School of Computing
Blekinge Institute of Technology

User Involvement in In-house Developed Software

Case Study of a Nigerian Financial Institution

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Thesis submitted for completion of Master of Science (60 credits)
Main field of study: Computer Science
Specialization: Informatics

June 2011

This thesis is submitted to the School of Computing at Blekinge Institute of Technology in partial fulfillment of the requirements for the degree of Master of Science (60 credits) in Computer Science with specialization in Informatics. The thesis is equivalent to 10 weeks of full time studies.

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ABSTRACT

Over the years, researchers have argued that user friendly and result oriented systems were not necessarily products of participatory user involvement; however there is a degree of user involvement required in the development process of any Information System.

The aim of this research is to discover the level of user involvement in in-house software development process in *All Nigerian Bank[1] (ANB).* We use two research methods - survey and process observation. A survey was conducted for 107 end users and 10 developers (programmers) of 5 selected in-house developed software solutions; we complement our survey with an active observation of a typical software development process.

Relative to the five in-house software solutions studied in our reseach; our study reveals that user involvement in the development process on the whole for these five solutions has been 8% participative, 18% representative, 33% consultative and 41% informative. 67% of end user respondents agreed that these specific in-house developed solutions are user friendly while 62% said solutions meet business needs. This result is a clustered representation of the 5 cases as a way of exploring the "normal in-house development process" in ANB

We conclude that the level of user involvement relative to business needs and user friendliness is a reflection of a number of factors which include ANB's business strategy, organizational culture and politics; other factors include weak Nigerian labour laws, low ethical standards and high unemployment rate.

Keywords: User Participation, User Involvement, User Centeredness, Participatory Design, Information System, In-house Software.

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[1] All Nigerian Bank is a fictitious name for the purpose of reporting this research work in line with the banks privacy policy

EXECUTIVE SUMMARY

Relative to the five in-house software solutions studied in our reseach; our study reveals that user involvement in the development process on the whole for these five solutions has been 8% participative, 18% representative, 33% consultative and 41% informative. Although, these solutions are meeting business needs with some level of user satisfaction (67% and 62% respectively); system developers have untapped potentials that could be used to the advantage of ANB. We also observe that a greater number of users appreciate 'psychological' involvement than 'physical' engagement in software development: they are not seeking for physically active involvement, but a consultatively informative involvement that reflects a sense of belonging.

It is therefore recommended that in-house software development process in ANB should be more user involving. Additionally, better working environment should be created for programmers to enable them perform at their best.

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1   CHAPTER 1: INTRODUCTION

1.1   Preamble

Software solutions could be classified into three broad categories: o*ff-the-shelf solution*, *tailor-made solutions*, and *in-house developed solutions*. Off-the-shelf solutions are customizable software with a wide range of coverage; examples are Human Resources (HR) and Enterprise Resource Planning (ERP) solutions. Tailor made solutions are proprietary software made and developed for a specific business need, although they can be customized but the customization requires some level of technicalities and professionalism. In-house developed solutions are software developed and managed for an organization by developers (or programmers) hired by the organization. In-house developed solutions unlike other categories offer a great potential for interacting with the users during the development process. Because the developers are an integral part of the organization, developing a solution "in-house" presents a great opportunity for participation. In-house developed solutions thus have a high potential to meet business needs by applying participatory development processes that support gathering and specification of user requirements and in-house usability testing.

The purpose of software development is the same irrespective of organization; the objectives are to increase efficiency, meet specific business needs and promote positive user experience. Unfortunately, some in-house solution do not meet these expectations, some are junked after great effort has been put into the development processes. Although a lot has been researched on why software development projects fail (Neon, 2011, Gulliksen et al, 1999), most of these studies looked at software development from a very broad perspective, not specifically from in-house developed solutions. Nor are there many examples of studies of software development in a Nigerian context.

Focusing on in-house software development and the Nigerian organizations, some pertinent questions readily come to mind: how involving are in-house developed software solutions? How influential are the stakeholders (users, developers and managers) in the development process? Are these solutions meeting business needs and user's expectations compared to off-the shelf and tailor-made solutions? What factors impact in-house software development? What can be done to positively increase the impact of in-house software solutions on business objectives and user experience? This research may not provide answers

to all our questions, but will address some of them, especially from user involvement and business focus perspectives using a financial institution in Nigeria as a case study.

1.2   Aim and Objectives

This research is aimed at discovering the level of user involvement in the in-house software development process in a Nigerian financial institution. For the purpose of this research, we will refer to the *'Nigerian financial institution'* as '*All Nigerian Bank'* – ANB.

1.3   Research Questions/Hypothesis

The following are our research questions:

- How involving is the in-house software development process in ANB? By this question we mean; how are users involved in the development processes?

- What are the factors that affect user involvement in in-house software development in ANB?

This research will attempt to answer these questions and go further to make recommendations based on the outcome of our research findings.

1.4   Introducing All Nigerian Bank (ANB)

All Nigerian Bank (ANB) is an indigenous financial institution with over 150 branches and about 2,000 employees spread across Nigeria. ANB's vision is to have visible presence in all African countries. ANB is the fifth largest financial services provider in Nigeria with assets valued in excess of US$6 billion.

The bank has three broad functional segments; the banking operations, product marketing and back-office support. The banking operations deals with day to day running of banking services like customer service, cash management, money transfer, credit processing etc; product marketing deals with all marketing activities which include customer relationship management, cross selling and product development ; while back-office operations provides support to the banking operations and product marketing. Prominent among the back office components (or departments) are information technology, legal services, risk management, corporate audit, human resource management, corporate communications, procurement and general services teams.

The bank runs a functional organization structure; the working environment is neither *projectiz-ed* nor *matrix-ed,* except on very rare exceptional cases. Most projects are carried out within a functional area; in a situation where proficiency is needed from another functional area; a request is made to the area head who would assign somebody from his team. In this case, resources juggle between operational activities and project work.

Due to the nature of banking business in Nigeria and the need to favorably forge ahead of competition, ANB has a big Information Technology Division (ITD) which serves as the organization's back bone. ITD has over 15 units working together to actualize the bank's Information Technology (IT) strategy; as a matter of fact one of the IT managers we spoke to during our research adjudged ANB as one of the leading ICT driven banks in Nigeria. They have a team of 10 professional developers (or programmers) that developed over 50 solutions currently in use in the bank. It is also interesting to know that the internet banking was developed and managed in-house.

2   CHAPTER 2: THEORETICAL FRAMEWORK

The main emphasis of this research work is on the level of *'user involvement'* and its relative application in the in-house software development process at ANB. User involvement, user participation and user centeredness seem to be synonymous and closely related at a glance, in fact a number of literatures use these terms (Barki and Hartwick; 1994,1989) interchangeably; however, the ability to distinctively identify the thin line that demarcates these areas of study will give our research a clear focus. In an attempt to clarify these terms we must bear in mind that these terms are not only relevant in the field of information technology but in every sphere of life where there is a system and a user.

What is user involvement? "User involvement refers to the subjective psychological state that reflects the level of importance and personal relevance of the information system to users", (Barki and Hartwick 1989). It can be seen as a measure of users' contribution to the development process of a system from conceptualization to actualization.

User participation according to Mumford (Mumford, 1981) is a type of user involvement where end users are actively involved in the development of systems that have direct impact on them. It is a collaborative process of system development where end users and system engineers combine expertise in order to create an innovative system (Iivari and Iivari, 2006). Participatory Design (PD) is a system design paradigm that encapsulates user participation as a form of user involvement. PD is another research field on its own which is obviously out of our research scope.
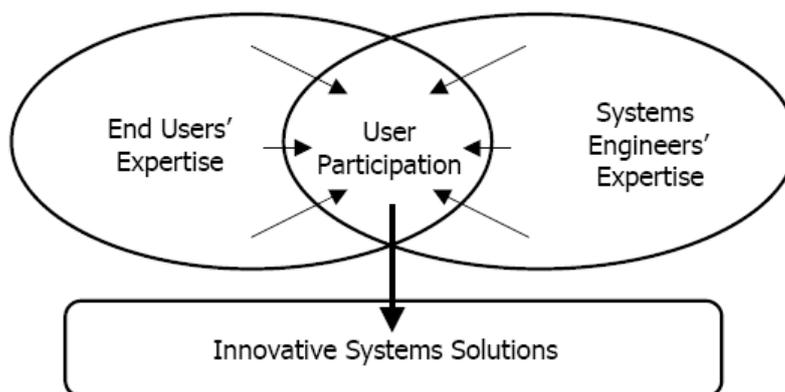
Figure 1: User Participation (Hunton & Beeler, 1997).

Defining user centeredness (UC) is an ambiguous task. According to Iivari and Iivari (Iivari and Iivari, 2006) the concept of user centeredness and user centered design has been approached from many schools of thought by researchers. User centeredness focuses on identifying where users belong in the scheme of system developemnt. User centeredness is a measure of how well the tools, processes, applications and devices, are suited to users within the boundary of an information system (Iivari and Iivari, 2006)
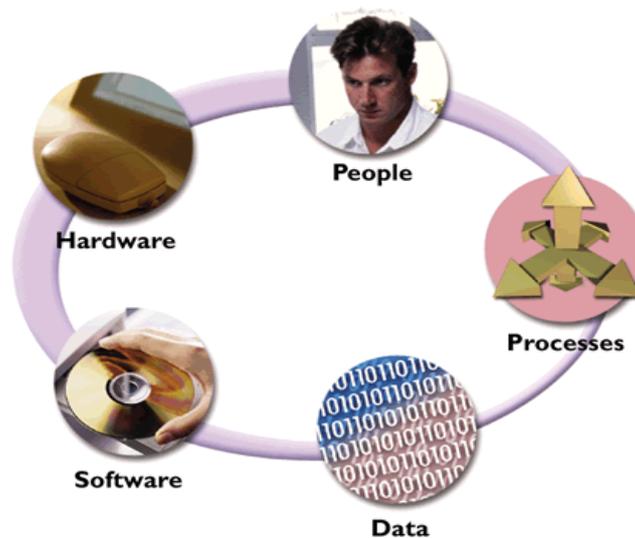
Figure 2: Information System Components (Roldan, 2010).

According to Roldan, the people (also known as 'users') are a key component of any information system (Roldan, 2010) as shown in figure 2.

In a study on "*Varieties of User-Centeredness*", Iivari and Iivari (Iivari and Iivari, 2006) researched into various dimensions of user centeredness. They streamlined user centeredness in to four segments: 1) as user focus, 2) as work-centeredness, 3) as user participation, and 4) as system personalization

- **As user focus:** This takes cognizance of the peculiarities of users and seeks to satisfy these needs by meeting their expectations. User centeredness as user focus revolves around usability from end users point of view.

- **As work-centeredness**: This focuses on the work domain of the users, it gives less preference to the user as long as the work is being done acceptably.

- **As user participation**: This is a direct involvement of users in system design, the primary aim is to address issues of power and politics in the workplace, it is seen as democratizing information system implementation process.

- **As system personalization:** This places emphasis on system customization in order to meet user's personal needs. For example, a web application like yahoo has a

yellow colored theme but not everyone likes yellow as a color. System personalization provides flexibility such that individuals could set or customize the system to meet personal likes by changing the theme and possibly rearranging the items and system layouts.

We cannot out-rightly rule out a degree of participation in any form of user centered design.

There is a general notion that user involvement is very critical to the successful implementation of information systems (Kensing and Blomberg, 1998; Ramannat et al, 2010). Analyzing user involvement from IS point of view, we could literarily observe the amalgamation of two key words: 'user' and 'involvement. A 'user' is any individual in an organization who is directly interacting with an information system; (Carmel, 1993). This quickly brings to mind the thin line between users and stakeholders. All users are stakeholders but not all stakeholders are users. 'Involvement' is the degree of contribution of an entity (in this case a 'user') in a given process.

2.1   Forms of User Involvement

Carmel suggests that the difference between various forms of user involvement approaches is the degree to which users contribute to the system development process (Carmel, 1993). Kujala categorized user involvement into three distinct forms: informative, consultative or participative. Principally, users may either take active roles or they may be involved as providers of information, commentators, or objects for observations. (Kujala, 1997)

2.1.1   Informative Involvement

This type of user participation does not give users the ability to actively influence the implementation of the system. Users simply provide information about input, expected outputs and processes between the inputs and outputs (Olson, 2004); they are not involved in *how* the input is processed.

2.1.2   Consultative Involvement

Consultative involvement seems to be a deeper form of informative involvement. Users here too have little influence or control over the operation and output of the system. It is assumed that users are more knowledgeable, therefore they could provide less ambiguous information

that will require less effort to process by the designers (Kujala, 1997). Of course one could argue that the information provided is a form of influence because without the information there will not be a system. We need to realize that the information given at this point is nontechnical; it could go for a mere conversation, often time this information could be retrieved through observation or interaction. Information retrieval is often deliberate, active and ongoing.

2.1.3   Representative Involvement

Representative involvement is based on involving a selection of representatives of the users in the design and decision making stages of the system implementation process. The selection of user representatives is often made by management, rather than by the user group or user groups which the representatives are expected to represent and/or be representative of. This seems to be the common user participatory model in corporate environment. The question of whether the selected representative truly represents the interest of the group is a different matter altogether. The representatives usually exert a considerable amount of influence but they may not be able to provide comprehensively adequate information since they are usually only a few representatives of much larger groups of users. (Beresford and Campbell, 1994)

2.1.4   Participative Involvement

This system implementation paradigm places users at the center of the design process. Users define what is to be done, and how it will be done. As a matter of fact the ownership rests with the users, information technology experts in this case only act as technical partners. This approach may be cumbersome but it gives a high degree of information, influence and control to users.

User involvement centers on the three key words, information, control and influence (Kujala, 1997); at any point in time when we need to assert the level of user involvement in information system design and implementation, the following questions could provide some direction

- Is the user providing the required information?
- Is the user influencing decisions?
- Is the user controlling activities?

2.2 User involvement fact finding techniques

A classical waterfall model is still a generally acceptable software system development technique; although in practice it may include a number of feedback loops and iterations. This model was believed to originate from Royce's paper "*Managing the Development of Large Software Systems*" (Winston, 1987). The waterfall model in its shortest form has four activities. The measure of user involvement in these activities dictates the overall degree of user involvement in system implementations. These activities include:

- **Requirement Gathering**: This is the combination of all activities aimed at collecting user's understanding of the proposed system; the language is usually plain and void of technicalities.

- **Requirement Specification**: Requirement specification is a systematic analysis of user's expectations as obtained during requirement gathering.

- **Design**: This is the process of actualizing user's specifications. In software development, a number of things happen after system design; it includes coding, integration, and component testing – all these activities are tagged "*development*". However the 'design' phase is critical because it serves as input to the development phase. User participation in *development* is a difficult task because of the technical procedures involved.

- **Evaluation**: This is the assessment of the design product by users; it could be in form of User Acceptance Test (UAT), Functionality Test (FT) or periodic upgrade evaluation.

Having reviewed some 'user prone' stages of information system development, in the following we give examples of user engagement methods which are often used during IS development. These include focus groups, usability testing, card sorting, questionnaires and interviews (Crandall and Grachek, 2006). Rivadran refers to these techniques as '*Fact Finding Techniques*' (Rivadran, 2006).

2.2.1 Card Sorting

Gaffne defined Card Sorting as *a technique for exploring how people group items, so that you can develop structures that maximize the probability of users being able to find items* (Gaffne, 2006). It is a user-centered design method for increasing a system's *findability* (Kaufma, 2006). This method is useful when designing a relatively large system where users

need to access a number of features within limited space and time. Going by Iivari's (Iivari and Iivari, 2006) classification of user centeredness; card sorting will be an appropriate method for user centeredness *as user focus* and *as system personalization.* It can be administered individually or within groups of users. Card sorting is relatively simple and cheap to implement but it puts more emphasis on content and presentation than on the task that needs to be accomplished.

2.2.2   Focus Groups

Focus groups are small-group discussions that provide in-depth information and views on a specific topic (Grudens-Schuck, 2008). As the name implies, this method is group based, although it is advisable that the group should be in the average of ten participants for effective coverage. The main focus is the need for users to share their views (thoughts, feelings and ideas) on the subject matter. Focus group is quite useful, but it requires a great deal of moderation and analytic ability on the part of the leader to be able to get the best out of the participants.

2.2.3   Interviews

An interview is a *one-on-one* information gathering activity where questions are asked from a target group of people (Rivadran, 2006). Interview provides an open ended opportunity to explore the subject matter in detail. Misunderstanding and misconceptions between interviewer and interviewee can often be identified during the interview and sorted out in dialogue. The disadvantage is that it creates space for easy digression. Interviewing often ends up with what may seem like a lot of irrelevant information, although such information may in fact contribute to a better contextual understanding of the domain in question. It could be time consuming and energy sapping especially when the user is not communicative; it is also possible that the interviewer may not be receptive or attentive enough. A high level of professionalism is required in order to analyze user requirements obtained in an interview.

2.2.4   Usability Testing

Usability testing is a technique for ensuring that the intended users of a system can carry out the intended tasks efficiently, effectively and satisfactorily with the support of the system (Gaffne, 1999). Usability tests are usually carried out by three participants; the user, the moderator, and the observer.   The user is expected to carry out operations and activities as instructed by the moderator, while the observer takes notes of challenges encountered by the

user during the process. Usability test takes various forms in software development process, especially under '*evaluative*' activities. Usability testing requires a lot of planning and strategic effort in order to yield desired results.

2.2.5   Questionnaires

Questionnaires are tools used for getting users' opinions about predefined questions. It is an inexpensive way of gathering data from a potentially large number of respondents. Questionnaires maybe open or close ended; by *close* ended users are required to select response from a set of predefined options while *open* ended accord users the freedom of expression. It is important that the questionnaire is well designed and structured in line with the objective of study. In software development, using a questionnaire is a good way of obtaining information when users and designers are not in the same geographic location (Rivadran, 2006).

3 CHAPTER 3: EMPIRICAL MATERIAL

Having established a theoretical base for this study in line with the research aim and objectives; in the next few paragraphs, we are going to walk through the research methodologies which describe how we obtained empirical materials for this research.

3.1 Research Methodology

In a similar study which was carried out by Subramanyam et al (Subramanyam et al, 2010) where they studied *user participation in software development projects*; they addressed the question of relative effectiveness of user participation by empirically examining the perceived software project performance from users' and developers' perspectives simultaneously. We make notable reference to the methods used in Subramanyam et al's article; the main difference is that we focus on in-house developed software used within a closed business environment of a case study.

Two research methods or tools were employed in our study: process observation and survey. These tools are in addition to the initial literature study of papers and other relevant materials on user involvement and software development, which we have carried out within the framework of our thesis project.

Due to the fact that this study is a combined effort by two of us (Owoseni and Imhanyehor), we were both actively involved in 1) the software development process observation at ANB; 2) the design of survey questionnaires and 3) analysis of results. Owoseni handled the interview with developers while Imhanyehor collated the end-user survey responses. The report writing is also a joint work of both of us through collaboration on *'google doc'*.

3.1.1 Process Observation

We were 'attached' to the IT Business and Collaboration (IT B&C) team as systems and business analysts; we interfaced between the users, system owners, management and programmers. This role gave us a very good avenue to see software development in ANB from multiple perspectives of users, developers, business owners and management. We were privileged to be part of meetings and discussions during *Requirement Gathering (RG)*, *Requirement Specification Analysis* (*RSA*) and *User Acceptance Tests (UAT)* processes of solution development as 'system analyst'. The RG involves asking questions bordering on the business process to be automated while UAT seeks user's acceptance of newly developed

but un-deployed solutions; as a matter of procedure, developed systems must be certified by representatives of process owners and end- users before such solutions are allowed to be deployed to live environment.

The process observation as 'system analysts' gave us a practical experience of how users are involved in software development process in ANB. There are a number of feedback (behavioral and psychological feedback) that were not captured in our survey but the observation gave us practical experience of one software development process, and thus how users could sometimes be involved in these processes at ANB; this has given us a richer software development knowledge. Our observation of the development process reveals eight distinct stages as shown in the diagram below:

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┌─────────────────────────────────────┐
│        Automation Request           │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│       Requirement Gathering         │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│        Requirement Analyis          │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│   Technical Analysis & System Design│
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│        System Developement          │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│             Testing                 │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│       Training/Documentation        │
└─────────────────────────────────────┘
                  ↓
┌─────────────────────────────────────┐
│       Go-live & Maintainance        │
└─────────────────────────────────────┘
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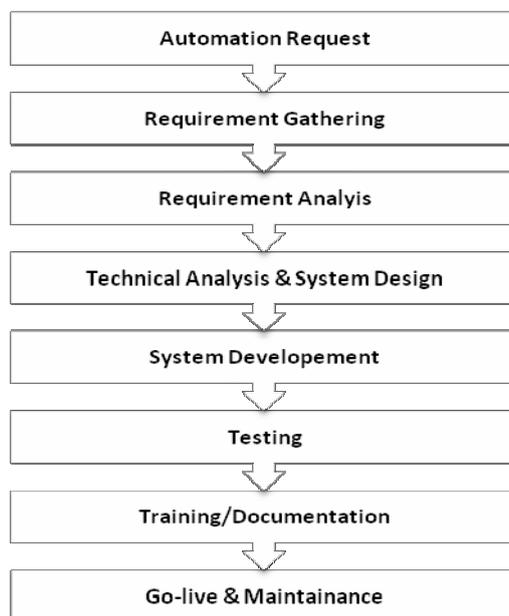
Figure 3: Software development stages in ANB.

3.1.2   Surveys

The surveys were targeted at two categories of participants, the end users and the developers of 5 selected in-house developed solutions. The 5 cases were carefully selected because of their relevance to the bank's processes, coverage and frequency of use (frequency as calculated by average daily user logins). Additionally, the solutions are web applications built on similar technology platforms and developed in record time as described in their project documentations.   All selected end-user participants have used 2 or more of the targeted 5 solutions two weeks prior to the survey as indicated in the audit log of the selected

solutions; similarly, all developers targeted in the survey worked on 3 or more of the 5 selected solutions.

Table 1 shows summary of the 5 selected cases.

S/No	Name of Solution	Description	Coverage	Frequency[2]
1	Expense Management Portal	Manages request and approval of all operational expenses in the bank	Bank-wide (Accessible to all staff)	2,805
2	Service Track Portal	This is an incident management portal that facilitates resolution of internal service related issues.	Bank-wide (Accessible to all staff)	2,342
3	Corporate Portal	This is an internal staff portal where management shares information, document management is an integral part of this system	Bank-wide (Accessible to all staff)	2,100
4	Info Biz	This is an alternative web platform for accessing the core banking application	Bank-wide (Accessible to all staff)	1,523
5	Customer Feedback Portal	This is an incident and enquiry management solution customer service related issues.	Bank-wide (Accessible to all staff and Customers)	1,557

Table 1: Summarized description of 5 selected in-house software.

It is good to note that the software development process we observed is not one of the 5 cases targeted in our survey.

3.1.2.1   End-User Survey
The target participants of this survey were non managerial users of the selected solutions; the motivation for this is due to the fact that they constitute the largest group of stakeholders involved in in-house software development; additionally, their responses were expected to be

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[2] Frequency is calculated by average number of user logins as indicated in the audit log two weeks prior to the survey. (i.e. No of login in 2wks/14)

more objective because their roles in the software development process are not dual-dimension like the roles of managers who double as users and supervisors.

The survey questions were relatively generic questions but responses were based on participant's perception of the selected solutions. We specifically informed the respondents at the introductory section of the questionnaire that their responses should be based on the 5 selected solutions. The survey has 10 Likert scaled questions with answers ranging from strongly agree to strongly disagree. (Ware and Brewer, 1999). The survey was electronically conducted through ANB's online survey portal. Figure 3 shows the survey web application interface.

150 participants were randomly selected and we got 107 responses (Appendix 1). Additionally all selected participants have used at least one of the targeted 5 solutions two weeks prior to the survey as indicated in the audit log of the 5 selected solutions. Note that we did not request the users to make distinctions *between* the 5 selected solutions in our survey. Our focus was on user involvement in and usability of in-house developed solutions at ANB in general, as perceived by the users, rather than on differences between the 5 systems we had selected as being representative of in-house software development in this case.

Figure 4: End User Survey Interface.

Over the years, research has been able to establish a connection between user involvement and user acceptance or perceived user friendliness of an information system (Kujala, 2003; Barona and Louis, 1988; Baroudi et al, 1986), the higher the user involvement, the better the solution is perceived to be by the users. Although there are various forms of user involvement (Carmel, 1993; Kujala, 1997; Kujala, 2003); we probe into the level of user involvement in ANB by user's agreement or disagreement with these five statements:

1. I usually provide information to system analyst about expected inputs, processes and outputs whenever software is to be developed.
2. I was actively involved in systems design and implementation through active participation.
3. I will like to be involved in the design (and implementation) of any system that will impact my job.
4. Involving me in the design is not necessary, it is IT's Job and they should be professional enough to meet my expectations.
5. I am not always part of IS implementation team but my unit is always WELL[3] represented.

Additionally, in order to make decisive recommendations after this study; we needed to have an idea of the users' general perception of the solutions with respect to 'user friendliness' and 'meeting business needs'. This was intended to help us draw some relationship between the level of user involvement and users' perceptions of the systems when implemented.

3.1.2.2 Developer's Survey

The survey was conducted with ten developers as respondents. The developers are employed by ANB and each of them actively participated in the development of at least 2 of the 5 selected cases.

These are the objectives of the survey:

1. We wanted to know the technical background of the developers in terms of experience and preferred software development methodology. According to McGill and Klobas, methodology employed in systems development could affect user involvement.(McGill and Klobas, 2008).

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[3] "WELL" is capitalized to determine if respondent agree with the representation usually selected by the management.

2. We wanted to know the developers' perception about users; are they comfortable interacting with users? This to a great extent will influence level of user involvement in the development process (Subramanyam et al ,2010).

3. We wanted to know the developers' perception about level of influence exerted by major groups of stakeholders in the development process; since level of user involvement is relative to how much influence users (stakeholders) have on the development process (Kujala , 2003).

4. We wanted to know the constraints encountered by developers during the process of development; to some extent, these constraints may affect level of user involvement (Subramanyam et al ,2010).

Due to the small number of respondents' involved (ten developers) and our physical access to them, the questions were more open ended (unlike end-user questionnaire). As intended, we were able to review some of the responses we got from the survey with developers through one-on-one interviews. These two questions were asked in the interview, based on free text comments received in the survey:

1. Please describe what constitutes *'enabling working environment'* to you?

2. What is your general opinion about the entire process of software development process in ANB?

Although the interviews were not in the initial plan, they proved helpful because we were able to gain a clearer understanding of certain factors that affect level of user involvement in ANB's in house software development process. Note that all participants in this study are employee of ANB. An excerpt of the survey questions is available in Appendix 2. Chapter 4: Result and Analysis.

The outcome of our study is presented in line with the order in which we performed our methodology: 1) Process Observation and 2) Survey.

3.2   Process Observation

The information system of reference is a Private Identification Number (PIN) Vending System (PVs) for an educational institution - Nigerian Drivers Institute -NDI[4] which is one

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[4] Nigerian Driver's Institute is a fictitious name in line with privacy policy of the financial institution where our research was carried out

of ANB's corporate customers. The system is expected to automate the process of fees payment by NDI students.

Here is the process flow: periodically, the NDI's administrative user is expected to upload PIN to PVs; this is done through a secure web connection to a database that is warehoused within ANB's domain. NDI student or prospective student walks into any cash outlet (branch) of ANB with cash; the student may or may not have an account with ANB, the student specifies the type of fee he would like to pay, (the fees vary, depending on the type of course or program the student is taking) the teller collects the money and other relevant details like name, address, mobile number etc. The teller posts the transaction on the core banking application; once the transaction is consummated successfully, PVs retrieves the PIN, decrypts it and sends it to the customer's mobile phone as an SMS. The student then proceeds to the institution's web portal with the PIN to unlock relevant service(s). The major user groups besides NDI students are NDI administrative users, ANB e-business users, ANB tellers and ANB System Support officers.

In the following, we briefly describe the outcome of our observation of Pin Vending System development in line with ANB's Software development stages depicted in figure 4.

3.2.1   Automation Request

The software development process starts with the business owner (or a representative of the unit whose process needs to be automated) sending an automation request to IT Business and Collaboration (IT B&C) team of Information Technology Division (ITD). This is done by completing an automation request form or simply writing an email.

3.2.2   Requirement Gathering

The IT business and collaboration team reviews the request and arranges a meeting with the business owners to obtain their requirements and observe the process they want to automate. Requirements gathering are user involving as representatives of NDI and ANB's were directly engaged in dialogue (questions and discussion) in order to understand their main points.

3.2.3   Requirement Analysis

After gathering requirements, IT Business and Collaboration (IT B&C) analyses the information gathered from end users. They group them into *Nice to Haves* (NH) and *Must Haves* (MH). NH are requirements on '*wish*' list of users, these requirements are good but will not tangibly affect business while MH are very important to the process at hand, they can adversely affect the business if they are not implemented. IT B&C also do some business process optimizations with the aim of removing operational bottle necks. The output of requirement analysis is a Requirement Specification Document (RSD).

Figure 3: Requirement specification analysis session. (Photos reproduced with permission from the involved people.)

We observed that the decision about whether to place a requirement in NH or in MH is done from a business point of view, thus effective business processes and rationalization are primary.

3.2.4   Technical Analysis and System Design

The IT business and collaboration team sends the requirement specification document (RSD) to the IT solution delivery (IT S&D) team. The IT S&D is a team of 10 developers. The team leader of IT S&D assigns 2 to 3 developers to review the RSD and come up with the technical analysis. This process involves interpreting the RSD in technical terms. This sometime involves reference to IT B&C to clarify any grey area.

The output of this process is a Technical Specification Document (TSD) and project charter. TSD is an updatable document that contains detail design and technical specifications of the system while project charter includes development timelines and work breakdown structure among other project details. It is at this point that project owners are informed about the exact date of completion. The design process is entirely a technical affair, end users are not involved.

3.2.5   System Development

The technical specification document (TSD) is a blueprint that serves as input to the development stage. This stage, when we observed it, involved converting algorithms in TSD into programming codes, it involved unit testing and integration; according to one of the developers in our study, '*development is usually very fast and interesting once TSD is good and straight forward*'.

3.2.6   Testing

Once the system development is completed, the application is hosted in a test environment; IT business and collaboration team will be notified to prepare test script. The test scripts list all functions expected in the application and a corresponding '*pass*' or '*fail*' comment.. Basically, four types of tests are conducted; user acceptance test (UAT), load test, integration test and vulnerability test. UAT measures users' satisfaction with the specified functionalities, load test measures the capacity of the application under some strains (like hardware processing capacity versus numbers of users per time). The vulnerability test confirms that the development meets minimum acceptable security standards depending on the number of end users. All users or representatives of users are invited to test run the system and grade system performance with the UAT script. The load test, integration test and vulnerability test are carried out by the IT compliance team. The IT business and collaboration team initiates the training process after the system has passed all required tests.

3.2.7   Training and Documentations

The developers create a user guide, organize and facilitate training sessions for users in collaboration with the business owners and the IT business and collaboration team. Training is usually through Microsoft communicator video conferencing because of wide coverage of users in different geographic locations. The technical specification document and project charter are updated to reflect current project and development status. After the training, the IT S&D initiates deployment by completing 'change management document' (CMDoc) also knows as *go-live permit*. The IT deployment and support team are also part of training as participants and facilitators.

3.2.8   Deployment and Maintenance

The developers are not allowed access to live environment; they liaise with the IT deployment and support (IT D&S) team. Completed go-live permit duly signed by head of ITD, head of IT compliance team, head of operational risk of the bank and representatives of process owners are handed over to IT D&S. In addition to *go-live permit* there are detailed stepwise deployment instructions that aid the deployment officer in the deployment process. IT D&S deploys the solution based on approval and deployment instructions.   After deployment, information is passed to end users through email and a project closure document initiated by the IT business and collaboration team; this brings the entire development process to closure.

Subsequently all system support issues have three escalation processes; 1) the business owners, 2) the IT deployment and support team, and 3) the IT solution delivery team (developers).

3.3   Survey

3.3.1   User Survey
The primary aim of the user survey is to measure the level of user involvement in the ANB software development processes. For easy analysis, we have tagged the survey questions to end-users Q01 to Q10 with corresponding question text as shown in Table 2 below:

Question ID	Question Text
Q01	The solutions are user friendly and easy to use
Q02	In my opinion, the solutions are meeting business objectives
Q03	I usually provide information to system analyst about expected inputs, processes and outputs whenever a software is to be developed
Q04	I was actively involved in systems design and implementation through active participation
Q05	I will like to be involved in the design (and implementation) of any system that will impact my job
Q06	Involving me in the design is not necessary, it is IT's Job and they should be professional enough to meet my expectations
Q07	I am not always part of IS implementation team but my Unit is always WELL represented
Q08	I influenced design and implementation of these systems
Q09	Management decides what Information system to be implemented and How it will be implemented
Q10	I was adequately trained or briefed before the systems were lunched

Table 2: End-User Survey Questions Mapping.

Table 3 depicts raw analysis of responses obtained from 107 respondents; the percentage response was calculated in line with the 5-likert scale:

- Strongly agree.
- Agree.
- Undecided.
- Disagree.
- Strongly disagree.

Question ID	Strongly Agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly Disagree (%)	Total Response
Q01	32.71	61.68	02.80	01.87	00.94	107
Q02	20.56	67.29	09.35	00.94	01.87	107
Q03	24.30	54.21	14.09	03.74	03.74	107
Q04	08.41	05.61	10.28	36.45	39.25	107
Q05	44.86	41.12	09.35	01.87	02.80	107
Q06	10.28	17.77	10.28	28.97	32.71	107
Q07	11.22	23.36	05.61	44.86	14.95	107
Q08	11.22	27.10	07.48	48.60	05.61	107
Q09	28.97	33.64	20.56	12.15	04.67	107
Q10	05.61	27.10	14.95	39.25	13.08	107

Table 3: Percentage response from end user survey.

It is important to note that we did not include any questions about differences between the 5 specified systems, as we selected them to represent the average software development process and in-house system in use in ANB.

Responding to the question of user friendliness and ease of use, 33% strongly agree, 62% agree, 3% undecided, 2% disagree and 1% strongly disagree that the five referenced solutions are user friendly and easy to use. Similar to this response is user's perception of the ability of in-house developed solution to meet business need, 21% strongly agree, 67% agree, 9% undecided, 1% disagree and 2% strongly disagree that business requirements are being met while working with these solutions. This result suggests that in-house developed solution enjoyed a high level of acceptance from the users and the business.

Expanding the result provided in table 2, users' response to 'user involvement statements' (refer to section 3.1.1.1 of chapter 3) are briefly explained below:

1. *I was actively involved in systems design and implementation through active participation*: 39% strongly disagreed that they were actively involved in the system design; 37% disagreed, 10% undecided, 8% agreed and 6% strongly agreed. Active participation in system design and implementation is synonymous to participatory design paradigm (Kensing, 1998; Stepanet, 2005) which is outside the scope of this research, however if we are to consider participation as a form of user involvement, this result shows that user involvement through active participation in system design in ANB is low.

2. *I will like to be involved in the design (and implementation) of any system that will impact my job*: This statement seeks to know if users desire to actively participate in the design and implementation of system that impact on their job; 49% strongly agreed to be actively involved, 41% agreed, 9% undecided, 2% disagree and 3% strongly disagree; this response is an indication that there is an inner desire for active participation in system design. Why is this desire not met? This will be discussed in the next chapter.

3. *I usually provide information to system analyst about expected inputs, processes and outputs whenever software is developed*: 54% respondents agreed that they were involved in software development process by providing relevant required information, 24% strongly agreed to this same statement while 14% are undecided. On the contrary the 4% disagreed and another 4% strongly disagreed that they provide needed information.

4. *Involving me in the design is not necessary, it is IT's Job and they should be professional enough to meet my expectations:* Conventionally, one will expect that the task of software development should be left only to the technical experts, ANB users disagree with this idea in these statistics: 33% strongly disagree, 29% disagree 10% undecided, 18% agree, 10% strongly agree.

5. *I am not always part of IS implementation team but my Unit is always WELL represented:* Actively involving all users in the design and development seems to be unrealistic, but we wanted to know if they were represented; responding to this question, 11% strongly agree, 23% agree, 6% undecided, 45% disagree, and 14% strongly disagree.

3.3.1.1 Measuring User Involvement

We mapped some of our user survey questions that depict user involvement as categorized by Kujala (Kujala, 1997). This is shown in table 4.

Question ID	User Involvement Mapping
Q03	Informative
Q04	Participative
Q06	Consultative
Q07	Representative

Table 4: Survey questions and user involvement mapping

The mapping in table 4 suggests that the users are responding to the following statements using the Likert scaled questions with answers ranging from strongly agree to strongly disagree. (Ware and Brewer, 1999): the outcome of the result is highlighted below for better understanding:

1. *In-house software development process is informative:* 24% strongly agree, 54% agree, 14% undecided, 4% disagree, and 4% strongly disagree.
2. *In-house software development process is participative:* 8% strongly agree, 6% agree, 10% undecided, 37% disagree, and 39% strongly disagree.
3. *In-house software development process is consultative:* 10% strongly agree, 18% agree, 10% undecided, 29% disagree, and 33% strongly disagree.
4. *In-house software development process is representative:* 11% strongly agree, 23% agree, 5% undecided, 45% disagree, and 15% strongly disagree.

Evaluating these findings, we observe that a greater number of users appreciate 'psychological' involvement than 'physical' engagement in software development: they are not seeking for physically active involvement, but a consultatively informative involvement that reflects a sense of belonging. Figure 6 is a graphic representation of this result.
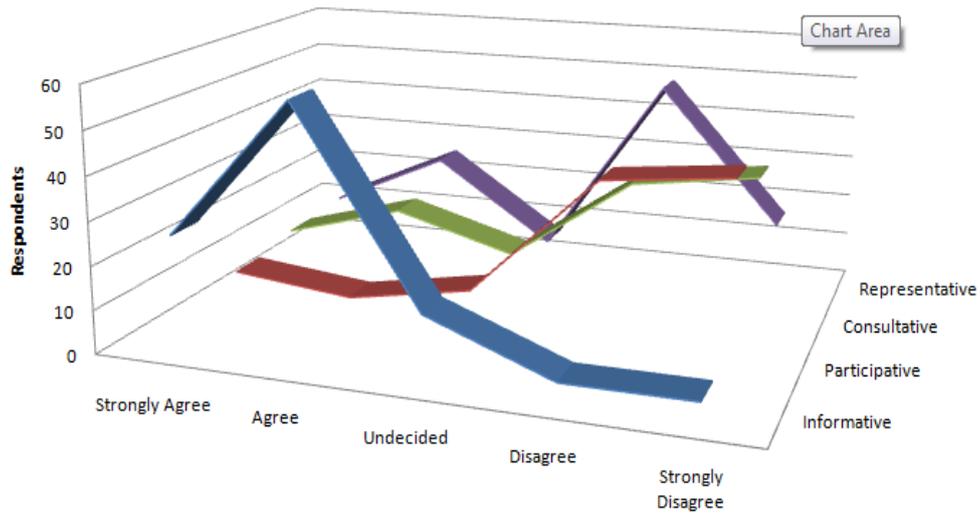
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
■ Informative	26	58	15	4	4
■ Participative	9	6	11	39	42
■ Consultative	11	19	11	31	35
■ Representative	12	25	6	48	16

Figure 4 : Measure of user involvement in ANB (1).

In order to analyze the identified user involvement forms within the context of our research, we collapsed the 5 Likert scale into two – 'agree' and 'disagree'. According to Grimbeck Likert scale items sometimes create problems for analysis that are best resolved by either transforming the existing range of responses to produce interval scale responses or by collapsing the number of response categories; (Grimbeek, 2001) the practice of collapsing response categories has been around since at least the 1950:s (Selvin, 1970).

We collapsed the 5 Likert scale in to two by summing up 'strongly agree' and 'agree' to form ' total agree'; similarly, 'disagree' and 'strongly disagree' were merged to form 'total disagree'. We compute the percentage 'total agree' relative to 107 responses. This forms a whole chunk of 100%; our final analysis reveals that for the cluster of five in-house software solutions we selected to represent the average in-house software development process in ANB, user involvement is 8% participative, 18% representative, 33% consultative and 41% informative. Figure 7 below is a pie representation of these findings. As we have pointed out earlier, we did not differentiate between the five selected in-house solutions, but rather selected them to jointly represent the average in-house software development process in ANB.
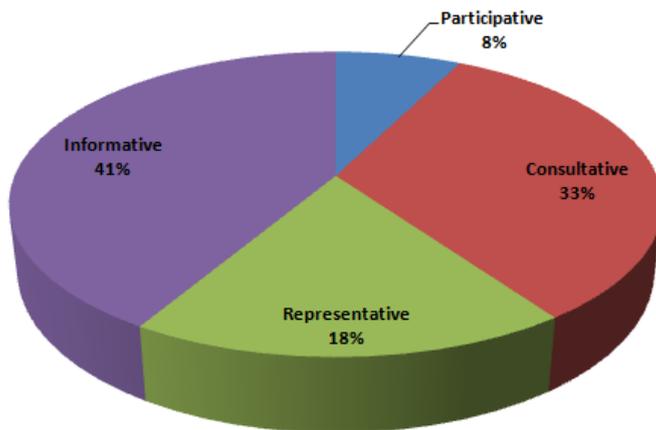
Figure 5 : Measure of User Involvement in ANB (2), based on a selection of 5 in-house software solutions representing the average software development process and solution.

3.3.2 Developer Survey

The outcome of the survey shows that ten developers that took part in the study have an average of six years work experience, minimum of five years and maximum of eight years. They have all worked in a core IT organisation as programmers. They are comfortable with both agile and waterfall software development models. Eight of them prefer to interface with end users through system analysts rather than direct contact interaction. Some of the reasons why they do not want to interact with users include:

1. Users sometime do not know what they want.
2. Users slows down the development proess.
3. Users could be very political, expecially if they belong to the management cadre.
4. Users are too complex.

The other two developers who do not mind interacting directly with users see it as an opportunity to learn and see software development from a business perspective.

When asked about factors that negatively affect software development in ANB, the following were highlighted:

1. Ambiguous user requirements.
2. Organizational structure.
3. Working (or programming) environment.
4. Workplace politics.
5. Discouragement arising from systems that were developed but not used.
6. Inadequate technical training.

3.3.2.1   Measuring Control and Influence

In an attempt to empirically provide evidence for user involvement trends observed in ANB (as explained in previous sections of this chapter), we decided to analyze the measure of control and influence of major stakeholders in the development process from the developers' perspective (refer to Appendix 2, question 3).

We asked the ten developers to assign an estimated degree of influence ranging from 0 to 4 to each stakeholder; 0 and 4 represent the lowest and highest levels of influence respectively. D1 to D10 represents the 10 respondents (developers) in the survey; the figure under each developer column (D1-D10) shows the developer's perception of influence exerted by each stakeholder. We sum the totals of all perceptions in the '*Total*' column; this portrays a relative degree of influence by all stakeholders.

Table 5 below reflects our findings.

Stakeholder	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Total	Influence%
Regulatory Agent	1	1	0	1	0	1	0	1	0	0	5	05.26
Management	3	2	4	3	3	1	3	2	4	2	27	28.42
Developer	4	4	2	4	3	4	4	3	3	4	35	36.84
User	2	3	3	2	4	0	2	4	2	3	25	26.32
Others	0	0	1	0	0	1	0	0	0	1	3	03.16

Table 5: Measure of influence from developers' perspective

Analyzing our results as presented in table 4; developers think they (as programmers) have the highest percentage of influence of 37% followed by management 28% and user 26%. Alternatively, looking at the same issue of 'influence' from users' perspective (refer to end-user survey, Appendix 1 question 9); users believe that management has the highest level of influence. Interestingly, this result will probably be different if we conduct the same survey from a *management* perspective bearing in mind that users that constitute our sample area are non-managerial users. Our study tends to depict that end-users exert minimal control and influence during the software development process in ANB; although this fact would have been more assertive if we have considered the management's perspective.

4   CHAPTER 4: DISCUSSION AND CONCLUSION

4.1   User Involvement Trend in ANB

Reflecting over the results of our study in ANB; users' involvement in the software development process is predominantly informative and consultative, yet solutions are adjudged to be meeting business needs. Is it really possible to *meet the need of the business* without *meeting the need of the people* that use the system as a tool to achieve organizational business objectives? It depends largely on how human capital is perceived in the organization; with reference to ANB, our findings tend to agree with Butler and Fitzgerald's argument that successful *systems development is a nebulous term; which sometime eludes direct evaluation* (Butler and Fitzgerald 1997). There is no doubt that effective user involvement can improve the gains of system development and deployment (Kensing, 1998); however we perceived that a number of factors affect user involvement in ANB. Let us explain some of these factors.

4.1.1   Organizational Business Strategy

The overall business strategy of ANB recognizes Information Systems (IS) as tools for achieving business objectives, but the strategy places less priority on the system usability, users are expected to learn about the system rather than users creating the system. ANB places high premium on staff welfare, the ANB's staff constitute the highest paid workers in Nigerian banks but the bank as a financial institution and a very sensitive industry is very careful about the level of access to sensitive information granted to any staff. It is believed that this rigid or tight '*Information Access Control (IAC)*' strategy will prevent fraud, enforce tight control, increase competitive advantage and add to profit margin. Another strategy of the bank according to our interaction (interview) with the developers shows that little technical training is available to the developers and training in terms of **technical**-*ities* and **monetary** cost are pegged according to staff hierarchy.

4.1.2   Organizational Politics

A number of times, 'automation requests' are politically motivated; the reason behind some IS development is not about the business, some powerful and supposedly influential individuals in the organization sometime raise requests in order to cause ripples in the organizational system. According to the developers we engaged in interview during our research, many in-house applications were developed and junked because the need for such

solutions were not well articulated, born out of selfish interest, or failed to secure the votes of the powerful stakeholders.

4.1.3   Unrealistic Expectations and Pressures

According to the interviews with some developers, about 60% of automation requests are tagged '*High Priority*' meaning the development process has to be as quick as possible. Sometimes the reason for this is political while in many cases it is geared towards gaining a competitive advantage over the competitors in the banking industry. This places a lot of pressure on the developers and system analysts to deliver the solution within the shortest possible time frame; this way, developers could not afford the luxury of involving the user. After development and deployment, users have to come to speed and make use of the system to achieve the organizational goals; this makes the change process difficult and increases the learning curve. Interestingly, this is seen as a sign of resilience as far as ANB's organizational culture is concerned. This probably explains why user involvement is informational, yet the business objectives are met.

4.1.4   User Awareness and Perception

The high unemployment rate currently put at 19.7% in Nigeria, (Trading Economics, 2010) coupled with weak labour laws have some cascading effects on user involvement. Users will rather strive to learn how new systems work than to question the process of system development at the expense of their jobs. Users' perception of their roles in software development also plays a major role in user involvement, according to Hunton and Beeler (Hunton and Beeler, 1997) *"Users who see themselves as functional experts, relative to others, are likely to question a system unless they have substantive influence on its design. On the other hand, users perceiving themselves as non-experts, relative to others are likely to accept a system regardless of the extent of influence on its design."* Generally, decision making in ANB belongs to the top and middle management team, therefore users (who are predominantly assistant officers) are under obligation to align themselves with management's vision. In a review of plain text comments we received from 82 users during our survey and our interaction with users as 'system/business analysts' we could infer that users want more of passive participation than physical involvement, they "*want to be informed*", they "*want to be carried along*".

Our survey result from developer's perspective shows that they (developers) perceive that they have the highest percentage of influence of 37% followed by management 28% and

users 26% in the development process. This contradicts users' perspective, measured through this statement: '*Management decides what Information system to be implemented and how it will be implemented*'; with these responses: 29% strongly agree, 34% agree, 20% undecided, 12% disagree, 5% strongly disagree. Interestingly, this statement generated the highest percentage of 'undecided' response in the entire survey probably because 'management' users in the lower levels who constitute the majority of our respondents are very careful with any issue that has to do with 'management'. This is a confirmation of general insecurity within the system.

We discovered from the survey that all the developers have worked in core IT software development organizations before joining ANB. They are quick to point out that "*the programming environment in an IT firm is not the same as in a banking environment*"; (note that programming is an integral part of software development). This appears to be in line with the work of Javier et al (Javier et al, 2008); where work environment of software development was said to be a major determinant of successful software development. Currently the development team works in an open office with other teams in the IT division. The work environment is prone to distraction and provides easy access for other stakeholders. The developers feel that access to them should be restricted to system and business analysts who should serve as a link between developers and other stakeholders. According to the developers, the best way out is to consciously simulate an '*enabling environment*' for the developers and treat the development team as an integral consulting arm of the bank; the following is what they mean by an '*enabling environment*':

1. Provision of sitting (and working) environment in an enclosed office rather than the current open office.
2. Provision of technical reference materials like books, videos and subscription to online programming communities.
3. Provision of regular technical training within and outside Nigeria. Training should not be based on staff hierarchy but on technical requirements of staff relative to the task at hand.
4. Provision of restricted access to programmers; end-users should have limited and controlled access to developers.

Future studies of user involvement within ANB could include a more differentiated look at different systems, in order to explore if some types of systems display a larger degree of user involvement than others, and if so, what are the explanatory factors responsible for this. It is

also possible to explore in detail *"what user involvement techniques are actually employed at ANB?"* Lastly, it is not possible to generalize the result of this research for all in-house developed software in Nigeria because our focus is on banking industry. We suggest further research into how users are involved in system development in other sectors like manufacturing, media, insurance, oil and gas etc.

4.2   Conclusion

Varying combinations of user involvement types come to play in the development of any system and they ultimately define the system either from a user or business point of view, or both. In line with our aim of discovering the perceived average level of user involvement in ANB's in-house software development process and factors affecting user involvement; relative to the five in-house software studied in our reseach; our study reveals that user involvement in the average development process as represented by five selected solutions which were clustered in our study is 8% participative, 18% representative, 33% consultative and 41% informative. We also observe that a greater number of users appreciate 'psychological' involvement than 'physical' engagement in software development: they are not seeking for physically active involvement, but a consultatively informative involvement that reflects a sense of belonging. Relatively, factors affecting user involvement include organizational business strategy, organizational culture, organizational politics, weak Nigerian labour laws, low industrial ethical standards and high unemployment rate.

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APPENDIX 1:END USER QUESTIONNAIRE

S/No	Question	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	The solutions are user friendly and easy to use					
2	In my opinion, the solutions are meeting business objectives					
3	I usually provide information to system analyst about expected inputs, processes and outputs whenever a software is to be developed					
4	I was actively involved in systems design and implementation through active participation					
5	I will like to be involved in the design (and implementation) of any system that will impact my job					
6	Involving me in the design is not necessary, it is IT's Job and they should be professional enough to meet my expectations					
7	I am not always part of IS implementation team but my Unit is always WELL represented					
8	I influenced design and implementation of these systems					
9	Management decides what Information system to be implemented and How it will be implemented					
10	I was adequately trained or briefed before the systems were lunched					

APPENDIX 2:DEVELOPERS QUESTIONNAIRE

1. What is your software development methodology?

    a. Agile

    b. Waterfall

    c. Prototyping

    d. Others : Specify

2. At what stage(s) of software development do you involve users?

    a. [ ] Requirement Gathering

    b. [ ] Requirement Specification

    c. [ ] System Design

    d. [ ] Development (coding)

    e. [ ] Testing

    f. [ ] Deployment

    g. [ ] Others

3. Please rate the following according to their level of control over how software are developed - 4 as highest and 0 as lowest

    a. [ ] Regulatory Agent

    b. [ ] Management

    c. [ ] Developer

    d. [ ] User

    e. [ ] Others

4. I don't like interacting with users directly as a developer, I prefer to interact with a business /System analyst

    Yes / No

5. If Yes, Why don't you like user interaction as a developer?

6. If No, Why do you like user interaction as a developer?

7. What factors positively affect system development from your working experience

8. What factors negatively affect system development from your working experience in ANB

9. How long have you been programming?

10. Have you worked in a core IT organization before joining ANB?