alternative process models. They are also applying "dominantly anti positivistic and action oriented research approaches" (Iilvari and Lyytinen 1998, p. 135).

Especially the critical research tradition of Scandinavian ISD&I has been influenced by the idea and values of democracy- within all spheres of life- including

the workplace. As such, the critical tradition rejects the harmonious view of social relations in work environments. The proponents of this tradition see organizations not as "cybernetic systems or symbiotic socio-technical systems, but as frameworks for conflicts between various interest groups with unequal power and resources" (Bansler, 1989, pp. 128). The critical ISD&I tradition that focus on job satisfaction and industrial democracy, that bear a conflict view and that emphasis opposing interests while thinking of labor force as individuals and group subjects tend to be the Scandinavian ISD&I approaches that depart mostly from the North American MIS tradition. Braa (1996) suggested, that the critical ISD&I tradition could become an interesting source of inspiration to inform and shape ISD practices at a local level in many African counties, being at true alternative to the often failed North American MIS tradition.

In this paper, we focus on four important principals of Scandinavian ISD&I as they are played out in the critical tradition; (User) participation, empowerment, evolutionary ISD&I and situatedness. We have chosen these four principles because we think they offer opportunities for ISD&I in the African context.

By **user participation** we mean "the involvement of users in work activities during systems development" (Bjerknes and Bratteteig 1995). This participation can have different degrees of involvement ranging from representative to direct collaboration and of different degrees of influence on the design decisions. The focus on user participation that is widely shared among the Scandinavian ISD&I schools, becomes most radical and innovative in the critical tradition. The fundamental understanding of opposing interests between capital and labor and of organizations as having inherent conflicts demands increasing work democracy and ensuring "the members of an organization the right to participate in decisions that affect their work" (Bjerknes and Bratteteig 1995). Designers and researchers have to arrange for fair and open possibilities for labor force to participate in the design processes to reach acceptable alternative solutions. The participate ideal aims further than improving the knowledge base for building the information system or than ensuring matching of expectations. Among the approaches that carry this tradition are the Collective Resource approach, (Ehn and Kyng 1987) designing to increase democracy and skills, and the Trade Unionist approach (see below).

By **empowerment** we mean to increase the ability of someone or some group of people to influence something they want to influence. Often they gain more power to take control of their own lives. Empowerment applies both to the aims and the means of ISD&I in the Scandinavian tradition. As mentioned above members of an organization should be given a high degree of influence on the design process and decisions, thus having the power to influence their own work. But also the resulting ICT should help empowering individuals and groups of powerless people. Some schools of Scandinavian ISD&I have a strong knowledge interest oriented towards "emancipation from seemingly "natural" constraints through free and open communication" (Iivari and Lyytinen 1998) while others merely aims specifically at work democracy and job satisfaction.

The idea of **evolutionary ISD&I** is widespread in the Scandinavian ISD&I schools, based on the belief that organizations and communities develop continuously through learning and new knowledge (Iivari & Lyytinen 1998). The continuous learning and change demand evolutionary ISD&I where the information system is

developed through continuous iterations from evolving requirements. Often practiced as grass root initiated and driven ISD&I, this should be seen in opposition to centralized top or management driven ISD&I. The research efforts leading to these approaches were often initiated by rather small groups of people that had alternative ideas for (the development of) the information systems and the power to carry the necessary research out, sometimes even against resistance.

On top of these principles we add the observation that many approaches and the differences between them often is resulting from **situatedness**. They develop through research as answers to specific situations in which they were developed. Differences in the technological, organizational, and societal challenges meeting and surrounding each research stream, lead to different and situated approaches. This ability to embrace and accept of the need to adapt each approach to the situation (instead of vice versa) we find rather evident and unique for the Scandinavian ISD&I schools and we bring it to our framework under the label of situatedness. It covers the willingness to adapt ISD&I approaches to the situation at hand in the organization, the industry, and the community taking into account concrete challenges, possibilities, community traditions and worldviews of participants (including the researchers).

The principles are all interrelated in different ways. To succeed in participation the approach has to be situated or at least suited for the participants. Situated and (critical) participative approaches support empowerment often more so when evolutionary, since the learning of the participants can enhance both the process and products developed through the effort etc.

4 Methodology

In order to investigate the challenges and opportunities of adapting (critical) Scandinavian ISD&I principles in the context of Africa, we have studied two major Scandinavian research projects doing exactly that. We base our discussions of the question on a qualitative content analysis of publications from the research projects in focus. Qualitative Content analysis is a research method that provides a systematic and objective means to make valid inferences from verbal, visual, or written data in order to describe specific phenomena (Weber 1990, Downe-Wamboldt 1992, Burnard 1996, Elo & Kyngas 2007

We have applied the basic principles of qualitative content analysis to the contents of published case studies from each of the HISP (Braa et al 2004, Braa et al. 2007, Braa & Hedberg 2002) and INDEHELA (Korpela et al. 1998, Korpela et al. 2002; Mursu et al. 2007) projects that were published between 1998 and 2007 in highly influential IS journals. We developed an analytical framework from the principles of the Scandinavian ISD&I approaches described above. The framework ensured a systematic and through analysis of how the principles played out in the projects, as well as provided basic descriptive data (project economic, socio-cultural and infrastructural context, project characteristics and values (worldviews) behind).

The main dimensions of the framework correspond to the predominantly characteristic of the Scandinavian approaches; ‘user participation’, ‘empowerment’, ‘evolutionary ISD&I’ , and ‘situatedness’. This is in line with the preparation phase of

content analysis which starts with selecting the unit of analysis (be a word or theme). For each dimension or aspect the opportunities and challenges of adapting (critical) Scandinavian ISD&I principles in the context of Africa were explicitly adressed.

We analyzed the available data iteratively. First each of the authors focused on one of the studied projects reading and marking the texts in accordance with the framework, followed by analytical thinking aiming at pin pointing the opportunities and challenges that the data (text) about each project displays. Then the studied projects were swapped between the researchers reviewing the first analysis[4]. Eventually the two partial analyses were compared to identify differences and shared aspects as a basis for discussing the possible opportunities and challenges that applying Scandinavian ISD approaches in African context could provide.

[4] This last part of the methodology we have to admit are "research in progress", so the following discussions are based on first iteration.

5 Findings[5]

In this section we provide summaries of our findings from the analysis, that we base our following discussions on. One sub-section pr. analyzed project.

5.1 HISP: The Scandinavian principles taken to the limit and beyond

Researchers from the University of Oslo initiated in 1996 a project called Health Information Systems Program (HISP) starting with a project South Africa. The idea of HISP was that despite the differences in country context the Scandinavian ISD approaches offer important lessons for African IS development practices (Braa, 1996). The first initiative was suggested by a strategic management team formed to plan the reconstruction of the health sector of South Africa post-apartheid. The project was founded in three health districts, funded by the Norwegian Agency for Development CO-operation and based in two local universities, too. The aim was "to identify information needs and to engage the end-users and local management structures in the process of developing new health information systems" (Braa & Hedberg, 2002).

The main focus was standardization through development of shared essential data sets and of new district health information software. Many of the challenges were due to funding, to gaining support and to handle the differences in the contexts of the new IS. The developed software was free, open, flexible and adaptable to other settings, which resulted in a country roll out of the system, with possible adaptions of the systems to all the local contexts, while still ensuring the standardized datasets.

The project has been further spreading and is now currently ongoing in a number of African and Asian countries including South Africa, Tanzania, Malawi, Botswana, Ethiopia, Nigeria, Sera Leone etc) and have given opportunity for research of the project(s) also to focus also sustainability of the systems and on networks of ISD and development. The spreading is facilitated by the openness and adaptability of the free software that was developed in the early projects in African. The software is further developed and adapted through prototyping in each of the ongoing projects.

HISP started as part of the reconstruction project of the health sector of South Africa, that were striving for equity in health care sector based on a decentralized structure of health districts. Empowerment was explicitly inherent in HISP (Braa & Hedberg, 2002 p. 113). Also many of the early actors were former political activists and the researchers (at least the Scandinavians) regarded themselves as political actors throughout the project (Braa & Hedberg, 2002 p. 114). The aim of engaging and empowering the end-users and local management was reached through wide spread participation and an active education and learning strategy.

[5] This section is the least matured text and may be difficult to read and can appear somewhat decoupled from the rest – sorry.

The ISD process is characterized by the researchers as cultivation, "by which they mean a slow, incremental, bottom-up process of aligning actors by enabling translation of their interests and gradually transforming social structures and information infrastructures where the resources already available forms the base." (Braa & Hedberg, 2002 p. 116) This concept of cultivation indeed describes an evolutionary ISD process, but compared to more well-known examples of evolutionary ISD from Scandinavia, this is more inclusive, slower and focused on the process as in opposition to the product. Braa (1998) call it a learning approach with process oriented perspective and Braa and Hedberg (2002) emphasis the role of negotiation in the ISD.

The participation in the projects spans traditional user participations in work-focused design and prototyping process (Braa & Hedberg, 2002, p. 122) e.g. sessions of evaluation of the existing data collection forms (Braa et al. 2004, p.350) and the involvement of the broader range of stakeholders in negotiations of decision. Both kind of participations played important roles in the balancing act of standardization and local flexibility that the researchers of the project carried out. The classic user participation brought the needs of the local health care works forward and displayed the differences between the local settings, while the broader negotiations emphasized the need for standardization.

This explicit and open balancing act led the researchers to develop the multilevel cultivation approach which is a true example of a situated approach (Braa & Handberg, 2002 p. 126). Cultivation as described above is based in the uniqueness of the situations and ensure adaption to what is there already (bricolage) and to what can be negotiated, while the unforeseen challenges and possibilities throughout the process sparks improvisation targeted the unique situation (Braa & Handberg, 2002, p. 116). The red line through all of the HISP projects are the adaptability of the IS and ISD processes needed to situate and localize the solutions that are already there. This ability of HISP to adapt to new situations is very visible in Braa, Monteiro, and Sahay, 2004, where they display the commonalities and differences between the local projects and explains (for some of them) how and why the adaptations happened (see table1,3 and 4 from the paper).

HISP adopted a multi-dimensional perspective to health information systems development, acknowledging the complex interplay between individuals as social beings, and technology as a dynamic and rapidly changing field influenced by huge range of factors, many of which are the control of any single individual. Given this understanding the challenges in many African countries is not to develop an appropriate IS, but to be able to scale the system and sustain it in a context characterized by poor infrastructural access, inadequate human capacity, heterogeneous actors, multiple institutional practices, and rapidly changing work settings.

For example, the case from South Africa revealed two important aspects of participation: reliance on the tradition and culture of participation in communities as well as ensuring that the key role players (multi-leveled and multi-sectorial) participated. The case material revealed that the participation was in line with traditional and customary traditions where decisions are made collectively (based on principle of Ubuntu collective personhood and collective morality).Traditional communication channels were used for data collection and feedback of information.

The Indian case typifies efforts to foster participation in hierarchical settings. They argue that in starkly different historical, political and social contexts such as India, participatory processes will not arise naturally as a result of democratic aspirations or reasoned argumentation, as may be the assumption in formal workplace settings of western countries like in Scandinavia or the UK. Paradoxically, however, participatory processes often need to be initiated by government official's in-charge, rather than these emerging idealistically from grassroots as a bottom-up process. An implication, therefore, is that to enable participation in settings that are traditionally hierarchical and non-conducive to self-initiated bottom-up processes, the initiative may need to come from the top, and then be gradually nurtured over time. In the Mozambican context, the mediating role of the academia lay in acting as a bridge between health bureaucracy on one hand, and the communities and the local health workers on the other. They also mediated between the policy formulated by national/state governments and its translation into concrete practice on the ground. The role of mediation played by the academic members of HISP was critical in creating the required environment for learning by doing. User participation means not only users participating in design but also designers participating in use. The designers should try to share practice with users. Participatory design is a learning process in which designers and users learn from each other and the users, in particular, must have a guarantee that their design efforts are taken seriously.

5.2 INDEHELLA: The Scandinavian principles taken for granted

Researchers from University of kuopio in Finaland in collaboration with a research group in a local university in Nigeria attempted a made in Nigeria type of ISD methodology in a project called INDEHELA-Methods (Korpela et al 1998). They criticized the conventional participatory approach for its primary focuses on the immediate users, and for not giving attention to issues of wider socioeconomic justification or sustainability.

However, they argue that elements from various participatory approaches can be adjusted and combined, based on a shared philosophical and pragmatic orientation, in order to develop ISD methodologies which fit the constrained conditions in Africa (Korpela et al. 1998, Korpela et al. 2000, Musu 2002). As such, Korpella et al. (2002) identified the following five criterions to develop more appropriate ISD approaches and methodologies in African context:

- ISD methodologies in Africa must be highly practicable to be used by systems developers whose education is limited and who work under severe financial, infrastructural, administrative and time constraints in projects with relatively scarce resources. Rapid, informal, and flexible methods are better than tedious, formalized and rigid ones.
- The methodologies must ensure that the resulting information systems have high socio economic impact in comparison to the resources invested in them.
- The methodologies must pay much attention to ensuring the long-term sustenance of the resulting information systems in financial, organizational and technical terms

    - The methodologies must mobilize wider social forces to push the ISD projects through and sustain them in a harsh environment as well as to safeguard the socioeconomic impact. Taking management and local communities as the most important stakeholder groups, in addition to system developers and IS users. Flexibility of methodologies is also essential.
- Draw from local tradition, i.e. to search for such aspects of local traditional culture and values which are conducive to ISD, and to harness them intentionally.

Based on the above criterion, they selected participatory methods (including Activity Analysis and development, Cooperative design, and MUST) from the Scandinavian approaches and tested their applicability for ISD in African context in general and for Nigeria in particular.

Primarily, the INDEHELA project information systems development (ISD) was studied as a work activity. ISD as a work activity was studied by using the Activity Analysis and Development as a framework. The focus was on the work activity of information systems development, not just individual, group or organization, but all the elements of the activity, like object, outcome, process, actors, collective actor, means of work, means of coordination and communication, and mode of operation.

One interesting finding from the INDEHELA project with regard to ISD in Nigeria context was that the work does not differ much from the industrial countries, when it comes to technology or software engineering. The main differences were found from the socio-economic and infrastructural context of the country. To address problems related to socio-economic and infrastructural issues, the INDEHELA project emphasized the importance of taking into account some special requirements (or principles) during the ISD process, but which are not sufficiently dealt with in ISD methodologies in Nigerian context.

The first issue is sustainability of the information system. Korpela et al. (2000a) argue that in order to fulfill the expectations of the information systems as a tool for development, these systems should be sustainable. Particularly in a less affluent country, the long-term viability of information systems is essential, but the required infrastructure and support activities are often lacking. The development process and methodology should consider the appropriateness of the technology to the application environment and the availability of the local technological capacity to sustain its beneficial use. The issue is that the new system would not be abandoned when the development project has ended.

The second issue is affordability of the social information system and the new technology used within it. Information technology is still quite expensive an investment for companies in Africa, so it is important that the scarce resources are not wasted. The benefits must exceed the expenses, and the organization must be able to afford to cover the running costs, maintenance, and further development of the system in the long run. Thus the technology must be suitable for both users and developers, and the application must be adapted to the actual conditions. The existing information system must afford the changes caused by the new technology. For example, it can be risky to follow the latest technological trends, even if it can be tempting (Mursu et al. 2001).

The third issue is the ethics and socio-economic justification of information technology. Korpela et al (2001a) noted that Information systems cannot just make

life easier for immediate users, in particular in a less affluent country. However, although information technology cannot directly influence high-priority issues like health, education or agriculture, it should have an indirect multiplier effect. For example, computers do not cure the diseased or feed the hungry, but they can make healthcare delivery more efficient, more accessible, and more focused (Korpela et al. 2000a; Korpela et al. 2002, Mursu et al. 2001).

In order to successfully address the issues of sustainability, affordability and ethics and socio-economic justification of technology in resource constrained settings of African countries, the INDEHELA project on the importance of user participation in the process of ISD. It could be assumed that organizational barriers, economic hardship and the general insecurity of life creates obstacles for cooperation in developing countries, but the experiences by Korpela et al.(1998) in Nigeria indicate that participation and cooperation are not only possible in a deprived African country, but a must. They conclude that a computer-based system will not survive the harsh socio-economic conditions without the dedication of its users. Dedication begins by having users involved. Bringing users into the development process alleviates problems like computer phobia and fears and thus increases the user organization's technological capacity to sustain the system and reach a positive socio-economic impact.

However, Korpela et al. (1998) argued that the scope of participation should be expanded from designers and users to the communities. More specifically, drawing from the experiences an information system project at a university teaching hospital in Ile-Ife, Nigeria, Korpela et al (1998) pointed out that for primary health care (PHC) information systems design, tripartite participation is required – a partnership between designers (computer personnel), users/providers(healthcare personnel) and community representatives. The essence of such tripartite partnership is that when the designers and developers, local government authorities and communities work as partners in a project, this encourages capacity building (i.e. empowerment of local or indigenous communities with information and skills needed to carry out specific activities), a sense of ownership and sustainability of the project when the donors leave (ibid pp. 341). They also argued that the full participation of all parties in PHC projects is dependent on how three basic steps or activities are managed: (i) entry into community, (ii) capacity building, (iii), and project implementation.

6 Analysis & Discussion

We have described three (four) key principles that characterize the Scandinavian critical ISD&I tradition and analyzed two concrete applications of them in African context. We now discuss their potentials to be adapted in the context of economically deprived African contexts. The question is how the Scandinavian critical ISD principles of participation, empowerment and evolutionary IDS&I shaped by the values homogeneous and non-hierarchical social structure of the Scandinavian countries can possibly be applied to inspire and influence ISD&I practices in the African context with heterogeneous culture and rigid bureaucracies traditionally run by the authority of superiors rather than the initiative of employees?

6.1 Applying the Scandinavian ISD&I principles in African context

Our analysis of the literature from both HISP & INDEHELA projects revealed that, despite severe socio-cultural, economic and infrastructural constraints in developing countries in general and in Africa in particular, the principles of participation, empowerment, evolutionary ISD&I and situatedness was successfully adapted to local contexts, but that the challenges of the local contexts pushed the principles to and beyond their limit.

Whereas in Scandinavia the principle of participation is mainly characterized by a workplace focus recognizing that it is ethically and morally right that workers should be involved in the development of systems which are to affect their working lives; in the context of Africa, the focus has been on community participation and empowering deprived communities through learning (see for example Braa & Hedberg 2002; Korpela et al. 1998). In the African context the principle of democracy in ISD&I have to reach further than just workplace democracy. It needs to span the local community, since the sustainability of the information system depends on how ready the community is to embrace the change brought by the system. This in turn demands more from the participative principle than usual in the Scandinavian context, where there is a tendency of rather few participants representing "the users" in the design process to ensure high quality designs adapted to the actual use – and in the critical tradition as means for empowering the users to influence their own work day /life. In the African context however participation in order to ensure good solutions cannot count on high and evenly distributed skill and knowledge level among the users and influenced citizen's. Thus the participation will also have to ensure an appropriate skill and knowledge level in a broader community as part of a good solution – or at least an adopted /accepted solution. The methods and ideas for participation invented in Scandinavia still applies for the actual design, but needs to be supplemented in order to involve broader communities in mainly the decision making processes. The need for broader involvement has been less researched in the Scandinavian approaches but has been addressed in the MUST method (Kensing et al. 1998).

In the context of HISP, for example, the principle of participation has been adapted to involve economically deprived communities where the majority might be without formal employment. The community is generally seen as a key level for social development. Such development will rely upon community participation in decision-making for social development at a local level (Braa 1998; Braa et al. 2004; 2007). Braa (1998) put forward two rationales for using the community based participatory design approaches in the context of Africa and third world in general:

- It is community perspective, a strategy to enhance both the communities as well as prepare technical development that goes beyond mimicking the Scandinavian tradition.
- A bricolage perspective, a strategy to base system development on the potential given by the situation, context and resources available in a bottom-up approach. This is a pragmatic third world perspective, a functional way to get things working despite lack of the resources and network support that are taken for granted in the first world.

In the context of INDEHELA, Korpela and his associates from Finland and Nigeria also emphasized the importance of community participation through action research to ensure the sustainability of ISD&I initiatives in African contexts. They argued that participatory approaches and more importantly community participation in ISD&I in Africa is even more important than in industrial countries, since it alleviates problems such as computer phobia and fears and thus increase the user organization's technological capability to sustain the system and to bring positive socio-economic impact (Korpella et al. 1998; Korpella et al. 2002; Mursu et al. 2007).

Empowerment always brings relative de-powerment elsewhere. The notion of power struggle between capital and labor provide a basis for the (critical) Scandinavian ISD&I principle of empowerment. In the African context however, this may also be at stake, but the most evident power struggle is between the central, well-educated and richer areas/ authorities and the less educated and poorer regions and local authorities. Traditionally global awareness is on the central authorities and the international founding goes to and is distributed through these. In this light the empowerment principle needs to be refocused to another power balance, yet the methods, techniques and ideas usually applied will still be useful. Through participation, learning and funding to local projects the less powerful parties (local) needs to regain power in comparison to the centralized power.

Viewing ISD&I as evolutionary and being grass root initiated and driven was rather early part of the Scandinavian principles (see Iivari & Lyytinen 1998). Still the ISD&I processes tend to be viewed as well-defined projects among known stakeholders, with rather clear goals of developing and implementing an information system and thereby changing the organization. This somewhat well-orderedness however does not apply in the African context. The ISD projects here are often shorter lived and narrower defined than the usual Scandinavian action research projects, since it is very likely that the communities lack resources to ensure sustainability when the external funding of the projects ends. Thus the principle of evolution needs to be extended across project periods and the grass roots principle needs to be strengthened in to a networking principle actively involving outsiders in the grassroots network of the ISD&I during the periods of funding, attempting to ground the effort so that they can be sustained also through the more difficult periods.

Because of the lack of experience in information technology and information systems development in the African context (see Odedra 1992), IS designers have high level of uncertainty regarding both the context of the systems development, the goals of the system and its future use (see Davis 1982). In such situations, Davis (1982) suggests evolutionary and experimental approaches (through user involvement and participatory prototyping) as appropriate approaches to systems development.

The evolutionary prototyping approach to ISD adopted by HISP helps to secure adoption and use of the system while also reducing development costs (Shaw & Braa 2010). The main objective of the evolutionary prototype approach is to empower local users so that the end users will be converted to become advocates of the system. The result has been that the HISP network has seldom initiated an ISD&I project on the basis of systems specification- rather it has been through a process of small-scale, bottom-up start-up modifications and adjustments depending upon existing local needs. HISP's approach takes in to account the fact that if the new systems are too complex, then it is likely that they will be rejected as inappropriate, but small changes

that build towards a bigger vision has a much better chance of being accepted (Shaw & Braa 2010; Braa et al. 2004). According to Shaw & Braa (2010), this creates an environment whereby systems development processes interacted with the scaling process in an interactive manner.

6.2 Opportunities and Challenges of Applying Critical Scandinavian ISD Principles in African contex

In the previous section we discussed how the Scandinavian ISD&I principles was applied in the African context. In this section we address research question, which deals about identifying the opportunities and challenges of applying those principles in African context. Indeed, there are conflicting views with regard to the potentials of the Scandinavian principles. For example, Avgerou & Land (1992) claim that in addition to political and economic obstacles, the traditional cultures of developing countries are also hostile to applying the principles of participation, while Greenbaum (1993) regard traditional culture as a potential "indigenous opportunity factor" rather than as an obstacle. Our analysis of the literature from HISP and INDEHELA projects conform with the view of Greenbaum's (1993) seeing local culture as an opportunity factor. Of course we acknowledge the differences in context and the need to adapt some principles to be aligned with local cultural values and traditions. For example, as Puri et al. (2004) noted, that in most developing countries, cultural practices are deeply embedded in the ethos of the community, and that the participatory paradigm in these settings is bounded by the cultural traditions and practices. Ritual and ceremonies are the events to assert unity and harmony of the community. It is through these mechanisms that social fabric of a community is constructed and value systems to nurture common good are developed and find expression (ibid, pp. 48). Therefore, combining local cultural values with the principles of participation, empowerment, evolutionary ISD&I and situatedness is an opportunity that needs to be explored. For example, the principle of participation can easily be combined with the South African traditional and customary values where decisions are made collectively (based on the principle of Ubuntu – collective personhood and collective morality).

With regard to challenges, one prominent challenge faced by many developing countries is to sustain information systems at a local level after the system has been designed and implemented with financial and technical support from international donor agencies. As Mursu (2002) noted, especially in less affluent African contexts, the long-term viability of information systems is essential, but the required infrastructure and support activities are often lacking. This poses a big challenge to fulfill expectations and sustain its operations. Thus the development process and ISD&I approaches should consider the appropriateness of the technology to the application environment and the availability of the local technological capacity to sustain its beneficial use (ibid).

Braa et al. (2004) in their part address sustainability as the major threat for ISD&I initiatives in many sub-Saharan African countries. They inform that, shaping and adapting technological systems to a given context, cultivating local learning processes, and institutionalizing routines of use that persist over time (even when external economic and technical support is over) has been the biggest challenge in

HISP initiatives in many African countries. Similar challenges of lack of sustainability of apparently successful projects have also been reported in the critical Scandinavian ISD&I tradition (such as the UTOPIA project, see Bjerknes et al. 1987). Bra et al. (2004) argued that, in the context of African countries with poor economi, infrastructural and skilled manpower records, the problem of sustaining ISD&I interventions should be addressed through ongoing and continuous translations around the vertical (local appropriation) and horizontal (diffusion) axes. The translation perspective have been illustrated through the standardization of data collection and reporting tools in many HISP nodes including south Africa by introducing the principle of hierarchy of standards to forge compromises between variations in local requirements (Braa et al. 2004, pp. 355). Another example of building sustainable ISD&I initiatives from HISP comes from their approach for training and education (ibid).

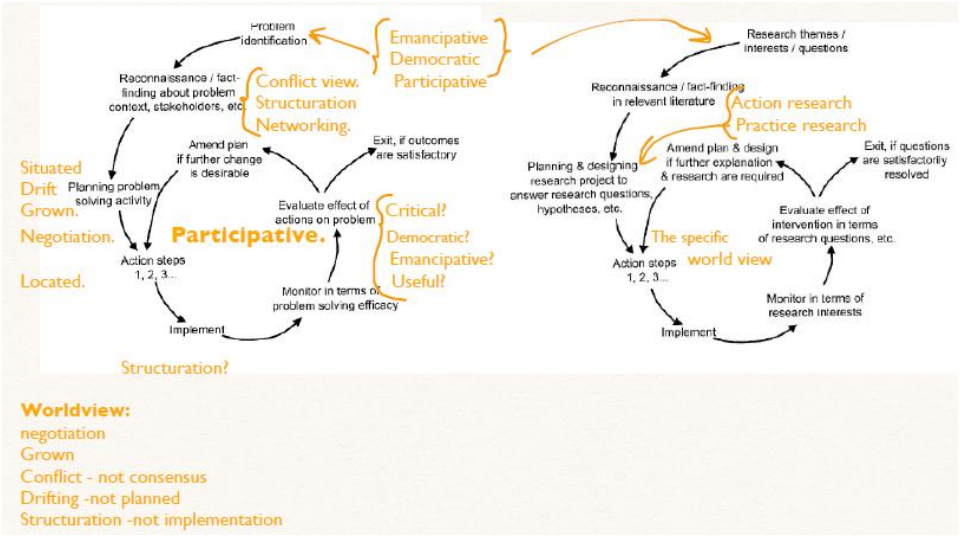
5.3 Mapping the Scandinavia principles to traditional (action research) projects – or why negotiations and learning are key activities[6]

As noted before the principles of Scandinavian ISD&I are of course intertwined and do interact when parts in a real IDS&I project and also our findings from the projects are connected to a whole by being part of real ISD&I practice and research project. From the findings it became evident that the principles played roles of varying importance during the lifespan of the projects (a finding we had not expected). To illustrate this we have mapped the principles as they played out in the projects onto Mckay and Marshall's description of action research. We have chosen this generic description because it covers the full learning and action circle for both the ISD&I and action research practice and thus fits the studied projects well (see fig..)

Left part of the figures shows the ISD&I actions of the action research project, while right hand side og the figure show the aligned research aspects of the project. We found that the principles had varying roles and varying importance in the two parts of the action research project over the lifespan. This could imply the need for taking this into account when applying the principles. Below we present the findings as displayed in yellow in the figure and suggest how take action on this basis.

First; it was evident that the notion of empowerment, emancipation and democracy were important points of orientation in both identifying the research themes and the actual problems to address. HISP for example was initiated with the explicit idea of reforming the outdated oppressive and unfair apartheid solutions to healthcare in South Africa. This was the interest of both the healthcare organization and the researchers thus important for the outset of both learning cycles of the framework.

[6] This section is a bit experimental. We do think that conclusion from the section are important, but struggle with how (and where in the paper) to bring them forward.



Second; when finding facts about the problem, the stakeholder's notion of a fact especially of an important fact is influenced by the worldview of the participants. If belonging to the critical schools of Scandinavian ISD&I your notion of organizations as frames of conflict full of inherent opposing interest, will influence what information is regarded as relevant and important. The worldview of the research projects was somehow brought to the projects by the Scandinavian researchers, and if this worldview is only partly shared by the rest of the participants negotiating facts can be a central point for alignment and learning.

In the HISP network, negotiation between different stakeholders played a major role. There are always negotiations at the political level and at the user's level. At the political level, the negotiations are between national, regional or district officials on how the technology is to be implemented and what values it can bring at different levels. At the user level, the negotiations are between IS designers and end users on the specific functionality of the system, on skills and knowledge required to use the system, and in co-development of the system through continuous negotiation and collaboration.

When basing the action research on the critical Scandinavian ISD principles, the action circle of course becomes focused on ensuring participation as a driving factor of the action and as a key means for the researchers to achieve their empowering goals.

In HISP, this was played out as empowerment by learning and the amount of participants learning could is key to sustain the effort and actually improve the abilities of a community.

In the planning of the action circle, situatedness plays an important role. Whether the planners understand the world as fluid and ISD&I as evolutionary or sequential is crucial for the planning. This is the most important activity in adapting the principles and approaches to the local context. Researchers and local participants both have to

contribute in this to ensure that local challenges are handled and especially opportunities are used.

Both projects displayed willingness to adapt their approaches and solutions to the situation at hand and they put emphasis on rooting the ISD&I in the local context.

Acting and implementing solutions is played out in an understanding of this process as structuration. This stresses the need for negotiation, iterations and good communication as part of an evolutionary approach to new solutions. The action and implementing needs to be intertwined with the planning and re-planning as an integral part of the action since the local situations at hand is less known by the researcher on one hand. On the other hand the principles and approaches are less known by the other participants, which in turn leads to more misunderstandings, but also to more innovations/new ideas/improvisation.

The learning and evaluation are of course again influenced of the goals of the effort, being based on the values of empowerment and democracy as well as just being plain useful. Compared to the Scandinavian application of these principles the benefits of the ISD&I in the African context may need to be evaluated broader since the full communities need to be empowered and lifted by learning. The solutions will certainly have to be evaluated in (a very broad) context.

So when bringing the Scandinavian principles of ISD to the very different context of Africa – or in general into context differing from the original context of the principles and approaches, the initiating phases of the action research have to be extended with negotiating, agreeing on and internalizing these grounding principles by the rest of the participants of the collaboration. In some projects the principles are more clearly outspoken (in HISP the core principles was part of the project goal) than in other projects, but the explicity is crucial in order to reach sustainable results of the efforts. This actually gives the fact finding phase a more important role than usual, as the opportunity to negotiate and commit to the grounding principles or a shared worldview for the ISD.

Another aspect seen especially in the HISP project is that it takes more than what is in traditional action research to ensure sustainable benefits of ISD&I in Africa (and maybe also in Scandinavia, since at critiques has been that the research project have rarely had sustained impact on society). As described above we have seen that in order to reach and sustain empowerment, have a better solutions adopted and being able to sustain and diffuse the results in a longer term perspective, the principles will have to be extended beyond the traditional boundaries or scope of the research projects. This calls for even further negotiations and learning of these basic principles.

3 Conclusion and Implications

In this paper, we analyzed the contents of selected publications from two action research based projects (HISP & INDEHELA) that have been working to apply the critical Scandinavian ISD principles in African countries in particular. Contrary to some doubts (Avgerou & Land 1996), our analysis demonstrated that the principles of participation, empowerment, evolutionary ISD&I and situatedness are indeed important even in the severely constrained settings of African countries. However, we have also noted that those principles have been modified, and translated to fit their new socio-cultural, infrastructural and economic context. As Puri et al. (2004) indicated there is very little that would apply universally, and the specific promoters and inhibitors of the principles vary even from country to country and even from organization to organization. For example, unlike Scandinavian countries where there is universal access to ICT infrastructure and facilities, in resource constrained African countries access to technological infrastructure are distributed from the center to the periphery unevenly in a manner that reflects the socio-political imperatives and economic realities of the African countries. Besides, the critical Scandinavian principles to ISD&I are results of the socio-cultural values of the Scandinavian society including work place democracy, equality, sense of solidarity, mutual dependency and fairly intense and causal cooperation at all levels of societies. On the contrary, the socio-cultural setting in African countries is characterized by complex hierarchies, over politicized decision-making process, bureaucratic complexity, commitment to personal gains…etc. Such issues should be taken into account when the Scandinavian principles are taken to the new setting. For example, the principle of participation in the context of Scandinavian countries has typically explored ISD in single organizational contexts, and rarely in community-based and networked organizational settings (Korpela et al. 2002; Braa et al. 2004). However, adapting the participatory approach in African contexts with diverse and internetworked organizational settings requires a multi-leveled and multi-sectoral approach. Community involvement and participation in ISD process is more important in African context than Scandinavian contexts since it alleviates problems like computer phobia and fears, and increases the user organization's technological capacity to sustain the system and make a positive socio-economic impact.

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