6   COLLABORATION IN ISD PRACTICE REVIEW AND REDESIGN

6.1   *Introduction*

This chapter presents answers to the four research questions as IS practitioners from government, the private sector, and with users, worked together in the review and redesign of current practice. In Chapter 5, I partly responded to the first research question (i.e. "What constitutes Botswana ISD practice?") by presenting a description of current practice based on interview and archival data. In this chapter the description of current practice is further extended using CHAT principles as I stimulated the expansive learning cycle through questioning of current practice, and analysis of its historical development as well as the primary and secondary contradictions.

The second research question (i.e. "What are users and developers learning and is the learning effective?"), is responded to in sub-section 6.3 where the analysis of learning on the case project is carried out retrospectively based on Rogers (2003) classification 'task' conscious learning (conscious learning) and 'learning' conscious learning (conscious learning).

As I continue this chapter, response to the third research question, (i.e. "How can current practice be improved in order to facilitate effective learning?"), is provided through modelling of a new solution and examining the new model during the change laboratory sessions. The new ISD practice model is presented together with how it was conceptualised.

Finally, throughout the expansive learning actions of questioning, analysis, modelling and examination of the new practice model, the chapter analysis provides response to the fourth and final research question (i.e. "What do users and IS professionals learn when collaborating in the review and redesign of ISD practice?").

6.2   *Learning action 1 - Questioning*

I triggered the initial questioning through guideline questions that were provided to the different participants as preparation for the initial change lab session. The guidelines provided a 'mirror' for participants to use for introspection, reflection and dialogue on the current practice. I asked the developers to use the following themes for reflection:

- Specific Botswana ISD project experience

- ISD Methodology, Techniques used including justification for choice of methodology

- Suitability of ISD methodology to specific projects

- Meanings that users in particular assign to the ISD methodologies used

- What learning took place on the projects by the different social actors i.e. users, and developers

- Suitability of chosen methodology to system uptake and learning

- ISD practice challenges

In terms of preparation for this first change lab, I asked users to prepare to share and dialogue on their specific project experience, lessons learnt, challenges and recommendations for the future. The idea for these questions was to try and get users to talk about problems they were having with the current ISD process as well as suggest improvements. The GITREP on the other hand was asked to prepare on the historical development of current practice as well as the reasons for the changes over the years. It is worth noting here, that at this initial stage I did not use any activity theory based terminology e.g. such words as 'contradictions', 'dilemmas', 'double bind' because at this stage, other than the ATIG, I had assumed that none of the participants were familiar with these or even with activity theory. But it was interesting that because the invitation letter mentioned that I would be using AT as a lens, some of the participants and more specifically practitioners from the private sector did their own research on activity theory which at some point during the discussions they wanted to share with the group. This in itself constitutes learning by individual subjects through self initiated acquisition of knowledge.

I started the discussions at the first change lab through a presentation of my research objectives and summary of the key activity theory principles. I also presented my initial analysis of the current Botswana ISD activity system. This I later developed into the network of activities depicted at Figure 15, showing subject producing activities as the PEX organisation, GIT, analyst firm and developer firm, and the rule producing activities as the GIT, Finance and Procurement activities. However, in this study the main focus is on the PEX, GIT and analyst firm representing users and the developers. Though recognised, the other activities such as Finance and Procurement activities have not been analysed in detail.

This was then followed by a discussion on the historical development of current practice that was triggered by a presentation by the GITREP. Again the questioning of current practice continued with presentations from two user representatives (i.e. one from the PEX project and the other from the second project that I was engaged in at the time) and three developer representatives (i.e. one was the developer of the PEX system, the other was the developer of my second project and the third one was just another IT industry representative). Discussions and interventions were allowed throughout the presentations.

The presentations and discussions on the historical development of current practice were quite insightful as they offered a perspective on how we arrived at the current state of ISD – it provided a useful context within which to understand and analyse the 'current' through a look at the 'past'. It was also interesting to see through the questioning the different motives of the three subject groups i.e. departmental users, GITREP (government IS practitioners) and the developers (private sector IS practitioners) – it was quite evident from what they identified as being challenges that they had different interests as a far as the ISD activity system was concerned (again this has been discussed in chapter 5). But despite there being some divergence in thinking in some areas, there was overall agreement on the current ISD process as well as agreement on the problem areas as identified for this research i.e. learning. In fact, what was presented as representing current practice was consistent with the initial ISD activity system model that I had presented earlier to kick-start discussions.

A major observation from this initial session was that there was enthusiasm from participants to engage in this exercise of questioning and reflecting on what they do. And so what started of as individual questioning by myself as the researcher and interventionist ended up being a collective action by all participants.
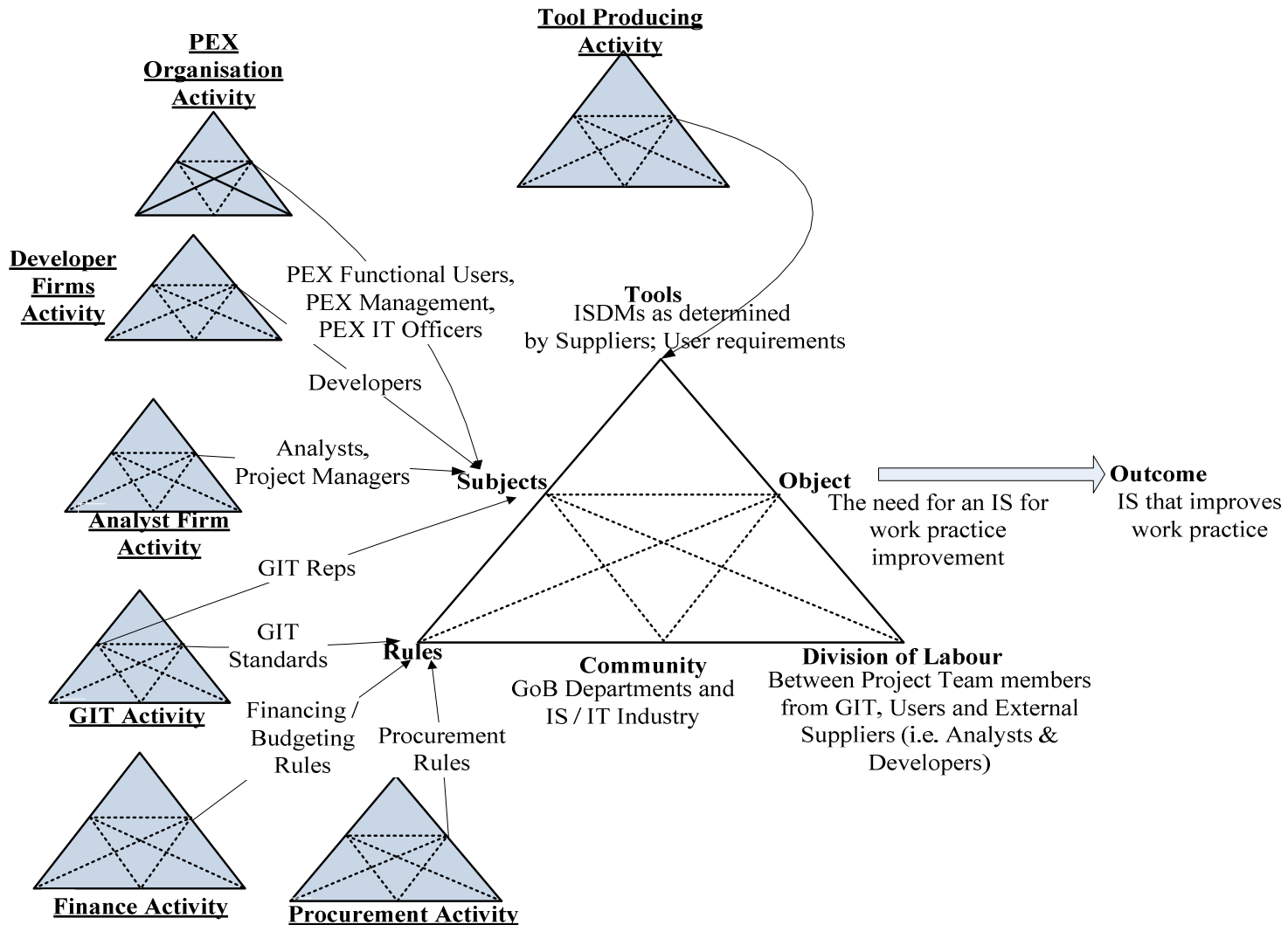
Figure 15: Current Botswana ISD Network of Activities

6.3   *Learning action 2 – Analyses of Historicity, Contradictions, and Learning*

6.3.1   **Historical Analysis**

According to Engeström (2001), *activity systems are shaped by their history,* and it's important to study that history in order to *understand the activity systems problems and potentials*. In this regard the history and evolution of ISD practice was presented in Chapter 2.

Tracing of the historical development of the practice was triggered through a presentation by the GITREP. This particular GITREP was the ideal candidate to take participants through this because she had been an employee of the GIT since its early years, whereas most of the practitioners attending the CL had only been around since the 1990's, including myself.

The presentation started as far back as 1969 when the GIT was still part of the Ministry of Finance and Development Planning, up to 2010, at which point the GIT was part of the Ministry of Communications Science and Technology. As I write this research report in 2011, the GIT is yet again part of a different ministry.

The key points of her presentation and discussions held at the change lab, together with findings from archival research (i.e. mainly National Development Plans) are presented at Table 12. I present this local history using similar categories as used in Chapter 3 i.e. Time period / Era, Technology Type & Applications, ISD Practice and Social Actors. This local historical analysis will help in understanding the current contradictions as will be discussed in the next section.

Table 12: Botswana ISD Practice Historicity Summary

NDP Period	Technology & Types of Applications	ISD Practice (includes ISMM / ISDA)	Social Actors
NDP 1: 1966/7 – 1967/8 NDP 2: 1968/69 – 1972/3 NDP3: 1973/4 – 1977/8 NDP4: 1978/79 – 1981/2 NDP5: 1982/3 – 1986/7	Mainframes Unix OS Real time and batch processing systems developed using Cobol utilising the IDMSX DBMS; and Oracle Tools supported by the Oracle DBMS were introduced later	GCB started in 1968 under MFDP; Management of IT centralised via GCB which was then part of the MFDP Mainly In-house development by GCB	Mainly the GCB with minimal user involvement
NDP6:1987/8 – 1991/ 2	Same as above – with also some Dbase based systems slowly being developed by user departments	Some IT staff at Ministries were deployed – especially the larger ones SSADM adopted as standard methodology but not really cascaded to Ministries Ministry systems largely not documented User departments mainly developing internal systems if they had expert developers on-site	Still mainly GCB Reliance on donors for funding projects, minimal use of external contractors
NDP7: 1992 / 3 - 1996/7	Computer imports rose in government from P43m in 1994 to P51m in 1995; IT budget rose from P26m in 1992 to P65m in 1996/7 Systems for Voters Roll, Payroll and Vehicle registration had been completed and systems for taxation, supplies, national registration, HRM and police were in the pipeline; Over 5000 computers had been installed in government offices country wide	Systems were either outsourced or undertaken by GCB. There was generally a shortage of IT resources and GCB could not retain skilled IT resources - this was a major constraint for IT service delivery, especially given the growing expectations in Government of IT, and an accelerating appreciation for the significant contribution IT can make to the improvement of service delivery. The government budget for IT in NDP 7 was P65 million of which only P51 million was spent due to the inability of both the private and public sector to make adequate resources available to meet demand. As a result of lack of separation between Development, maintenance and application support activities there were operational difficulties due to unclear responsibilities. Project Management was not formalised Dev of Govt IT Strategy initiated in mid 1995 intended to guide IT initiatives in the next plan – dev coordinated by the Gov Comp steering committee (GCSC). In addition a	Centralised approach to IT service delivery Mainly DIT for large government systems like payroll and accounts Some DIT staff now placed at Ministries Slowly User Departments were getting involved

NDP Period	Technology & Types of Applications	ISD Practice (includes ISMM / ISDA)	Social Actors
		government-wide IS Needs Analysis was carried out by PwC to assist budgeting for NDP8	
		GCB Reform project, which was done by KPMG was initiated in Sep 1996 and was completed March 1997; The purpose of the reform project was to facilitate the effective management of IT during NDP8 and beyond, taking decentralisation of IT, growing demand for IT, and other factors fully into account.	
NDP8: 1997/8 – 2002/3		IT budget grew from P 61 Million during NDP7 to an estimated P 300 Million[1] during NDP8. 86 high priority information systems within Ministries, seven of which were identified of critical importance due to the need for implementation across Government were included for development during NDP8 ICT Strategy was finalised in 1996 to guide ICT initiatives Decentralisation of IT services to Ministries and establishment of Ministry IT Units Devolution of IT budgets to Ministries Outsourcing now formal strategy to speed up projects and ISD	DIT User Department External IS Professionals comprising of mixed teams i.e. Analysts, Design Architects, Domain Experts, Programmers, Infrastructure engineers etc.
NDP9: 2003/4 – 2008/9		Development of the National ICT Policy (and Master Plan) Main emphasis on production of SOURs before any system can be developed	
NDP10: 2008/9 – 2015/16	N/A	NA	N/A

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[1] Based on findings of Price Waterhouse project: Information Needs in Government of Botswana, 1996

In terms of what is presented in the table above (Table 12), the period 1968-1995 (i.e. 27 years) was characterised by centralised, in-house development of systems based on structured techniques where possible. This was more of a craft activity in terms of the ideal typical historical activity types described by Engeström – with low complexity of systems and high levels of centralisation. The tensions and contradictions that brought about the transformation from this craftsman-like ISD practice to the current practice were mainly 1) user demand for more IS / IT and 2) efficient delivery of IS / IT services. As a result of that the improved ISD practice during the period 1995-now (i.e. 16 years) is characterised by decentralisation of IS / IT services, and outsourcing of development with the decision of methodology mostly left to the developers. Furthermore, unlike in the previous period there is greater involvement of users and other expertise that can now be brought into the ISD process as a result of outsourcing. In terms of the ideal typical historical work activity the current practice fits into the humanised type with high complexity of systems and decentralisation of services as well as outsourcing. The historical development of these two main era's (i.e. 1969-1995 and 1996-now) is modelled using the activity system model in Figure 16. As stated previously the object that brought about the change was the high user demand for work improvement through IT. As shown in Figure 16, the subjects changed form just being the in house GIT staff to now include users and external consultants as a result of the outsourcing. The tools changed from just the piecemeal application of ISDM's to the application of tools and methodologies as determine by the developers, together with the statement of user requirements as produced by the analyst firm (another third party provider). In terms of the rules, in the new era, almost all the rules and procedures followed were specified in the GIT framework, which had to be adhered to by user departments and external suppliers. The community for the ISD activity now included the IS / IT industry and the division of labour, as expected now included division of responsibility between user teams and supplier teams. Though the object remained more or less the same, the outcome changed somewhat.
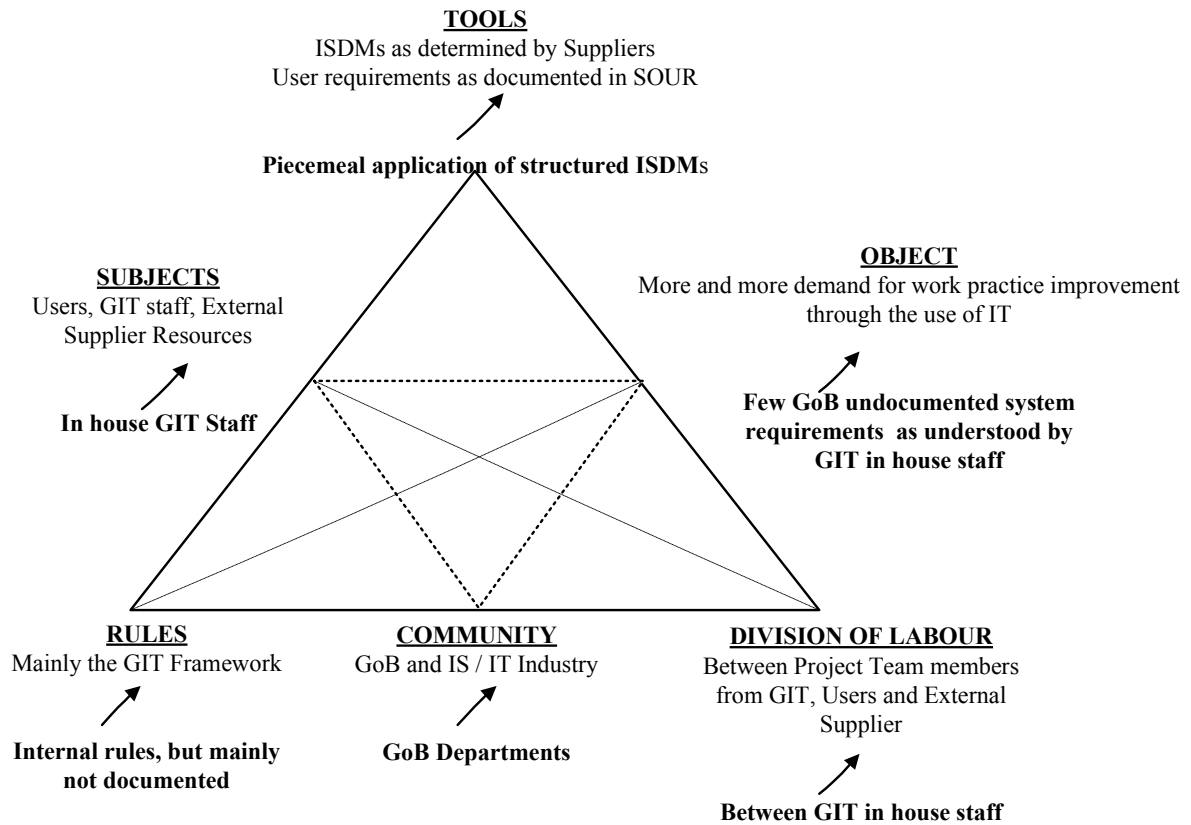
Figure 16: Historical Development of Botswana ISD Practice from 1969-1995 to 1995-now

The changes (as shown from the bold to the regular black) from one period to the next for most if not all of the activity system elements were mainly of a qualitative nature e.g. the change in rules from undocumented to documented standards and procedures through the GIT framework that were to be adhered to all those carrying out government ISD projects (i.e. internal or external); and the change in subjects from just in house GIT resources to now include users and external suppliers etc. However, it is significant to note that these qualitative changes were mainly brought about by the quantitative change in the object in terms of higher user demand for IT systems.

6.3.2   **Analysis of Contradictions**

In the first change lab there was also an analysis of the current contradictions as presented by the different participants representing the multiple voices in this network of activities which make up the current Botswana ISD practice. Each of the voices as represented by the user and developer

subject groups had their views on what the current challenges were. These different perspectives have been summarised in the table below (Table 13).

Table 13: Summary Perspectives of Current Challenges

USERS	DEVELOPERS
GIT Perspective • Enforcement of standards is a problem especially as it relates to hosting • Management of external suppliers is a challenge as GIT does not have seasoned project managers • System integration problems and too many silos of information as government ministries are all doing their own thing • '*Learning (on what IT could do) lagged behind automation that is why we have these problems*' • Methodologies employed were fossilising the manual system whereas ISD should produce results much quicker than the current 3 years it takes to develop and implement a system	• Decentralised with no proper coordination • Management not playing its role in terms of directing projects despite their role in initiating them; management disappear, but human nature is such that if 'big brother' is not watching users also disappear • Lack of harmonisation of implementation into a global organisational strategy – since users may be measured on performance on other areas, and not specifically on the system • Rigidity in Time, Cost, and Quality VS learning in an environment where the IS / IT implementation is being done for the first time • Lack of continuous user education through such programmes as ICDL • Life cycle split between multiple vendors – i.e. Analyst firm and Developer firm creates problems for understanding by users • Lack of well balanced project team – representatives are selected without considering the value the people would add to a project
Departmental Users Perspective • Management level have clarity as to what the systems are to do – but at an operational level people were lagging behind and there was lack of buy-in • Slow system uptake due to lack of preparedness even in terms of availing the necessary data for meaningful system use • Level of preparedness as well as generating interest on the project; Lack of situational analysis before engaging in projects • Management visibility and role as change agents • Time factor – took ten years from project conception to SOUR and then another two years for design, development and implementation • Staff movements – originators of system have all gone and other staff members have either been transferred or gone for training – this has affected	• Low level of user IT literacy and understanding of ISD e.g. somebody in team who does not know how to use a mouse – but are in Project Committee to make decisions • Insufficient job knowledge and processes – the fact that you are doing a job does not mean you know the job. May not understand the processes and business rules behind the job • Governments desire to have world class systems VS reluctance to make the necessary funds available - development does not come cheap!–

continuity and learning on the project as it always seems we are starting again	• In-house Vs package – development resources are in the decline, guys out of university don't want to do development, there are more interested in hardware and network support
• Package Vs Bespoke – solution we have now has never been tried anywhere else – reliance on one supplier	• Lack of user uptake
• Supplier and PM contracts did not run for the full length of the implementation – challenge of resources	• Inadequate change management and lack of change champions in all process areas
• Data – have been struggling for months to get the baseline data;	
• Had not budgeted for some items which contributed to delays;	
• Management support – was there but was affected by staff movements	
• Need to constantly re-train our users since users may only use functionality seasonally	
• Need to find ways of getting people to not revert to manual system – force them to learn – force them to use system	
• Network connectivity problems	
• Project funding	

The GITREPs perspective on challenges is consistent with her role as a government IT advisor and enforcer of standards (and therefore at a higher level) whereas the perspective of the departmental users and developers was system and project specific. For example, challenges identified at the government-wide level were integration, enforcement of standards and overall learning whereas at the system or project level challenges identified included data availability, involvement of management and users in projects and learning at a system or project level. What we see here are hierarchical (and vertical) level of challenges depending on the level at which a particular subject group is performing. This may suggest that within a network of activities there are (vertical) hierarchies of contradictions that may lead to different levels of learning similar to those identified by Toiviainen (2007) in her study of inter-organisational learning across levels. Furthermore, one can identify from this hierarchy of challenges the motives of the different subject groups as stated earlier. It provides another way of looking at the vertical dimension of

learning than that of power and subordination. This of course will have to be subjected to further empirical research.

I used these identified challenges, discussions from the first change lab and data collected from the initial interviews with the GITREP as well as the users and developers, to analyse the inner contradictions in the current ISD activity system in activity theoretical terms. Though there were different views on what the current challenges were, there was agreement with my initial assessment that learning and slow system uptake were major challenges in current practice.

The learning reported by users during the PIR interviews seemed to be inconsistent with the low system utilisation / uptake – one would have thought that what users had reported to have learnt would motivate them even more to use the new system even more – but that was not the case. This represents a **Subject Vs Object** contradiction because for as long as low user uptake persists there can be no meaningful work practice improvement, which was the desired outcome of the project.

Transition from work practice representation using the analyst firm's tools & techniques (i.e. ISDM) to representation using the developers tools & techniques was not easy for the users to follow initially and therefore it took some time for them to become active participants in the object transformation process. This represents a **Tool Vs Object** contradiction as well as a **Subject Vs Tool** contradiction. The RAD and more specifically the prototyping approach expect active participation of users through different iterations of the product – the active participation can only be achieved fully if the subjects understand the process fully and, in this case, the understanding was very slow. The RAD, as the word 'rapid' implies, anticipates a shortened development timeline – but in the PEX project there were delays in the prototyping which had a knock-on effect on the subsequent phases i.e. UAT, Piloting etc. resulting in an overall delayed implementation.

In addition to the two contradictions stated above, which result from the current standard practice of splitting the ISD process services between two companies (i.e. the analyst firm and the developers),   there is also a **Division of Labour Vs Object** contradiction. Developer firm representatives who participated at the first change lab could not agree on whether this was the best approach to achieving the desired outcome as it contributes to confusing the users. One

asked – *'Why should the work be split between two companies? What purpose does it serve?'* And yet others felt that it is the correct approach because the analyst firm basically assumes the role of client and is there to assist the client to produce a specification that will be understood by both the client and the developer. Furthermore, this initial analysis is intended to help in scoping the project and coming up with a budget estimate. Given the current government setup and capability it would not be possible for them to carry out this work without external assistance.

As stated earlier, GIT has overall responsibility for advising, directing and coordinating all IT matters in Government. Though GIT wants to enforce the use of the GIT Framework and other rules and procedures their officers did not make themselves available on the PEX project to do so. During the initial change lab, this was highlighted as a common problem in other projects. Related to this, was the point made by the GITREP, that there was inconsistent use of the framework. This presents a **Rule Vs Object** contradiction.

The unavailability of GIT representatives also presented challenges for the analyst firm, as they now had to assume some role in ensuring adherence to government standards by the developers – this assumed that the analysts were well versed and up to date with regards to what those standards and procedures were. This is a **Subject Vs Rule** contradiction because the subjects (i.e. the analyst firm actors) who were now expected to ensure adherence to the rules were themselves not necessarily fully conversant with all the rules. An example of this had to do with domain integration whereby through a new GIT project all government departments were to be integrated into a single network domain and therefore there were new procedures developed in this regard which the PEX IT Manager, the analyst firm and the developer firm were not aware of for some time.

There was a top-down approach to the PEX project conceptualisation, which is quite common within current ISD practice. The full automation of the seed multiplication processes was an idea that came from Management and IT. They are the ones who identified the contradictions, tensions and problems with the current work practice and so they initiated the development of the PEX system to address these problems. As one of the User representatives at the change lab observed '*Reasons for and Benefits from ISD solution are often crystal clear in the mind of Management; Operatives at times struggle to appreciate the usefulness of ISD solution in their context*'. Furthermore, after conceptualising the project, Managements involvement on the PEX

project was minimal. They were consulted extensively during the analysis phase, but during the design and development they only availed themselves towards the end, when the final system testing was being done. Their input in the design at that late stage resulted in some rework to the system. This represents another **Subject Vs Object** contradiction in that not only did the transformation of the object not benefit from the input of all key stakeholder, but the operational users (as subjects) are the ones who are expected to actively engage in transforming the object into the desired outcome when they may not themselves fully understand what the desired outcome should be or even fully embrace the motive for the activity.

In a similar manner, the PEX clients input was only obtained during the piloting of the system, albeit in an informal way, and yet those that conceptualised the project identified them as key stakeholders. This is another **Subject Vs Object** contradiction.

There were instances when the Functional users did not appear to fully understand their own work practice. As observed by one of the participants at the change lab one of the challenges they experience in ISD projects is *'Insufficient user job knowledge and processes ... the fact you are doing a job does not mean you know the job. (Users) may not understand the processes and business rules behind the job.'* For example in the PEX project, we would go through a session with the Functional Users, only for the PEX Head to come and say *'... No that's not how it is done ... this is what they are supposed to do ...'* Again this presents a **Subject Vs Object** contradiction since the users were expected to contribute towards transforming a work practice which they did not fully understand. This delayed learning of the user domain by the developers. It also delayed learning by the users at it took time to get to their eventual system.

According to one of the developers / suppliers – the classical approach is preferred by government as opposed to their preferred iterative approach. But this is not consistent with what was explained by GITREP – the choice of methodology is currently left to the Supplier. This misconception and misunderstanding of what is the actual practice concerning this issue is a **Rules Vs Object** contradiction.

Developers at the change lab identified a double bind in the need for learning and the three criteria for successful projects i.e. time, cost and quality. They questioned how learning could be achieved when they have to deliver within a set time and budget. This represents a **Tool Vs**

Object contradiction because the choice of methodology as well as timeframes for completing projects is left to the developers. Furthermore, their preferred iterative approach is supposed to encourage learning.

At around the same time as government developed the ICT Strategy, a Performance Management System (PMS) initiative was introduced, which emphasised the need for strategic planning and execution of initiatives within set timeframes. Despite this you still have projects like the PEX project which took ten years from conceptualisation to implementation. As a result of this the project experienced high human resource attrition rates. For example only 29% of the users who started the project were there when it was completed. This could be classified as a **Rule Vs Object** contradiction where the Key Performance Indicators (KPIs') as defined in the Strategic Plan, and project timelines as defined in the Project proposal document (i.e. submitted when funds were being requested) are the rules that set out the timeframes within which the object transformation should have been completed for meaningful impact. About this issue one of the participants observed:

> *'Where people are measured and performance measured on specific areas we have hardly seen IT included in the scorecard and therefore the focus of the user / project team has not been on the system but other things i.e. what they are evaluated against. That is a challenge for learning because their mind is elsewhere.'*

 The desire by government to decentralise IT services and to grow / develop the ICT sector on the one hand versus the desire to maintain high system integration standards as well as adherence to common standards across government is a major concern and contradiction as expressed by the GITREP. The desire to not only grow the sector and develop local (citizen) capacity through outsourcing Vs the need to complete projects as quickly as possible. As the GITREP put it *'Software development is critical to be done and finished as quickly as possible.'* What has happened instead is there is no growth in local (citizen) developers, as outsourcing is to mainly foreign-owned companies who prefer to bring their resources from outside. This is a **Rule Vs Object** contradiction since the rule was to use more citizen resources – but that was not achieved.

Figure 17 is a representation of my interpretation of contradictions within the current activity system. Though not discussed in much detail there are primary contradictions in the use value and exchange value in the Subject, and Rules elements of the current activity system. For example, there are reported instances where the user's clients (e.g. farmers in the case of the PEX project) are consulted during the ISD process and instances where they are not. The other inner contradiction is where a representative of the analyst firm as Project Manager assumes the role of user during the design and development of some projects and not others. The same applies to the inconsistent application of the Rules where in some instances a PIR is carried out at the end of the project and instances where it is not deemed to be part of the process. This may be because the PIR is not part of the GIT framework.

Overall these identified contradictions contribute to the current learning problems and slow system uptake as they shift the focus from the object of the activity.
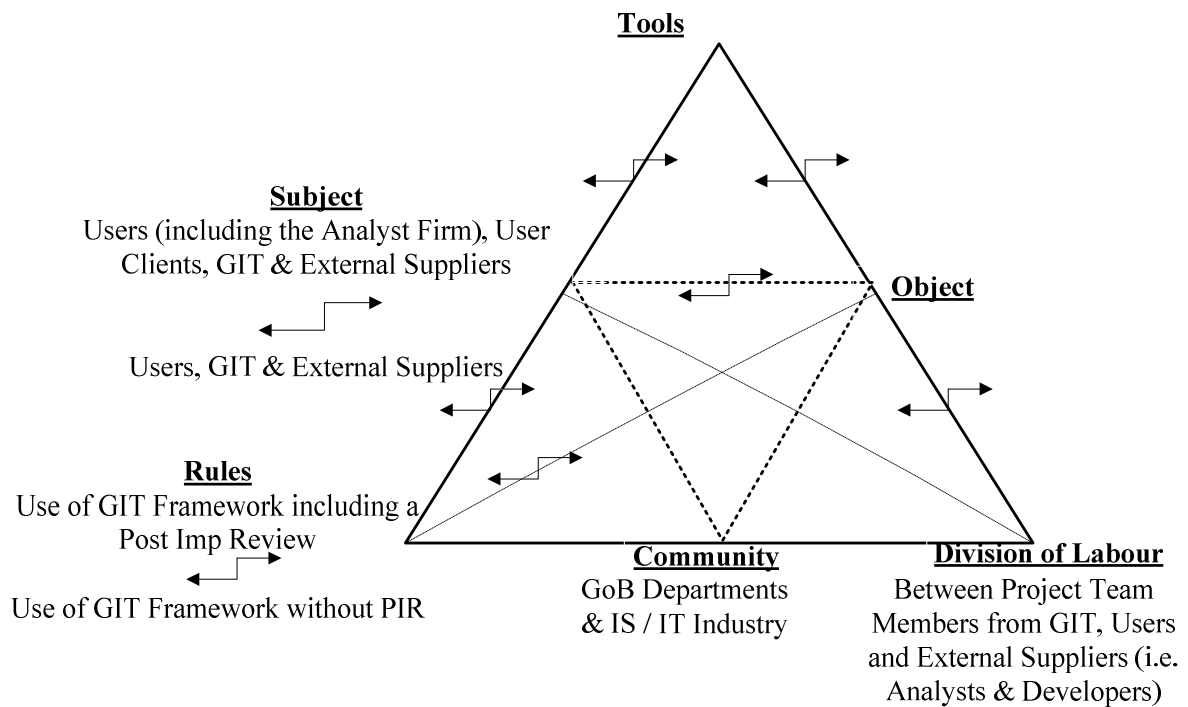

Figure 17: Representation of Primary and Secondary Contradictions

The question that now arises is – how has the historical development of the Botswana ISD practice discussed earlier contributed to these current tensions and contradictions? It would appear that the decentralisation of IS services, as demanded by User Departments, and as provided for in the 1996 ICT strategy, contributed to the challenges and contradictions identified above in that there doesn't appear to be sufficient capacity to monitor adherence to GIT standards and procedures. There is also, as highlighted by the GITREP, a major issue of systems integration as each government department seems to be doing its own thing. Furthermore, there is major issue of effective learning within current ISD practice, which is the subject of this research study. Figure 18 shows a hypothetical analysis of these contradictions based on the historical analysis presented earlier.
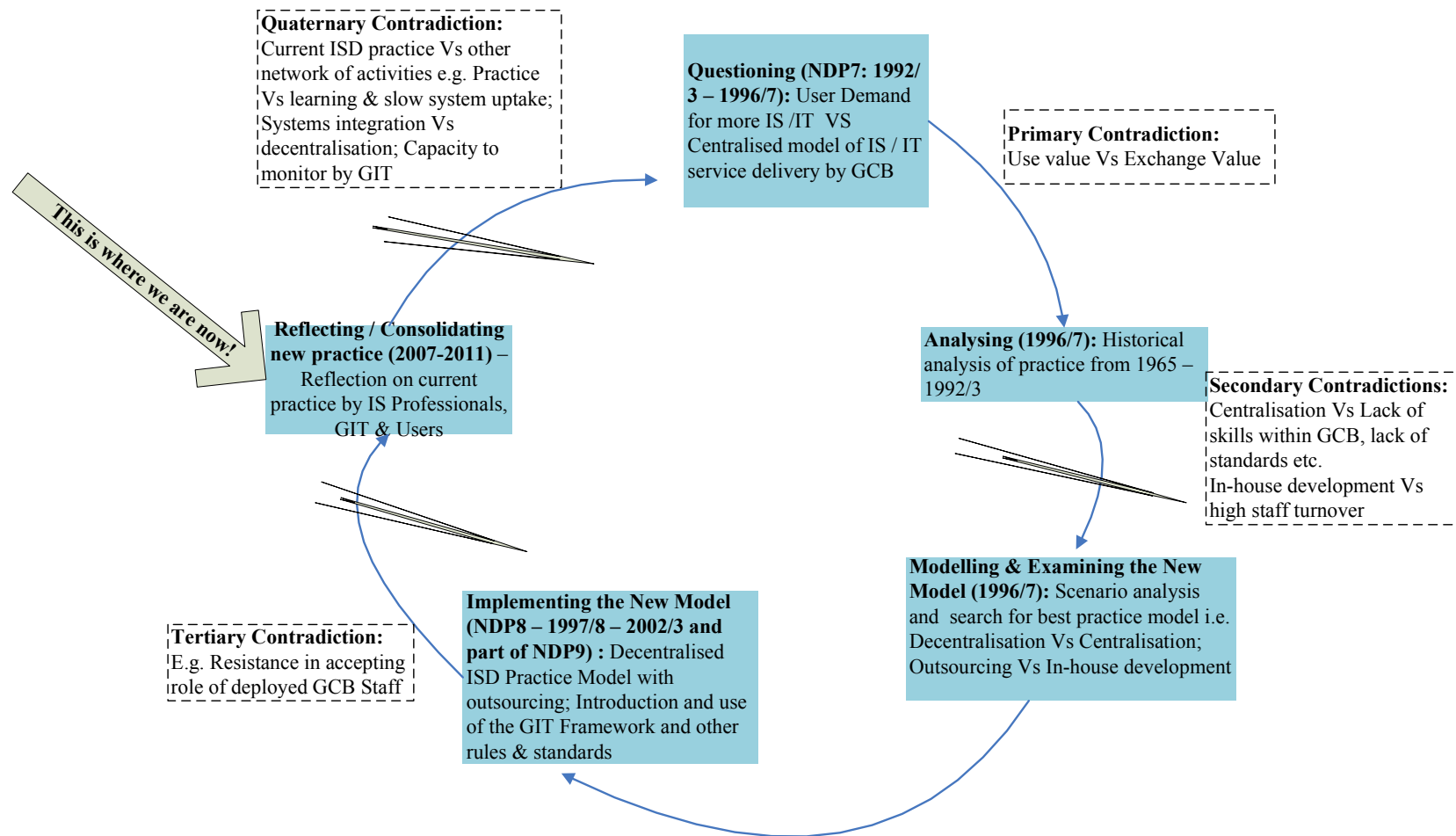
Figure 18: Historical and Hypothetical Analysis of Contradictions in Current ISD Practice

6.3.3   **Analysis of Learning**

Though as observed by some of the participants, the contradictions and identified challenges contribute towards problems of learning and slow system uptake, I felt that it was necessary to still carry out a retrospective analysis of learning on the PEX project. This has been done by identifying the conditions and means for learning as well as the type of learning using Rogers (2003) classification i.e. whether an action presented an opportunity for task conscious learning (unconscious learning) or learning conscious learning. This analysis is presented in Table 14 below. The analysis shows that most of the learning actions may be classified as facilitation mainly task conscious learning. This leads to the conclusion that in the PEX project, which is a typical example of most GIT ISD projects – learning opportunities were not being fully exploited to achieve both task conscious and learning conscious learning, which Rogers (2003) states facilitates effective learning in whatever learning environment. Furthermore, on the PEX project, learning was only evaluated at the end of the project and only as part of the post implementation review. There was no evaluation of learning at the end of each action. Therefore one is left to wonder whether there would have been benefits if the evaluation had been done at the end of each action, especially that, according to Rogers (2003), evaluation of learning focuses reflection – it makes that which was unconscious conscious.

Table 14: Learning Analysis based on Rogers (2003) classification – 'Task' Conscious Learning or 'Learning' Conscious Learning

ISD Stage / Activity System Action	Learning Opportunity / Actions (i.e. what were the learning tasks?)	Subjects / Social Actors / Actors Involved	Conditions (i.e. Under what conditions were the learning tasks carried out)	Means ((What means were used to carry out the specific learning action e.g. Were experiments used, games or some creative tasks etc.?)	Type of Learning Task / Action / Opportunity	
					Learning Conscious	Task Conscious (Unconscious Learning)
Indication of Intent	Preparation of the formal letter of intent requires an understanding of the ISD process and discussions with GIT on that	PEX Management PEX IT Personnel GITREP	Report writing in office environment	Guidelines provided with minimal interaction – maybe that is why GITREP said they were just going through the motions of computerisation		✓
Budget for SOUR Consultancy	Preparation of the budget requires drawing info from different sources, and calculations that could be using some tacit knowledge. Putting together the budget document is an externalisation of the budget guidelines – making tacit knowledge explicit.	PEX IT Personnel GITREP	Report writing in office environment	Again here, guidelines are provided with minimal interaction		✓
Procurement of SOUR dev services	This also requires drawing info from different sources i.e. GIT for the IS side, Procurement body guidelines etc.	PEX IT Personnel GITREP Procurement Personnel	Report writing in office environment	Again here, guidelines are provided with minimal interaction		✓
Production of SOUR & Budget for Solution Development	Interviews / Change labs with Management, Functional Users, PEX IT to illicit requirements; An explanation of the process and approach was an opportunity for them to learn about how ISD projects were carried out	PEX Management PEX Functional Users PEX IT Personnel GITREP Analyst firm	One-on-one interviews; Group change labs organised by PEX Units i.e. Labs Workshop; Inspection Workshop etc.	Facilitation by Analysts using the CSF approach which allowed reflection on work practice and current issues / constraints; There was dialogue & discussion amongst the Users		✓
	Analysts production of the SOUR document provided them with an opportunity to externalise in writing what they understood to be PEX's work practice and system requirements	Analyst firm PEX Management PEX Functional Users PEX IT Personnel	Report writing in office environment plus interaction with PEX stakeholders during the review process	Some dialogue and discussion to confirm understanding of work practice as SOUR was being produced		✓
Design, Developmen	Workshop with Developers to confirm requirements which was	PEX Management Developers	Workshop and dialogue facilitation; Report writing in office environment	Dialogue to allowed users confirm their understanding of their work practice and		✓

ISD Stage / Activity System Action	Learning Opportunity / Actions (i.e. what were the learning tasks?)	Subjects / Social Actors / Actors Involved	Conditions (i.e. Under what conditions were the learning tasks carried out)	Means ((What means were used to carry out the specific learning action e.g. Were experiments used, games or some creative tasks etc.?)	Type of Learning Task / Action / Opportunity	
					Learning Conscious	Task Conscious (Unconscious Learning)
t, Testing & Implementation of the Solution	being facilitated by the Lead Developer and production of the Requirements Scoping Document	PEX Functional Users PEX IT Personnel Analyst firm		the developers to learn about the users work practice		
	Developers production of the Functional Design Specification and other technical documents allowed them to externalise in writing what they had learnt & understood to be the user requirements;	Developers PEX Functional Users PEX IT Personnel Analyst firm	Report writing in office environment plus interaction with PEX stakeholders during the review process	Some dialogue and discussion to confirm understanding of work practice as SOUR was being produced		✓
	Users review of the FDS (or any other document) was an opportunity for them to learn about different documentation standards and techniques – but because they found it difficult to understand – it may have created a barrier to learning	Developers PEX Functional Users PEX IT Personnel Analyst firm	Desktop reading exercise, feedback provided in a meeting environment	Reading through document and having discussions amongst themselves.		✓
	Prototyping sessions provided learning opportunities through brainstorming and idea generation for redesigning the new work practice	Developers PEX Functional Users PEX IT Personnel Analyst firm	Workshop environment with a facilitator	Presentation of prototype and facilitation of brainstorming / idea generation sessions. Users did not play (hands on) with the prototype – only viewed it as well as signing off hard copy versions of the screens. The focus by both Users and Developers was on getting the design right.		✓
	Lab Testing – involved play as used got to interact with the system hands on and using different data sets allowed them to play with results / expectations	Developers PEX Functional Users PEX IT Personnel Analyst firm	Users were asked to do this as functional groups i.e. Labs brought their data, Inspection their data etc.	Play and direct, hands-on interaction with the system; Objectives were outlined. Though the focus was on the task, the conditions and the means allowed for play and reflection which are	✓	✓

ISD Stage / Activity System Action	Learning Opportunity / Actions (i.e. what were the learning tasks?)	Subjects / Social Actors / Actors Involved	Conditions (i.e. Under what conditions were the learning tasks carried out)	Means ((What means were used to carry out the specific learning action e.g. Were experiments used, games or some creative tasks etc.?)	Type of Learning Task / Action / Opportunity	
					Learning Conscious	Task Conscious (Unconscious Learning)
				associated with conscious learning		
	Training – formal, classroom training with objectives outlined in advance and an evaluation of the training / learning at the end	Developers PEX Functional Users PEX IT Personnel Analyst firm	Training room set up at DAR with computers shared by trainees, user training manual was developed and used during training; exercises used	Play and direct, hands-on interaction with the system; Training objectives outlined and evaluation done at the end	✓	✓
	Piloting - Real-life practice of the new work practice using the new computer-based 'tool'- presented an opportunity to learn about the new work practice and any challenges that may arise	Developers PEX Functional Users PEX IT Personnel Analyst firm	Carried out at each of the PEX officers site e.g. the Lab, the Warehouse etc.; Real, live data was being used and there was interaction with the clients	Direct interaction with the new PEX system.	✓	✓
	Go Live - Developers can learn about the technical operating environment of PEX and how to make the system operate as per the agreed performance standards	Developers PEX Functional Users PEX IT Personnel Analyst firm	Technical system operating environment; User operating environment	Developer with machine; User in interactive environment with clients		✓
Support	Direct assistance to a user on an application / system functionality – sometimes turned to training the user on that functionality	Developers PEX Functional Users	One-on-One assistance	Sometimes used system walkthrough	✓	✓
Post Implementation Review	A review and evaluation of the whole project together with an evaluation of the learning – Was there a learning opportunity here?	PEX Functional Users PEX IT Personnel Analyst firm Developers	One-on-One interviews	Opportunity to reflect on the project as a whole including the learning	✓	✓

6.4   *Learning action 3 – Modeling the new solution*

The main objective of this research study was to find a solution to the current learning problems that manifest themselves in slow system uptake and lack of meaningful work practice improvement. In this section I will present the solution design.

The questioning and analysis of contradictions and learning in the earlier sections confirmed my initial concerns about limited learning in current Botswana ISD practice. As the GITREP put it *'Learning (on what IT could do) lagged behind automation that is why we have these problems'*

In the initial change lab session some of the factors contributing to slow systems uptake and learning were said to be the lifecycle split between multiple vendors i.e. between the analyst firm and the developer firm, the lack of well balanced project teams where you have a mix of seasoned professionals and artisans, the low level of user IT literacy, insufficient job knowledge and processes, lack of management visibility and assumption of role as change agents, and timing of the system implementation. As one of the users put it:

> '*Could it be timing of system that contributes to slow system uptake – maybe in our case we may have started the process too early. The Department could have done other things to ready itself first before introducing the system ... at Management level there appears to have been clarity as to what the new system was to do – but at an operational level people were lagging behind – this leads to other problems – particularly on this type of project which requires data to have high level of uptake and the data can only come from the people in the organisation – consultants will not know where the data is.'*

From the initial change lab, it would appear that the choice of methodology used was not the issue or reason for slow system uptake because all three companies represented suggested the use of an iterative approach which was intended to encourage learning. It was suggested that a readiness assessment should be carried out prior to starting any ISD project to look into such issues as data availability, network availability and the IT skills level of users. Developers suggested that a due diligence of the user requirements should also be carried out prior to design and development of a system.

Both users and developers suggested that change management should be incorporated into the ISD process. The argument here was that though there was recognition that there were change

management activities carried out on some projects, there was need to ensure that change management was an integral part of all ISD projects and that capacity needed to be developed to be able to carry out the change management activities both internally and externally. Another suggestion made which was common to both users and developers was the need to enforce the use of any new system by management. Lack of management push and enforcement was as contributing towards slow system uptake. Other suggestions from the developers were that client resources must be involved from the beginning to the end and that two user acceptance tests should be carried out to address pre and post pilot implementation. The developers' argument for these two UATs was that it would help with the user learning curve and could therefore potentially assist with user uptake of the system. The suggestions are tabulated in Table 15 below.

Table 15: Summary of suggested Improvements

User Suggestions	Developer Suggestions
Readiness Assessment	Change Management
Change Management	Due diligence on needs analysis to ensure Department is ready
Enforcement of system usage	Enforcement of system usage from top Management
	Client resources must be involved from the beginning
	Carrying out two User Acceptance Tests to address pre- and post pilot implementation

Though I agreed with these suggestions I also thought that the main problem is that learning was not a primary objective of the ISD process and because of that, there were no learning 'check points', in a similar manner to having sign-offs at each phase / stage of the process. The learning checkpoints would allow for reflection at each stage of the process in terms of not only what had been achieved in terms of deliverables but also the learning that had been achieved. The idea of introducing some form of reflection was adopted from the concept of reflective practice introduced by Schön in 1983 which can also be traced back to the work by Dewey on exploration of experience, interaction and reflection (Bould et al., 1985). Reflective practice enables one to reflect on their actions and thereby achieve learning. And this according to Schön (1983) can be achieved in two ways i.e. reflection-in practice and reflection-on practice. Reflection-in practice

involves reflecting on ones actions whilst they are acting or doing something, and reflection-on practice refers to reflection after the fact, that is reflection on actions or tasks once they have been completed. It is the latter which I have used to inform the new model. The model also addresses the vertical as well as horizontal dimensions of learning as suggested by Vygotsky – the vertical in terms of the knowledge acquisition at an individual level through reflection and the horizontal as users and developers interact and dialogue during the evaluation sessions (Engeström 1999). Reflection in this collaborative manner brings about expansion in learning through the collective unconscious – through bringing the individual unconscious knowledge to the fore through dialogue and discussion during the 'learning evaluation session'. It would be expansion through activity!

As the interventionist in this research study, I therefore set out to propose a new model that included learning checkpoints for presentation and discussion at second change lab session. The existence of checkpoints enhances learning consciousness during all the project tasks than was originally the case – which is currently what is missing from current practice. The suggested model, as depicted at

Figure 19 and Figure 20 also takes on board the two suggestions which were common to the two subject groups i.e. Change Management and Readiness Assessment.
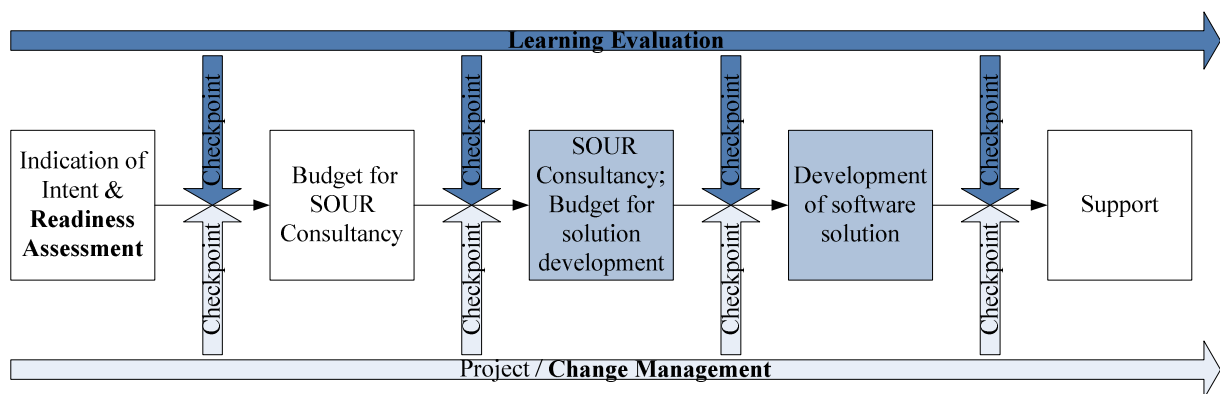

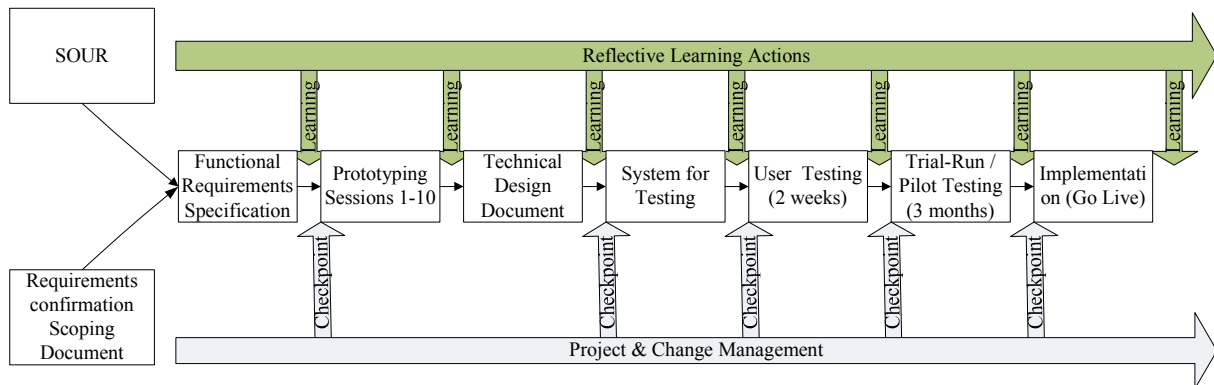**Figure 19: Learning Evaluation Checkpoints in the New ISD Process**

Figure 20: Learning Evaluation Checkpoints in the Design Process

I further suggested that the learning evaluation should involve the following (also as depicted at Figure 21):

- At the end of each action / stage social actors spend time reflecting on what has been done as well as on the learning (out-side of the process)

- A one day session is organised for this reflection

- Learning is analysed using Engeström's expansion learning theory (i.e. that is going through the four questions as articulated earlier in this report)

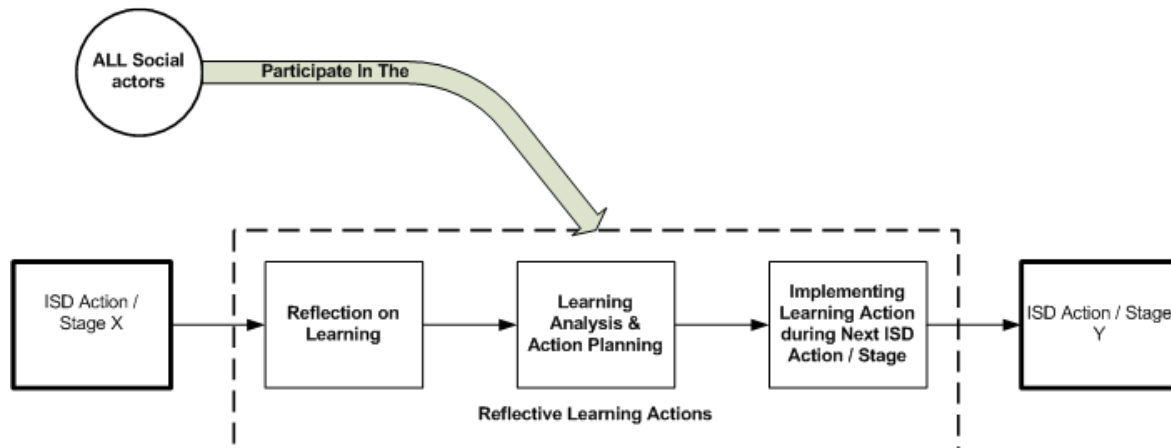- Learning (improvement) actions where necessary are agreed and included in the next stage of the ISD process

Figure 21: Reflecting on Learning

This new model was presented at the second change lab session as a stimulus to trigger discussions and focus thinking on learning and how to resolve current problems. I explained to the participants that joint collaboration in redesign of practice was crucial to the acceptance and implementation of the model. What follows next is presentation of the examination of this suggested model that took place at the second change lab, together with the learning that resulted from that.

The proposed model suggests that in activity theoretical terms, learning should be included together with work practice improvement as the object of the ISD activity. The suggested transition from the current to the new activity system is depicted at Figure 22. The suggested qualitative changes to the current activity system are as follows:

- Tools – in addition to the existing ISDMs that various developers use, they would have to also use the new ISD practice model that incorporates learning checkpoints;
- Subjects – Both users and developers would need to be active participants not just in the development process but also in the learning process;
- Rules – The current GIT framework would need to include the new rule of ensuring that all users adhere to and comply with the practice model;
- Community – All members of the community (i.e. the various government departments) and the IS / IT industry would need to have a clear understanding of the new model and also be active participants in its realisation;

- Division of Labour – there may be need to add more resources and teams on both sides to facilitate the learning evaluation process.

From a systemic point of view, these qualitative changes will affect mainly the subject and rule producing activity systems. The subjects produced in order to realise this model will need to be what Schön (1983, 1987) terms reflective practitioners. A study of whether current ISD practitioners are reflective along the lines described by Schön would be an interesting one to carry out. In terms of the rule producing activity, a process will need to be initiated to incorporate this new model into the GIT framework as well as to put the necessary measures in place to ensure adherence in line with government requirements.
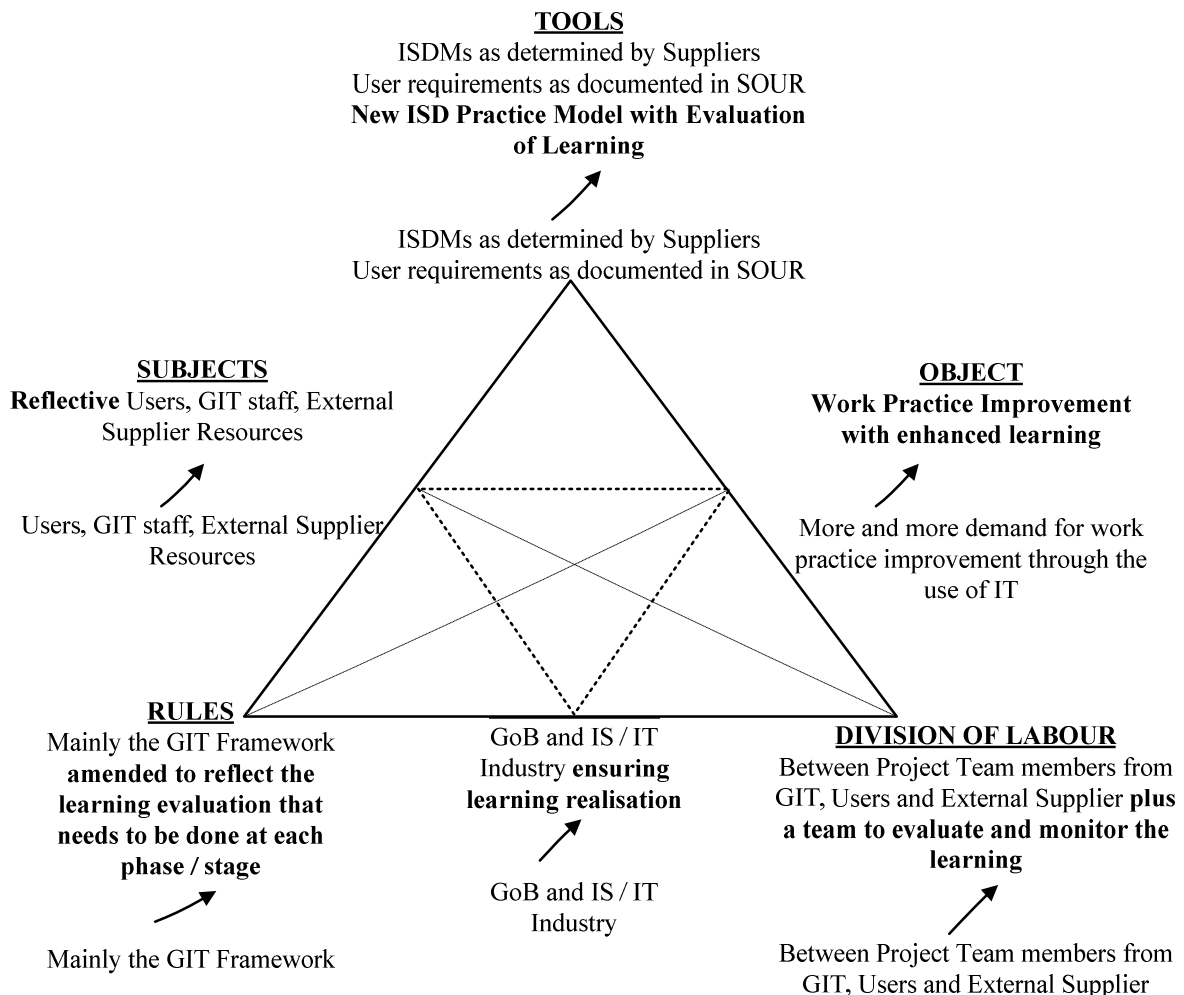

Figure 22: New ISD Activity System

6.5   Learning action 4 – Examining the new model

Examining the new model was done immediately after I had presented the model at the second change lab session. Again as the interventionist, at the end of presentation of the proposed model, I provided guideline questions to facilitate the expansive learning as the new model was being examined. The guideline questions were meant to assist in the analysis of expansion of the object in line with the four dimensions of expansion as suggested by Engeström (2000), Hasu (2000), and Engeström and Sannino (2010). The questions were open ended in structure to allow flexibility in examining all aspects of the model. Though the order of discussion did not necessarily follow the order of questions as I had provided them, we managed to have useful dialogue around each one as well as others that resulted from the discussions. The usefulness of the questions as a guide was not missed by the participants, whereon after about an hour of discussion one of the participants said '… *Go back to the last slide with the list of questions so we can have more organised contributions around those questions'*.

The questions and the analysis of learning along these dimensions follow in the order of the guideline questions, again just so that I can have an organised analysis rather than jumping from comment to comment.

i)   **So would this (i.e. the new model) suffice and will it address the current learning challenges?**

This represents a systemic-developmental dimension of expansion where the questioning and learning is on "how does this shape the future of the activity". Through this question I wanted participants to dialogue on first of all whether the model would achieve the desired results in terms of learning and secondly how the future activity should be constituted based on this model.

On whether the model would suffice, there were those participants who offered their views specific to the model and the concepts that I had indicated informed the development of the model e.g. conscious and unconscious learning and reflection as demonstrated, for example by the following comments from the participants:

Excerpt 1:

'... I do agree with you when you said that sometimes we dwell more on task learning to an extent that even yourself you are not even aware of how much learning has actually taken place in yourself ... and then people go to an extent of learning to do things without appreciating the other side of the learning i.e. the knowledge that they have gained and it becomes in most cases evident when you ask someone to show somebody else what they have learnt and how it works and how it can improve their operations ... and they will give you a blank kind of face and they say ''Aa I don't know we went through that and we are supposed to do this and this and this'' ... but I do agree that somewhere in the system we have to deliberately make an effort to build into the whole cycle an opportunity to help people realise that there has been learning ... to make them conscious of that which they are not conscious of ... it will add more value to all these initiatives that we are always doing and sometimes things do not catch up and get implemented as we anticipated because people are not aware of how much they have learnt ...'

Excerpt 2:

'In my opinion really when we are in unconscious level, we are in the ideal state which means learning has taken place and we are now in a pilot mode and for me to get to that stage will require a lot of repetitive type engagement in projects ... in other words the whole system, the whole user community, implementers as well needed to have been involved in a lot of that in order to get to that point ... so that will be my comment. And that is a very ideal stage because 20 years later when we evaluate Botswana as a whole in ICT implementations and whether they are achieving what they are supposed to achieve ... basically we will be able to say ... look a lot of learning has taken place and we are now at stage where we can unconsciously when given a system to implement we will all know what to do in the correct manner to achieve the project objectives.'

This comment seemed to suggest the desired levels of learning may require engagement in more than just one project but repetitive projects. But there are also those who without making reference to the concepts of conscious, unconscious learning and reflection

thought the model would achieve the desired results as gleaned from the following comments.

Excerpt 3:

'I totally agree with the learning and evaluation throughout. I am going to give you an example of the PEX project. I joined them at like completion of the whole thing, but then it had so many problems ... and the users themselves you'd ask why this thing is like that? "No, I don't understand, the supplier just said this it ok and I said it was ok". Then you would go on to another stage or four more stages, (but) for you to correct the first stage it's so expensive, it is linked to the 2nd, 3rd, and 4th and now it cost the government about 100,000 to correct. But if after learning that part it was evaluated and checked how it would influence the next one - maybe it would have cost government about 12,000 ... but now that it is way far it was attracting those costs ... so I think learning and evaluation can improve on the systems.'

Excerpt 4:

'... my concern is that from what you have come up with ... I did not get the part of linking the functional and management level because the level of understanding is not the same, there should be a model of how do you provide learning to Management throughout the process as against the functional users throughout the process...'

This last comment was suggesting improvement to the model, which I believe had already been taken care of since the evaluation sessions would involve all the social actors. This was pointed out during the discussions.

The Change Management aspect of the model was also discussed as being critical especially since one of the Subject-Object contradictions that had been identified in the current activity system had to do with the fact that in most cases Management were the initiators of most ISD projects, and their involvement during the development process was minimal as they left everything to the functional users who may or may not be willing or capable to carry out the work. About this one of the participants stated:

Excerpt 5:

'... Sometimes the project may be initiated from the top, and sometimes when it starts there may be issues of communication that an organisation has to deal with. The workers or junior staff may feel that the project has not been communicated well to them and may not want to own anything or do anything. But they will go along with the project because it is an instruction that from now onwards we will do this – they will not question it and if you ask them about the project they will tell you about a different thing about the process, they will deliberately give you wrong information because they are really not interested. And this really comes back to the issue of Change Management...'

There was emphasis on the fact that in order for the model to work, there would have to be a Readiness Assessment as well as someone (or party) taking responsibility for guiding the learning:

Except 6:

'... if we want to achieve that (i.e. system uptake and meaningful work transformation) then we must guide that whole learning process and that whole learning process for it to be guided needs somebody who must have the knowledge ... the blind need to be lead ... so that will be my contribution on that and obviously at each stage we will have identified what we believe is the readiness level, really what specific areas do we believe will contribute to learning, so that when we evaluate at least we have some guidelines of some sort which says at this stage this is really what we want to evaluate and hopefully see if there is a shift from what our initial assessment was...'

The comments on the need to lead the learning process shifted the discussion to a discussion on ownership. The discussion on ownership moved from a discussion on ownership of the learning process to ownership of the system that was being developed. This was even extended to a discussion on how ISD contracts should be framed in order to protect the rights of users from developers who were said to be taking advantage and selling systems developed using user information for their sole benefit. But after some

lengthy discussion on this we reverted back to the central question which had been posed by one of the participants as:

'Who should own and drive the learning?'

I like the fact that this was a question that had resulted from the discussion about the model and that it was not amongst the three guideline questions that I had provided. This, according to the four dimensions offered by Engeström (2000) and Hasu (2000) represents expansion in the moral-ideological dimension which is said to address the question "who is responsible and who decides?"

There was general agreement that Management, as the initiators of projects should drive the learning process. This, according to some, would also ensure their active involvement throughout the process. In addition to reflection, there was a strong feeling that the learning and knowledge from stage to stage needs to be captured. This would be made possible, if the model would also expand on the learning that is anticipated at each stage of the process.

The discussion on how the future activity should be constituted was addressed indirectly as part of the second and third questions in that even though the questions have been classified as representing the anticipatory-temporal dimension in the discussions that ensued the group touched on the systemic-developmental dimension because introducing a Learning Contract or amending the current GIT Framework will affect the activity system as a whole. The learning contract would constitute a new rule, and amending the GIT Framework would also mean changing existing rules as well as tools, since now social actors would need to follow a new model.

On other systemic issues one of the participants observed that delays to project implementation and inability to achieve project milestones due to lack of funding could contribute to failure in achieving the desired results with the use of the new model. This

delay may make it difficult to evaluate the learning since some '... *project input was missing from the beginning*.'

ii)   How can we make it work in practice? Do we need to have a 'Learning Contract' in addition to the Memorandum of Agreement between clients (i.e. users) and suppliers (developers)?

This represents the anticipatory-temporal dimension where the questioning relates to "what previous and forthcoming steps should be considered". I wanted to trigger discussions here on what forthcoming steps should be considered for the new activity. This question also touches on the systemic-developmental dimension as mentioned above.

In terms of the next steps, there are those who felt that the Learning Contract should be introduced, but battled with how to frame a contract that includes what they termed 'active' learning (i.e. learning to use the system) and 'inactive' learning (i.e. as attained through participation in the project e.g. manager role).

Excerpt 7

'... *(the learning contract will) assist with dealing with other issues that are not currently covered and allow people to think outside the box. The current (standard) MoA (Memorandum of Agreement) does not address what someone knows or doesn't know... How do you say you assisted someone with learning when it was not in the initial agreement ...?*'

Excerpt 8

'*I believe that should work (i.e. the learning contract). I think that is exactly what they need and it is possibly the best way of approaching it. That is the only way you can ensure that there is learning taking place and you are going to directly or indirectly get buy-in from these people because these people will now realise they need to be part of the process. ... It is probably something that has been missing. It is true that system uptake is*

very low ... probably if you incorporate this you could increase the level of system uptake. You probably need to test it somewhere but I believe it can work. This is the way to go.'

Excerpt 9

'I am trying to think what does the learning contract entail because one aspect of learning a system is that users are going to be trained on it, so part of the learning contract already captures that i.e. the formalised way is already captured. The other learning which is not captured which is learning by observation e.g. the memory stick example, is the one that is not covered'

This discussion on whether to have a learning contract or not also took another focus shift as the group then began a discussion on informal learning and handholding.

Excerpt 10:

'... to me the more they talk about it the more I realise that probably there is more need for informal learning, maybe there is need for cognitive support as people are actually now implementing the system. So that when they reach challenges then there is ready support to say this is our problem and this is how you go about it. My problem with innovations is that people are trained initially and then not given continued support so that when they meet challenges they become discouraged...'

Excerpt 11:

'I would also want to suggest that if this process may be followed (i.e. the proposed model) you probably will be able to create more capacity so that the handholding (which is currently being provided as part of current practice) will be reduced to some extent, even aspects of problem solving will be reduced. But if they just come in at the end when the system has been developed there will be need for handholding and hugging (laughing). But if there is process learning you will increase capacity.'

After some lengthy discussion there was agreement that amending the GIT framework to include the use of the new ISD model may be the easiest and most appropriate route and

that provision would be made in the current contract that the new ISD model, incorporated in the GIT framework, would be used on all ISD projects.

iii)   How and when can we test and implement this model? What needs to be done in order for us to implement and test this new model (e.g. does the current government IT framework need to be amended?).

This third question was also along the lines of anticipatory-temporal dimension of expansion. In addressing this participants were of the view that GIT should be consulted to assist with identifying a project that could be used. The difficulty that was noted with testing of the model was the length of time it would take, especially if the testing was to be done from the 'Intent' phase. The case project took ten years from intent to implementation, and most government projects, though they may not necessarily take ten years – are normally delayed for some reason or the other.

It does not appear as if the social spatial dimensions where the interest becomes "who else should be included?" was covered at all – not in the guideline questions or even during the change lab dialogues. This may have been so, because the activity system as represented and analysed included almost all the social actor's including at the community level. It will be interesting to find out if this dimension is not observed during the testing and implementation of the model.

6.6   *Conclusion*

In this chapter I have presented an analysis of collaborative ISD practice redesign following the expansive learning cycle or actions as proposed by Engeström. The analysis shows primary and secondary contradictions in current ISD practice which contribute towards ineffective learning by social actors. The analysis also shows the multi-voicedness of activity systems as participants during the co-design change labs expressed differed perspectives on first of all current challenges and then what they viewed as solutions to those challenges (Table 13 and Table 15). The analysis of learning actions during change lab dialogues that dealt with developing and examining the new model show possibility of expanding the object in three dimensions i.e. the anticipatory-temporal, moral-ideological and systemic-developmental. There was no clear demonstration of possible expansion in the social-spatial dimension.

The anticipatory-temporal dimension revealed possible expansion of the object through incorporation of the model into the GIT framework and adding the necessary contract provision in the MOA to ensure adherence by all parties. On the moral-ideological dimension, management was seen as the ideal candidates to drive and lead the learning process. Analysis on the systemic-developmental dimension further confirmed the need for considering the network of activities and the wider community (e.g. the Government Finance Department as mentioned here) in the eventual testing and implementation of the new model.

Learning actions 5 (Implementing the new model), 6 (Reflecting on new practice) and 7 (Consolidating Practice) have not been possible as part of this current research. I have initiated discussions with GIT on how this model can be tested and adopted within the government system. Though it was not possible to go through all the epistemic actions, learning was achieved as described by Daniels et al. (2007), Engeström and Sannino (2010). I was able to observe how the participants were able to expand the object of the activity and enrich it as they went through for example the focus shifts of discussing the moral-ideological dimension of who should drive the process. This had not been in my original guideline questions. We traversed the zone of proximal development together as we moved from the two key suggestions of Change Management and Readiness Assessment, to a model that incorporates learning checkpoints and requires reflection-on action at each phase / stage of the ISD process. This in itself constitutes the creation of new knowledge. At the beginning of the process we did not know what the final outcome would look like – the resulting model evolved as a result of the learning activity that we engaged in.

It was interesting to observe how participants reacted to the introduction of new intermediate concepts such as conscious and unconscious learning, and reflection. The conscious and unconscious learning concept was found to be an interesting way of looking at learning by others, but others saw it as a remote idea. This interpretation and reconstruction of the task at hand (i.e. in line with Vygotskian theory) using concepts that were new to some, opened up potential and emerging new psychological formations of the participants.

 The new ISD model has the potential to have a meaningful impact on improving current ISD work practice in Botswana because the solution addresses mainly secondary as opposed to the primary contradictions identified in the current activity system. It will mainly address secondary

contradiction between Tools and Object, and between Rules and Object. And this, according to Engeström (1995) and Pihlaja (2005), is the best scenario since although solutions to primary contradictions may be necessary, they are much more hypothetical and therefore may achieve minimum benefit.

What now remains is for this model to be applied to a real life project and the results monitored over a period of time. In my final chapter, I will now evaluate contributions as well as report on the lessons learnt during my exploratory journey of learning by expansion.