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An Investigation of Iot Importance and Viability of Health Records Retrieval using Electronic Tags in Pilgrimage

By Ali Ibrahim Latif, Marini Othman , Nor'ashikin Bte Ali, Azizah Suliman
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Abstract- Health care services is one of the most important domains in the world. One of most important goals of healthcare services is the need of make accurate healthcare decisions in the right time. Retrieving useful historical health records of patients in real-time is necessary to provide accurate healthcare decisions. Traditional health record systems like paper-based system require time and efforts to collect, manage, and retrieve patients' records. Electronic health record systems were adopted to allow health staff to retrieve useful health records in real-time and consequently improve and speed up healthcare services. EHR is effective to serve patients in their local countries.

Keywords: EHR, electronic tags, IoT, pilgrimage travellers.

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AN INVESTIGATION OF IOT IMPORTANCE AND VIABILITY OF HEALTH RECORDS RETRIEVAL USING ELECTRONIC TAGS IN PILGRIMAGE

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An Investigation of IoT Importance and Viability of Health Records Retrieval using Electronic Tags in Pilgrimage

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Abstract- Health care services is one of the most important domains in the world. One of most important goals of healthcare services is the need of make accurate healthcare decisions in the right time. Retrieving useful historical health records of patients in real-time is necessary to provide accurate healthcare decisions. Traditional health record systems like paper-based system require time and efforts to collect, manage, and retrieve patients' records. Electronic health record systems were adopted to allow health staff to retrieve useful health records in real-time and consequently improve and speed up healthcare services. EHR is effective to serve patients in their local countries. Although EHR is effective for local healthcare services (i.e. hospitals within patient country), the implementations of EHR for global purposes is still an issue. EHR is not applicable for the persons who travel to other countries. One of the most important travelling purposes for Muslims is the pilgrimage journey. Each year millions of Muslims travel to KSA to complete pilgrimage rites. Pilgrims may need healthcare services and these services should be accomplished accurately in real-time which requires historical health records based electronic approaches. This study aims to investigate the importance and viability of IoT implementations to support EHR retrieving of pilgrims using electronic tags. A questionnaire with 60 academic staff and interview with five experts from KSA were conducted to address the main aim of this study. The significance of the results show that EHR supporting tags reading is a promising solution to enhance healthcare services and avoid the challenges of EHR implementations in pilgrimage.

Keywords: EHR, electronic tags, IoT, pilgrimage travellers.

I. INTRODUCTION

Health professionals need to have good vision of health cases in order to make timely and accurate decisions (Hibbard & Peters, 2003). Patient's health records represent important source that support healthcare decisions (Bose, 2003). None-the-less, the traditional retrieving systems of health records such as paper based system are still face many problems such as probability of damage or harm the health records, and time requirement of health records collecting, managing, and retrieving (Tang et al., 2006).

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These challenges and more could delay or effect on the efficiency of health services.

Many people have travelled abroad to different destinations for different purposes and have been exposed to different health risk (Cossar and Reid, 1989). Pilgrimage is considered as the most holy and important travel for Muslims. Each year millions of Muslims travel to complete pilgrimage rites.

Health risks have been documented most notably during the Hajj (Ahmed, Arabi, & Memish, 2006). Moreover, travel-related somatic and psychic health problems occur more frequently but are less severe remain unreported and should be explored only in specific studies (Cossar et al., 1990; Page, Clift, & Clark, 1994).

Pilgrims need healthcare services and these services should be accomplished accurately in real-time which required historical health records based electronic approaches (Ahmed, Q. & Balaban, V., 2013). EHR encompasses all health information in all media forms regarding an individual and is primary source for recording and documenting client health data (Bickford and Hunter, 2006). EHRs combine data from all ancillary services with other medical care components. These clinical data have different methods for sharing or importing various components, such as presentation or data integration (Carter, 2008). Internet of Things (IoT) technology could be effective solution to retrieve health records of pilgrims from their original countries and pass it to health staff in pilgrimage health centres. This research focuses on importance and viability of deploy IoT to retrieving EHR of pilgrims using electronic tags reading.

The main purpose of this study is to analyse the viability and importance of EHR using electronic tags in pilgrimage to enhance the health services of pilgrims. It also aimed to investigate the challenges of current health records approaches and the importance of EHR.

II. PROPOSED FRAMEWORK

Outdoor services like pilgrims' healthcare services require two main IoT Layers which are (Agrawal & Das, 2011): 1) lower layer, and 2) upper layer. Lower layer (RFID) consists of electronic tags and wireless sensors. Sensors read data of tags and transfer it to

upper layer (Al-Turjman et al., 2013; Zhu et al., 2010). Upper layer (WSN) consists of super nodes and base station. Super nodes handle data from lower layer and transfer it to base station (Al-Turjman et al., 2013; Zhu et al., 2010). Hence, data stored in base station is managed and processed automatically connecting with central web servers.

By reflecting the above two layers of IoT on Technical implementations, there are 4 main layers of IoT environment which can be described as the following (Figure 2):

- *Connectivity Layer:* The electronic tags should be in very short distance of wireless sensors (i.e. 3 meters) (Jia et al., 2012). Data transferred from electronic tags through sensors to next layer (access layer).
- *Access Layer:* The sensors should be in short distance of super nodes (i.e. 100 meters). Data is transferred to base station from sensors through super nodes (Tao et al., 2014).
- *Abstraction Layer:* This layer is responsible for transfer of data from base station to central web servers through open gateway such as internet infrastructures (Atzori et al., 2011).
- *Service Layer:* This layer is about providing real IoT services, the data that delivered from abstraction layer are processed and the results display on output devices such as monitors (Da et al., 2014). These monitors are usually connecting with the tags in connectivity layer. Thus, the results of data processing send from service layer to connectivity layer through access and abstraction layers respectively.

According to the IoT framework, pilgrims need to have an electronic tag which identifies their personality (ID). In case of need for healthcare services, healthcare centre contains wireless sensors to read pilgrim tag. Data is transferred from wireless sensor to base station via super nodes. Base station sends request via internet network to the pilgrim's country of origin in order to acquire pilgrim EHR from health database in central web server. Web server sends pilgrim EHR via internet network to base station. Base station display outputs on monitor that is connected with the sensor that sends tag data.

III. MATERIALS AND METHODS

Data was collected from health staff in Kingdom Saudi Arabia (KSA) using a questionnaire in order to explore the current processes and challenges of healthcare services in pilgrimage and the importance of EHR to support these activities. The sample of the study is composed of 60 out of 350 healthcare staff in four healthcare centres. According to Yount (2006), the sampling percentage should be 10% at minimum for the

size of population between 101-1000 workers. Thus, the sampling percentage of this research is valid (i.e. 17.1% of study population).

The questionnaire included four sections which are: (1) personal information to ensure the expertise validity of experts, (2) importance of EHR to support healthcare services in pilgrimage, (3) challenges of EHR implementation in pilgrimage healthcare services, and (4) EHR supporting tags reading to support pilgrimage healthcare services.

IV. RESULTS

a) Demographic Data

With regards to the respondents' gender, there was 22% female of all respondents while the number of male respondents 78%. The percentage of gender variable considered as reflect the reality of health activities in pilgrimage. The male staff members are usually more involved in the pilgrimage health activities more than female staff members.

Regarding to respondents' percentages based on their age. Most of respondents' ages are between 30-40 years which represent 65% of respondents (39 respondents). Thus, the presented data from the respondents will be efficient for future development i.e. the respondents will work in the health domain in KSA for a long period (i.e. 15 years).

According to the respondents' job roles, there are 29 respondents working as nurses (48% of total respondents) followed by 24 respondents working as doctors (40% of total respondents). There are also 7 respondents working as support staff (12% of total respondents). Most respondents are mainly involved in the healthcare activities (i.e. doctors and nurses).

The majority of the respondents had 4-7 years of experience (33 respondents), followed by 34% with more than 7 years of experience (22 respondents). Therefore, this segment of respondents is mature enough to provide the needed information for the study, the employees with long experience years can provide rich data to support the questionnaire analysis usefulness. With regards to the number of pilgrimage seasons attended by respondents, 43% of total respondents attended more than 8 pilgrimage seasons (26 respondents). There were 22% of respondents that attended 4-7 pilgrimage seasons (13 respondents), followed by 20% that attended 2-4 pilgrimage seasons (12 respondents). The respondents that attended less than two Pilgrimage seasons are 15% of total respondents (9 respondents). Therefore, the respondents are able to provide valid responses based on real situation of pilgrimage healthcare activities.

b) Availability of Pilgrims' Health Records

Table 1: Availability of Health Records

Item No.	Item	SD	D	N	A	SA	Mean	Agreement Level
1	Each pilgrim has his/her personal records	55	4	1	0	0	1.10	Very Low
2	Each pilgrim has his/her health records	56	4	0	0	0	1.06	Very Low
3	Health records are continuously updated	55	3	2	0	0	1.11	Very Low
4	Pilgrim can access his/her own records	56	3	1	0	0	1.08	Very Low
5	There is systematic methods to access health records of pilgrim	56	4	0	0	0	1.06	Very Low
6	The development has an electronic management for healthcare and emergencies	57	1	2	0	0	1.08	Very Low
7	There is necessity to store and retrieve the pilgrims' health records in different format i.e. images and texts	0	0	0	8	52	4.86	Very High

c) Challenge of Health Records Retrieval

Table 2 reflects on challenges: lack of staff and infrastructures are apparently major challenges. It was also shown that the respondents are not familiar with the

technical issues of electronic healthcare methods. Therefore, they are not sure about the privacy effectiveness of electronic healthcare approach.

Table 2: Challenge of Health Records Retrieval

Item No.	Item	SD	D	N	A	SA	Mean	Agreement Level
8	There are not enough staffs to manage the electronic health care systems	55	5	0	0	0	1.08	Very Low
9	The staffs do not have enough computer skills to manage the electronic healthcare system	54	6	0	0	0	1.10	Very Low
10	There are not enough technology facilities to deploy the electronic healthcare systems	55	5	0	0	0	1.08	Very Low
11	There is budget limitation in developing and deploying the electronic health-care systems	59	1	0	0	0	1.01	Very Low
12	Privacy of health data limit the use of the electronic healthcare systems	0	5	49	6	0	3.01	Medium
13	The traditional healthcare approaches (i.e. paper-based) delay the health services for pilgrims	0	0	0	2	58	4.96	Very High

14	The traditional healthcare approaches (i.e. paper-based) decrease the understanding of health cases	0	0	0	1	59	4.98	Very High
15	The traditional healthcare approaches (i.e. paper based) increase the expenses of healthcare services	0	0	0	1	59	4.98	Very High
16	There are challenges in understand the non-Arabic pilgrims in the context of healthcare services	0	0	0	1	59	4.98	Very High

d) Importance of Electronic Health Records Retrieval

Table 3: Importance of Electronic Health Records Retrieval

Item No.	Item	SD	D	N	A	SA	Mean	Agreement Level
17	The EHR speeds up the health care services	55	4	1	0	0	4.80	Very High
18	The EHR supports the accuracy of healthcare services	56	4	0	0	0	4.86	Very High
19	The EHR based on Arabic language increases the usefulness of healthcare services	55	3	2	0	0	4.88	Very High
20	The EHR based on Arabic language makes the healthcare services easier	56	3	1	0	0	4.93	Very High
21	EHR can increase the performance of communication with the pilgrims' country (i.e. Health Ministry) to describe health cases accurately	56	4	0	0	0	4.91	Very High
22	EHR decreases the expense of traditional healthcare approaches (i.e. paper-based)	57	1	2	0	0	4.91	Very High

Table 3 shows consistent answers that support the importance of having EHR for timely decision making and better services. Notably, respondents were aware that EHR would improve communication and reduce costs.

healthcare services. EHR implementations in pilgrimage face many challenges such as time, effort, and financial costs. The EHR supporting tags reading is a promising solution to enhance healthcare services and avoid the challenges of EHR implementations in pilgrimage.

V. FINDINGS SUMMARY

The current healthcare services in pilgrimage are not supportive by EHR. Usually the paper forms are used for specific purposes such as producing general reports about pilgrimage activities. The use of EHR in pilgrimage could speed up and improve the quality of

VI. CONCLUSION AND FUTURE WORKS

Retrieving health records using electronic systems is important to improve the accuracy and speed up health services of patients. EHR retrieving using IoT considered as effective approach to retrieve health records of travellers. IoT facilities can be applied

in pilgrimage through retrieve pilgrims' health records from central database in their countries by using electronic tags reading.

Pilgrims tags could be accessed by sensors and these sensors send health record request through IoT layer (connectivity, access, abstraction, and service layers). Thus, health records can be retrieved in real time to support healthcare services for pilgrims. Data collection using questionnaire and interview show that the implementation of proposed idea of health records retrieving using electronic tags reading is important and viable.

In future, the importance and viability of proposed ideas implementation need to be investigated according to perspective of pilgrims' courtiers. On other hand technical framework of proposed ideas would be developed to clarify overall aspects of EHR retrieving using IoT. This requires empirical case study of specific country of pilgrims such as Malaysia.

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The Role of Information Technology in National Security: “A Case Study of Nigeria”

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Abstract- The growing challenge of security in Nigeria is of concern to all and every effort must be employed to combat this challenge. Some of the pertinent questions raised in the paper are, Can our Information Technology skills & strategy guarantee internal security in Nigeria? Do the security agencies have proper Information Technology Infrastructure in place for the purpose of information gathering, sharing and dissemination? Do they have adequate surveillance equipment? Information technology (IT) will play a critical role in strengthening Nigeria’s National security against potential future attacks and threat. Specifically, IT will help enable the nation to identify potential threats, share information more readily, provide mechanisms to protect the Nation, and develop response capabilities.

Keywords: *national security and information technology.*

GJCST-H Classification: *K.4.4*



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The Role of Information Technology in National Security: “A Case Study of Nigeria”

Adams Oluwadamilola Kemi

Abstract- The growing challenge of security in Nigeria is of concern to all and every effort must be employed to combat this challenge. Some of the pertinent questions raised in the paper are, Can our Information Technology skills & strategy guarantee internal security in Nigeria? Do the security agencies have proper Information Technology Infrastructure in place for the purpose of information gathering, sharing and dissemination? Do they have adequate surveillance equipment? Information technology (IT) will play a critical role in strengthening Nigeria's National security against potential future attacks and threat. Specifically, IT will help enable the nation to identify potential threats, share information more readily, provide mechanisms to protect the Nation, and develop response capabilities.

This paper examines key trends and developments in information technology, and the implications of those developments on National Security. Focus is on Terrorism. The paper also examines the prospects for the future, particularly the threat of terrorism. Finally, it summarizes initiatives and recommendations for improving National Security.

Keywords: national security and information technology.

I. BACKGROUND OF THE STUDY

ICT (Information and Communication Technology) is a widely defined term that has several meanings across different sectors. Though, essentially, it is used as an umbrella term to refer to the use of communication devices (such as radio and cellular devices, satellite devices and channels, computers, amongst others) and utilities (programs) to manage information (acquisition, dissemination, processing, storage and retrieval). In lay terms, National Security could refer to a state of absence of everything and anything that could be a threat to peace, progress, development and tranquillity within a society [1]

Thus, ICT has consistently been proven a powerful double-edged sword with a capability for both overwhelming good and devastating evil, all depending on the skills and values of the user(s) in harnessing its powers in either or both directions. There is general agreement among historians that insecurity have been the core cause of bloodshed in Nigeria and the world at large [2]

The deep scars that insecurity leave on people and nations are often obscured by historical accounts that, more often than not, glorify conquest and ignore aggression. One major challenge been faced by Nigerians deserving for more attention as far as security,

mapping and conflict management is concerned is their effect on everyday life [3]

The inevitable security issues leading to subsequent destruction of lives, properties and the environment calls for a holistic approach through effective use of information technology [2]. Although Nigeria have taken bold steps to settle their insecurity issues through combat approach, there still exist several unresolved issues bordering the country peaceful coexistence on one hand and accurate mapping of contiguous areas using geospatial science and technology such as satellite Remote Sensing (RS), Geographic information Systems (GIS) and Global Navigational Satellite Systems (GNSS) on the other hand. In this paper, we trace the evolution of Nigeria security challenges possible causes of insecurity and methods of solving the challenges through using Information technology and compliance with laid down rules/treaties and the possible areas of collaborations in the areas of space science and technology (with reference to Nigeria space programme), culture and politics. [9]

Hofstede, 2002, stated that “One of the most important features of the digital age is the use of new communications technologies to build digital citizen ships.

The state of insecurity in Nigeria today is no news to anyone and although it can be blamed on some factors that have been left unchecked for a long time by both the Government and people of Nigeria but the level of insecurity in the country today is threatening to tear her apart and requires quick, adequate and a new approach to deal with the security challenges plaguing the nation. Apart from food insecurity, financial insecurity, terrorism, health insecurity and others, security failure has eaten deep into the fabrics of the country. The situation in Nigeria since the beginning of this decade in which dozens of militant groups emerged and challenged in the most violent form the authority of the Government; the growing level of urban crime including armed robbery, kidnappings, ritual killings, and cultism; the continuing erosion of the moral authority of religions in which people engage in acts in open defiance of their religious and moral teachings; the culture of impunity that characterizes public affairs; the corruption that is submerging the average Nigerian; and the collapsing social and political institutions in the country over the last few years, more than anything demand for quick

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and lasting solutions that will at least reduce the security threats facing Nigeria today. [10]

The quest for stability and development is, without doubt, the Holy Grail for Nigeria; a condition under which the country would be able to develop institutions and structures with the capacity to ensure economic growth, equitable distribution of national wealth, political stability and accountability. To do this successfully, however, requires reduction of threats (actual and potential) that are capable of generating insecurity for the country. Accordingly, there is the challenge to rethink and improve on policy and institutional means of dealing with security concerns arising in the country. Apart from the role that has been played by the traditional security agencies, Information and Communication Technology (ICT) is now the focus to lead Nigeria in the new era of globalization and knowledge and consequently development to manage and possibly eradicate threats facing the nation as expressed by the following top law enforcement agents in Nigeria. [11]

National security threat has been a major issue for the government of Nigeria in recent years. Recently, Nigeria has been characterized with different turmoil ranging from human abduction, political mayhem, terrorism and bomb attacks. Governments have tried several methods in order to curb these menaces but all of them have been proved abortive. According to Philip Zelikow Executive Director of 9/11 Commission and now a Professor at the University of Virginia, USA, the most significant lessons learned from the 9/11 catastrophe is: "The United States of America would have done, before the 9/11 saga, most of the things (i.e.: reactionary measures taken) that we did post 9/11!" A valid example is the establishment of the Homeland Security Institutional framework with its complex, colossal, multi-dimensional and highly-critical information infrastructure and expansive Database systems on Cyber security and Terrorism. It is all for public safety. [12]

Nigeria is currently faced with a similar challenge –informed by the magnitude and complexities of the several bomb blast in various parts of Northern Nigeria. Would we have done some of the things we now intend to do – about 10 years ago? Would we have created a National Security Intelligence Database, adequately prepared with disaster recovery plans and mastered the related operational complexities before they stuck? 21st century Information clusters are dynamic knowledge architecture for developing Intelligent and security systems.

The role of Technology and in particular, software systems in National Security Database Intelligence dynamics has therefore become a critical and significant component as well as a fundamental necessity for understanding e-security life-cycle. Also, it amplifies the needs and accelerated urgency for deploying strategies capable of protecting Critical National Infor-

mation Infrastructure (CNII) with result-oriented and sustainable implementation process.

To actualize this important national objective, one global best principle is mandatory, that is: *National Security Database Applications Software must be developed through and by harnessing internal resources and know-how and NOT by external forces*. Swim or sink, Software-Nigeria is the key and the secure Roadmap to our future and *Indigenous skill-sets must be called to national duty*. The reason is not far-fetched, the task is a very sensitive initiative which represents and is indeed, the knowledge laboratory for national survivability. The reality today translates to the fact that it should be abundantly clear to us, that the era and long-addicted habit of physically and blindly chasing the containers and cargo packages at all our import terminals and air/land borders and throwing away the content of the manifest documents that represent the knowledge-base and real world inside the containers, must be over by now. Today, Information Technology (IT) is undoubtedly the world's fastest growing body of knowledge for sustainable development and national survivability. At the centre of these very complex processes is Software Infrastructure, capacity and capability which determines the equilibrium for national security, peace, growth, creation of wealth and for business continuity of nations at all levels. [4]

II. STATEMENT OF THE PROBLEM

Since the advent of Information Technology, it is assumed to have been of greater advantages than the disadvantages most especially in the area of Security, even at that the Security situation of Nigeria is getting deteriorated and more complicated by the day. The major challenges of security in Nigeria include: Terrorism by the boko haram in the Northern Nigeria, Kidnapping in the Southern part of Nigeria, armed robbery, the most recent pipeline vandalism caused by some Militant group known as the Niger Delta Avengers in the South-South region of the country and Herdsmen killings in some part of the country.

Therefore, the question this study is out to answer is: how can Information technology impact positively on National Security in Nigeria?

III. OBJECTIVES OF THE STUDY

The main objective of this study is to determine the role of information technology in national security and the specific objectives include:

1. To determine the relationship between Information Technology and National Security;
2. To find out the various ways in which Information Technology can impact positively on National Security;
3. To find out reasons why Information Technology has not been able to help in achieving full National Security in Nigeria; and

3. To find out reasons why Information Technology has not been able to help in achieving full National Security in Nigeria; and
4. To determine how National Security can be achieved through Information Technology.

IV. SCOPE OF THE STUDY

The essence of this research work is to primarily study the role of Information Technology in National Security. The research intends to focus on Nigeria's security situation.

V. CONCEPTUAL CLARIFICATIONS AND LITERATURE REVIEW

We shall clarify some concepts and review some literature with regards to developing the subject in Nigeria:

a) *National Security*

National security, means "security from threats or attacks from people, organizations or countries that are impact the well being of a nation and its citizen as a whole rather than of any specific individuals or within the nation. Such threats and attacks are usually directed at harming the lives of people and property. However, this does not rule out other illegal acts.

National security is a concept that a government, along with its parliaments, should protect the state and its citizens against all kind of "national" crises through a variety of power projections, such as political power, diplomacy, economic power, military might, and so on.

b) *Information technology*

This is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data, often in the context of a business or other enterprise.

c) *Nigeria Security Challenges*

National security is important not only to the government, but to the nation as a whole. National security serves many purposes. First of all, the armed forces are a very important aspect of national security. The Federal Republic of Nigeria has a very strong military to help ensure that the nation stays safe and the citizens well secured, however Nigeria's security concerns and threat perceptions emanated from many quarters, these includes the threat of sects like Boko Haram, high level of unemployed youths, Militant from the oil rich Niger delta, ritual killings and kidnappings, the high rate of inequality, influx of illegal migrants from the neighbouring countries, emergence of political and regional thugs, and the collapse of the justice system . In addition, when threats are directed at the country there is an attempt to keep these threats isolated.

National security is also concerned with emergency preparedness among many other things.

In 2010, United State of America listed Nigeria among countries that are prone to terrorism. This followed a failed attempt by a 23 year old Nigerian Umar Farouk Abdul mutalab to blow up a commercial plane at Detroit Michigan. Though the Nigerian government protested by saying "Abdul mutalab's behaviour is not reflective of Nigeria and should not be used as a yardstick to judge all Nigerians." It must clear to the Nigerian government today that terrorism, the want on criminal acts of kidnapping, hostage taking, bomb blast and various crises in different locations in the country are signals of insecurity which can lead to anarchy if not addressed and arrested. Terrorism is the most alarming criminal acts and the major challenge of the government and the Nigerian people. It is noted that: Between January to August 2011, over 50 attacks have been launched on the police, military and individuals including several assassinations by Boko Haram. [5]

These attacks have exposed the weakness in the Nigerian security. The Nigerian security forces in their present state do not appear to be in a position to defeat the terrorist and kidnappers. Between 1999 and 2005, it was noted that Nigeria witnessed over 90 violent ethno – religious communal political conflicts of varying intensities and magnitude. [6]

The central pillar of Nigerian national security policy includes Safe guarding the sovereign, independence and territorial integrity of the Nation. The other guiding principles of the security policy are African unity and independence, non intervention in the internal affairs of other states, and regional economic development and security cooperation. The Subordinate goals included military self-sufficiency and regional leadership. In pursuing these goals, Nigeria has been very diplomatic and flexible, but it employed coercive methods or measured force when necessary. The country has been an active participant in the United Nations (UN), the African Union (AU), and ECOWAS. [7]

d) *Information Technology and National Security*

Information technology (IT), as defined by the Information Technology Association of America (ITAA), is "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware." [5] IT deals with the use of electronic computers and computer software to convert, store, protect process, transmit, and securely retrieve information. Today, the term information has ballooned to encompass many aspects of computing and technology, and the term has become very recognizable.

Specifically, IT will help enable the nation to identify potential threats, share information more readily,

includes authentication, availability, containment, detection and identification, privacy, recovery, and new security models); Information fusion (Information fusion includes research in data and text mining, data integration, language technologies, image and video processing, and evidence combination), and critical infrastructure-based as recommended by a National Research Council Committee on Science and Technology for Countering Terrorism in the USA.

e) *Some Security Challenges in Nigeria*

- Poverty and unemployment
- Insurgences – Boko haram, militants, religious or ethnic wars
- Insecurity of lives – kidnapping, armed robbery, ritual killings
- Corruption – Rigging of election, fake licenses, etc.
- Theft – Oil pipeline, public funds or piracy
- Information security – defacing government websites, theft of critical data, Denial of Service attacks
- Insider threats - Moles within security agencies, disgruntled employees
- Over-reliance on foreign technology
- Inadequate regulations: e.g. cyber security and the most recent
- Farmers/Herdsman clashes

f) *Emerging Opportunities for Security Management*

The integration of information technology and emergency management presents significant opportunities for innovation in the way to assess, manage, and respond to security challenges. Most technologies today are increasingly mobile, highly integrated, and inherently flexible. From social networking sites to geospatial imaging, the society today can take advantage of emerging tools to address critical security needs. [8]

g) *GPS Technology*

GPS-enabled devices can also help citizens signal for help when emergency situations arise. For example cell phones with Rave Guardian software, can activate a timer on their device when they would like surveillance from the police. [13]

h) *Social Networking Tools*

To reach members of the society who are constantly connected to the Web and actively creating and sharing content in their own time, security agencies should be turning to familiar social networking tools to share news and strategies for community security. Social networking sites like Facebook and MySpace will usually allow communities to create pages that store information about security plans, emergency procedures, and community events. The widespread popularity of networks like YouTube can create

opportunities for security agencies to educate through quick, entertaining videos and podcasts, these can easily be shared and stored. Members of the society are encouraged to become "friends" with security agents on Facebook and MySpace, this can create an alternate pathway for pushing information to the wider community. Facebook and MySpace Allow members of the community to add their own commentary through "on the scene" reporting, sharing messages with security agents. [14]

i) *Virtual Emergency Operations Centers*

Physical emergency-operation centres (EOCs) can be used as a hub of community response in times of emergency. Communities can consider supplementing physical locations with virtual EOCs, these can coordinate response teams across geographic areas. It is noted that a virtual EOC dashboard can store and integrate unit response plans, incident reports, and operational reports from a variety of community agencies. A single user can access the virtual EOC to send communications through various channels to relevant players. In cases when the physical communities are unreachable or unsafe, the virtual EOC provides a safe and accessible alternative to coordinate groups across the wider community [8]

j) *Intelligent Monitoring*

Important buildings and business areas in Nigeria must turn to using new advances in intelligent monitoring, from biometrics and speech-recognition software to intelligent video and swipe-card access to such buildings. These must be done by striking a balance between security and openness, personal freedoms and reasonable expectations of privacy must be maintained. [15]

k) *Data Mining and Database Tracking*

One of the most frequent barriers to effective emergency management generally is a lack of communication between security agencies. Greater communication might include sharing case studies that showcase best practices or offering open solutions to the society needs on security issues. The government must encourage information sharing and open dialogue between all the security agencies in the society. For example all personnel in the agencies must have e-mail addresses and subscribe to a discussion group where they can chat and share ideas real time online. [9]

VI. METHODOLOGY

There are diverse set of people in Nigeria both the Young and old, unemployed and employed, students and so also different states and geopolitical zones Using the simple random sampling technique, six different offices were visited which include Federal Ministry of Defence, Federal Ministry of Science and Technology, National Defence College, Defence

Headquarters, the Police Force headquarters and National Information Technology Development Agency (NITDA). Using the purposive sampling technique, the researcher purposively selected a sample size of 120 respondents from the five offices. Each offices contributed 20 sample sizes Therefore, the sample size for the study were 120 respondents.

Data was collected using the questionnaire which the researcher administered face to face to the respondents. Out of 150 copies of questionnaire distributed to the respondents, 120 copies were retrieved. This represented a response rate of 80%.

VII. RESULTS AND DISCUSSIONS

This deal with the presentation, analysis and interpretation of the data collected during the field survey of the study.

a) Socioeconomic characteristics of the respondents

Table 1 presents the socioeconomic characteristics that express information which include sex, occupations of the respondents and their opinion on whether IT can impact NS.

Table 1: These characteristics show the relationship IT and NS in Nigeria

Characteristics	Frequency	Percentage
Male	84	70
Female	36	30
Total	120	100
Military officers	46	38.33
Police officers	31	25.83
FMST	12	10
PRIVATE IT ANALYST	10	8.33
NITDA	21	17.5
Total	120	100
Yes	117	97.5
No	3	2.5
Total	120	100

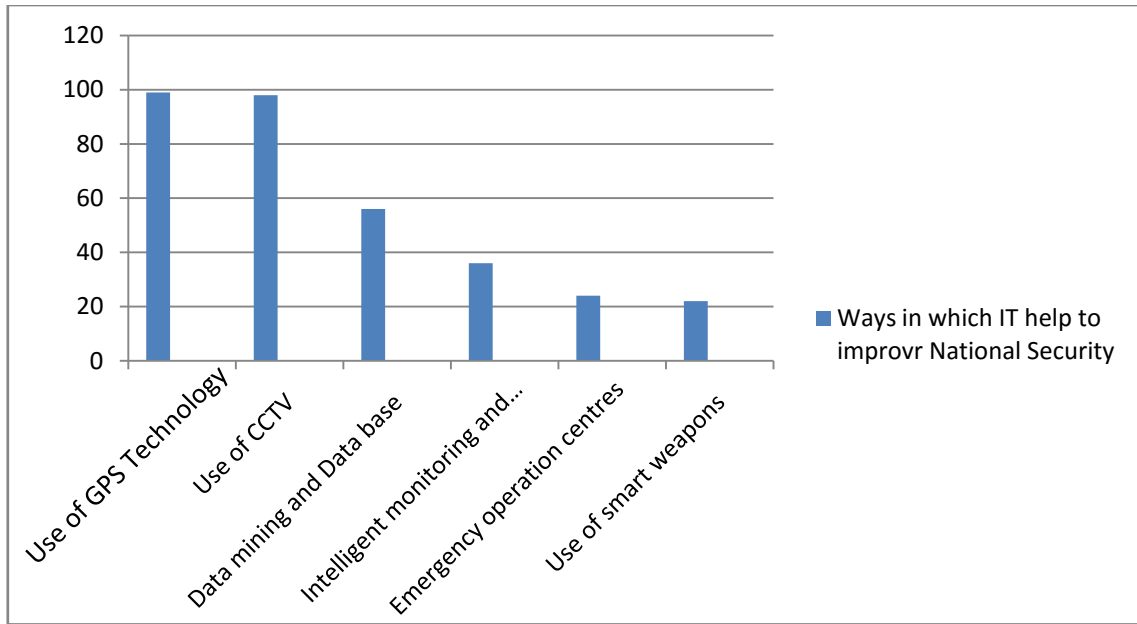
One way or the other, the Security agents and the IT analyst are the major set of people we can get information on the security situation of a country. 38.33% of the Respondents are Military officers, 25.83% were Police officers, 10% are civil servants, 8.33% are private IT personnel's and 17.5% are NITDA officials. This indicates that these set of people are the major

determinant of the role of information technology on National Security in the study. 70% of the Respondents were male while 30% are female. This implies that the military and paramilitary is been dominated by Men. 97.5% of the respondents believe IT can help to improve National Security.

b) Major ways in which IT can help to improve National Security?

Table 2

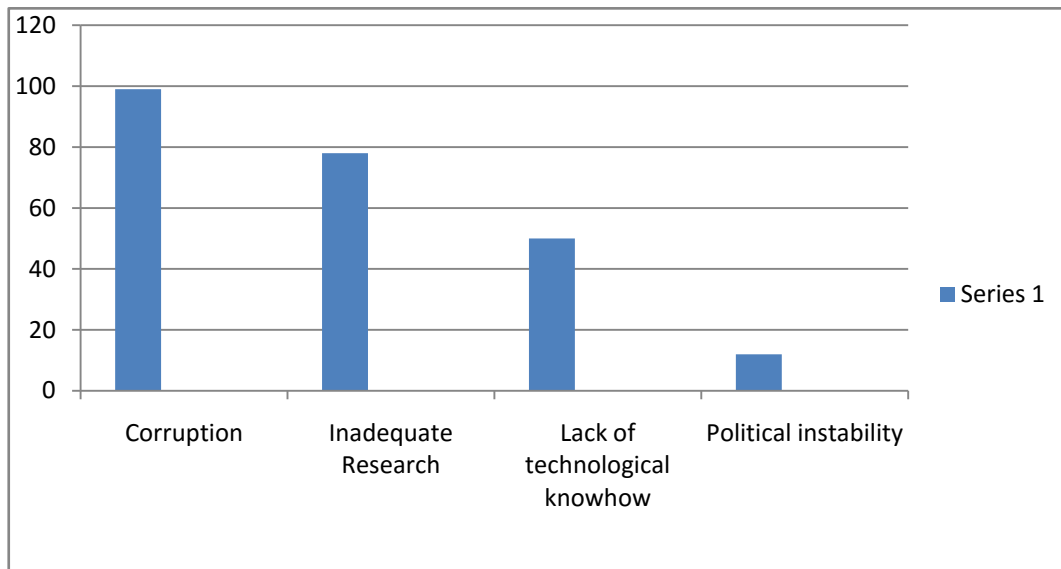
Characteristics	Frequency	Percentage
Use of GPS Technology	119	99
Use of CCTV	117	98
Data mining and Data base	68	56
Intelligent monitoring and gathering	43	36
Emergency operation Centres	29	24
Use of Smart weapons	26	22
Use of Social networks	14	12



c) Reasons why IT has not been able to improve National Security in Nigeria?

Table 3

Characteristics	Frequency	Percentage
Corruption	119	99
Inadequate Research	94	78
Lack of technological knowhow	60	50
Political instability	38	32
Inadequate funds	25	21



d) Ways in which Nigeria can achieve a stable National Security through IT?

Table 4

Characteristics	Frequency	Percentage
Government should invest more in the Defence Sector	111	92.5
Government and private individuals should focus more on Science and Technology related Research	89	74.2
Collaboration between the IT sector and Security agents	72	60
Capacity building	11	9.2

VIII. SUMMARY, CONCLUSION AND RECOMMENDATION

a) Summary of Findings

The findings showed that:

1. A great number of the officers in the Nigerian military and other security agencies believe IT can be of great impact in National Security so therefore there is a great relationship between Information technology and National security.
2. The reasons why IT has not really been able to impact in National security include: Corruption. Inadequate research, lack of technological knowhow, inadequate fund and political instability.
3. IT has been of 97.5% impact on Nigeria's National Security.
4. IV. IT can improve National security through the use of GPS Technology, CCTV, Social networks, intelligent gathering, Smart weapons, Data mining and data base tracking.

b) Conclusion

This paper has examined the issue of Information technology and its role on National Security. Some issues that are central to information technology and national security include Corruption, Inadequate research, lack of technological knowhow, inadequate fund and political instability. All these constitute a major source of insecurity in Nigeria.

It is quite glaring that information technology has a great role to play on national security in Nigeria. The growing importance of information technology presents not only new opportunities to benefit modern society, but also brings challenges to the approach and methodology of securing that society from outside attack.

To adequately address Nigerian security challenges, modern intelligence gathering devices must be acquired and deployed by security services, like the police, the SSS, the Army, the Navy, the Air Force and other Para -military . Surveillance system that can monitor most sensitive equipment and public places must be put in place.

Real time communication systems that will enable information sharing must be installed.

Adequate scanning of imported goods using modern scanners that can detect weapons and other materials used in making bombs and explosives must be put in place.

There is need for adequate border patrol and use of GIS and surveillance equipment to monitor people and weapon proliferations. There is need to ensure the loyalty of security agents because lack of loyalty can cause the leak of security information to agents of destabilization in the Country.

c) Recommendation

The problem of insecurity in Nigeria has been further compounded by lack of technological knowhow majorly in the aspect of using information technology as a tool in tackling insecurity in Nigeria.

- Hence, some recommendations were derived from this study:
- Government should invest more in the defence sector
- Government and individual should focus more in Science and Technology related research
- Military officers and other security agents should be adequately involved in Capacity building
- The Government of Nigeria should continue in the fight against corruption
- There should be proper collaboration between the information technology sector and the Defence and security sector.

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Application of Computer Programming to Estimate Volumetric Change of an Active Drilling Fluid System Cause by Elastic Deformation of an Open Borehole Section Wall

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GJCST-H Classification: D.1.2 D.1.3



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Application of Computer Programming to Estimate Volumetric Change of an Active Drilling Fluid System Cause by Elastic Deformation of an Open Borehole Section Wall

Asad Elmgerbi ^α, Gerhard Thonhauser ^σ, Michael Prohaska ^ρ, Andreas Nascimento [¥] & Abbas Roohi ^ω

Abstract- Volumetric changes in the active drilling fluid system during drilling operation are commonly termed borehole ballooning or breathing. One of the borehole ballooning contributors is the elastic deformation of an open borehole wall. When the elastic deformation of the open borehole wall occurs, it causes a volumetric change in the active drilling fluid volume in the system; the change in volume will be variable depending on the well in question and occurs frequently. Prediction of the volumetric change is highly complex, simply because huge number of complicated equations involved. Therefore, the use of the computer is necessary to reduce the process time and improve the prediction accuracy. Hence, Standalone software has been developed (built on Matlab) in order to estimate and quantify the volumetric change of the active drilling fluid system. The main objective of the presented Standalone software is to utilize the existing *in situ* principal stresses gradients, pore pressure gradient and rock geo-mechanical properties in order to compute the change in borehole volume for different flow rates. Moreover, it indicates any possible changes might occur to the equivalent circulating density within the referred system. The core of the presented Standalone software are two analytical formulas, which initially are used to estimate the radial elastic displacement for any point along the open borehole wall, which in turn will be utilized to quantify the volumetric change of the drilling fluid system for the entire open borehole section. The complete governing equations of the developed software are provided and described in detail. In order to examine the functionality of the software, two case studies have been performed using the developed software, several scenarios were assumed for both cases. The base scenario was defined to use the actual well data without any changes, whereas the changes have been

applied for the other scenarios. The main finding of these studies was that the volumetric change of the open borehole section, due to the elastic deformation of the open borehole wall, is not significant and mainly controlled by the pump flow rate, drilling fluid weight and temperature.

I. INTRODUCTION

Certainly, three processes can cause volumetric changes to the active drilling system, these process are:

- *Kick*: A flow of formation fluids into the wellbore during drilling operations.
- *Loss*: The leakage of the liquid phase of a drilling fluid, slurry or treatment fluid containing solid particles into the formation matrix.
- *Borehole breathing (Ballooning)*.

Borehole ballooning sometimes referred as breathing is an expression used to describe the small volumetric change of the active drilling fluid system, which might occur during drilling operations. The phenomenon of borehole ballooning is caused mainly by following mechanisms [[1],[2]]:

- Thermal expansion and contraction of the drilling fluid.
- Compressibility of the drilling fluid.
- Elastic deformation of the borehole and the cased hole.
- The opening and closing of induced fractures at the near wellbore region.
- The opening and closing of natural fractures intersected during drilling.

By estimating the change in volume of the wellbore caused by one of above mentioned processes, we can avoid confusion with conventional losses or formation kick, consequently nonproductive time (NPT) is reduced.

According to the studies which has been performed by Bjørkevold et al (1994) and Aadnøy (1996), the volumetric change of an active mud system caused by the elastic deformation of the borehole and the cased hole does not exceed 10% of the total volume

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variation[3]. Helstrup et al (2001) stated that change in borehole volume due to elastic deformation can be significant and it is mainly driven by wellbore radius, well pressure and Poisson's ratio. Their results show that the change in volume can be as high as 1 bbl for 100 meter depth interval[4]. On 2016 Asad et al performed sensitivity study using syntactic data in order to investigate the effects of different parameters on volumetric deformation of the open borehole, the outcome of the study clearly shows that the volume variation is insignificant and controlled by the drilling fluid weight and temperature[5].

This paper presents standalone software (built on Matlab) to predict and quantify the volumetric change of the active drilling fluid system due to elastic deformation of the open borehole wall, which will assist the drilling engineers to a certain extent to avoid mixing ballooning with other formation flow incidents such as kick or loss. The developed software was designed to fully utilize the existing Geotechnical Mode land rock geo-mechanical properties for any depth interval in order to execute the main objectives of the tool. The

II. BACKGROUND

Recently Elmgerbi et al [5] introduced new analytical equations which are used primarily to predict

the elastic deformation of an open borehole wall, the equations have been validated numerically; this paper presents the recent work of Elmgerbi et al, which is exemplified in standalone software. Generally, the software has multiple features and it is capable to estimate the volumetric change of an open borehole section for different conditions and multi layers by using the Geotechnical Model data such as in situ principal stresses gradients and pore pressure gradient in addition to geo-mechanical properties of the rock like, Poisson's ratio, Young's modulus. The graphical user interface of the software (GUI) has been designed in a manner that allows the user to execute the entire process easily within a short time. The working sequence of the tool consists of five phases, data uploading, data inputting, model selection, final execution and result displaying. Since the graphical analysis is always preferable hence the software generates multiple figures, these figures collectively are comprehensive and readable that leads to valuable analysis. Figure 1 depicts the process roadmap of the developed software.

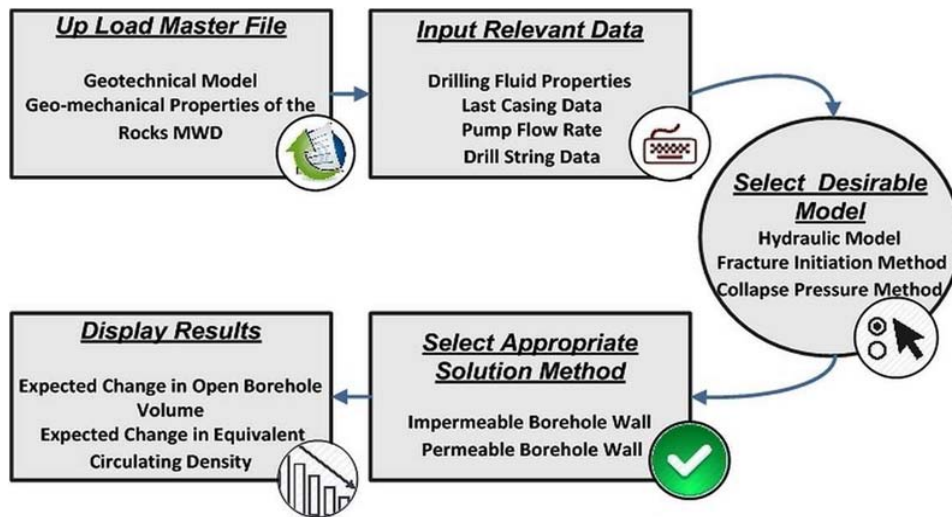


Figure 1: Process Roadmap of the Developed Software.

III. PROCESSING STEPS

a) Data Uploading

Three different data sources are combined in one file (Master file), Geotechnical Model, geo-mechanical properties of the rocks and subsurface data. Therefore it is assumed that the Geotechnical Model and rock properties of the interested field have been already obtained. Building a Geotechnical model can be derived by gathering and analyzing, wire line logs data, down hole measurements data, and drilling

experiences, whereas the rock properties can be determined by combing logs data with laboratory tests [6]. Table 1 shows the essential data categories and sources.

Table 1: Data Categories and Sources

Category	Parameter	Sources
Geotechnical Model	Vertical Principal Stress.	Density and Soniclogs, Cuttings.
	Intermediate Principal Stress.	Image and caliper logs, failure analysis.
	Least Principal Stress.	Leak-off tests, extended leak-off tests, Sonic logs.
	Pore Pressure.	Sonic, resistivity and density logs, seismic data.
Rock Properties	Young's Modulus.	Bulk density log, laboratory core tests, cavings.
	Poisson Ratio.	Bulk density log, laboratory core tests, cavings.
	Biot Constant.	Laboratory core tests.
	Thermal Expansion Coefficient.	Laboratory core tests.
	Cohesive Strength.	Laboratory core tests.
	Friction Angle.	Bulk density log, laboratory core tests.
	Tensile Strength.	Laboratory core tests.
Well Data	Measured Depth.	Rig Data.
	Hole Inclination.	Measuring while drilling.
	Hole Azimuth.	Measuring while drilling.
	Expected Mud Temperature.	Logs.

The Master file, which is recognized by the tool, is a structured text file containing fifteen channels and header information. The header information is located at the beginning of the file and followed by data arrays.

b) *Data Entry*

In the data entry phase the users is allowed to add more information in order to allow effective and successful processing and ensure the integrity of the results. The required data here is particularly related to well, which is under the study.

used by the software. Full mathematical derivations of the entire equations can be found in reference [8].

IV. MATHEMATICAL MODELS AND METHODS

The tool allows the user to choose the desirable hydraulic model and the appropriate failure criteria for both compressive and tensile conditions. Therefore several equations have been integrated with tool. In the next section the utilized equations will be presented.

a) *Hydraulic Models*

The three known hydraulic models, Bingham, Power law and Herschel Bulkley have been integrated with the software in order to make it independent. The main role of the hydraulic model here is to predict the annular pressure loss for the open and cased sections. The table below shows the pressure loss equations



Table 2: Hydraulic Models Equations used by the Developed Software

Model	Flow Regime	Pressure Loss
Bingham	Laminar	$P_l = \frac{PV * v}{1000 * (D_2 - D_1)^2} + \frac{Y_p}{200 * (D_2 - D_1)} \quad (1)$
	Turbulent	$P_l = \frac{\rho^{0.75} * v^{1.75} * PV^{0.25}}{1396 * (D_2 - D_1)^{1.25}} \quad (2)$
Power law	Laminar	$P_l = \left[\frac{144 * v}{D_2 - D_1} * \frac{2 * n + 1}{3 * n} \right]^n * \frac{0.00208 * k}{300 * (D_2 - D_1)} \quad (3)$
	Turbulent	$P_l = \frac{f * \rho * v^2}{21.1 * (D_2 - D_1)} \quad (4)$
Herschel Bulkley	Laminar	$P_l = \left[\frac{0.09984 * k}{14400 * (D_2 - D_1)} \right] * \left[\frac{Y_p}{0.00208 * k} + \left[\left(\frac{192 * (2 * n + 1)}{n * C_a * (D_2 - D_1)} \right) * \left(\frac{0.1016 * Q}{(D_2^2 - D_1^2)} \right) \right]^n \right] \quad (5)$
	Turbulent	$P_l = \frac{7.48 * f * (0.002217 * Q)^2 * \rho}{0.005712 * (D_2 - D_1) * (D_2^2 - D_1^2)^2} \quad (6)$

b) Fracture Initiation Pressure and Collapse Pressure Methods

In case the Geotechnical Model does not include fracture initiation pressure and collapse

pressure, the software offers several methods, which can be used to predict upper and lower bounds of the safe mud pressure window.

Table 3: Fracture Initiation Pressure Equations used by the Developed Software

per Boundary [Fracture Initiation Pressure] Methods[9][10], [11], [12]	
Method	Fracture Initiation Pressure
Hubbert & Willis	$P_f = \frac{(1 - \sin(\phi))}{(1 + \sin(\phi))} (\sigma_v - (\alpha * P_p)) + (\alpha * P_p) \quad (7)$
Eaton	$P_f = \frac{v}{(1 - v)} (\sigma_v - (\alpha * P_p)) + (\alpha * P_p) \quad (8)$
Minimum Stress	$P_f = \sigma_h \quad (9)$
Bellotti & Giacca	$P_f = \frac{2 * v}{(1 - v)} (\sigma_v - (\alpha * P_p)) + (\alpha * P_p) \quad (10)$
Hoop Stress Method	$P_f = 3\sigma_h - \sigma_H - (\alpha * P_p) + \sigma_t^{\Delta t} + T \quad (11)$

Table 4: Collapse Pressure Equations used by the Developed Software

Lower Boundary [Collapse Pressure] Methods[13], [14]	
Mohr Coulomb	
Case#1	$p_{wc} = \frac{(3\sigma_H - \sigma_h + \sigma_t^{\Delta t}) * (1 - \sin(\phi))}{2} - S_o * \cos(\phi) + (\alpha * P_p) * \sin(\phi) \quad (12)$
Case#2	$p_{wc} = \frac{1}{(1 + \sin(\phi))} * [(\sigma_v + \sigma_t^{\Delta t} + 2 * v(\sigma_H - \sigma_h)) * (1 - \sin(\phi)) - 2 * S_o * \cos(\phi) + (\alpha * P_p) * \sin(\phi)] \quad (13)$
Modified Lade	
	$I_3 = \frac{I_1^3}{(27 + \eta)} \quad (14)$

The detailed steps for deriving the equations can be found in Appendix

c) *Stress Transformation Equations*

In case the borehole is horizontal or inclined, the stress transformation equations are triggered in order to transform the stresses to a new Cartesian

coordinate system, where two stresses are perpendicular to the borehole whereas the third stress is parallel to the axes of the borehole[15].

Table 5: Stress Transformation Equations Used by the Developed Software

Stress Transformation Equations	
$\sigma_H^\circ = (\sigma_H * (\cos(\omega))^2 + \sigma_h * (\sin(\omega))^2) * (\cos(\delta))^2 + \sigma_v * (\sin(\delta))^2$	(15)
$\sigma_h^\circ = (\sigma_H * (\sin(\omega))^2 + \sigma_h * (\cos(\omega))^2)$	(16)
$\sigma_v^\circ = (\sigma_H * (\cos(\omega))^2 + \sigma_h * (\sin(\omega))^2) * (\sin(\delta))^2 + \sigma_v * (\cos(\delta))^2$	(17)
$\tau_{xy}^\circ = \frac{1}{2}(\sigma_H - \sigma_h) * (\sin(2\omega)) * (\cos(\delta))$	(18)
$\tau_{xz}^\circ = \frac{1}{2}(\sigma_H * (\cos(\omega))^2 + \sigma_h * (\sin(\omega))^2 - \sigma_v) * (\sin(2\delta))$	(19)

d) *True Vertical Depth Determination Method*

There are several known methods of computing true vertical depth, one of these methods is the

minimum curvature, it is theoretically the most accurate and most commonly used, hence it was integrated with software[16].

Table 6: Minimum Curvature Method Equations Used by the Developed Software

Minimum Curvature Method	
$DL = \cos^{-1} * [\sin(\delta_1) * \sin(\delta_2) * \cos(\omega_2 - \omega_1) + \cos(\delta_1) * \cos(\delta_2)]$	(20)
$RF = \tan\left(\frac{DL}{2}\right) * \frac{180}{\pi} * \frac{2}{DL}$	(21)
$\Delta TVD = [\cos(\delta_1) + \cos(\delta_2)] * \left[\frac{RF * \Delta MD}{2}\right]$	(22)

e) *Solution Methods*

Two solution methods are available, one is for impermeable borehole wall whereas the second for permeable. Practically, the impermeable proposed solution is valid once the rock formation is exposed to the drilling fluid and last as long as no filtration occurs

[Initial condition], whereas the permeable solution is effective only when a stable mud cake is built [Steady stat condition]. Only the final formula of the two methods will be mentioned here. Therefore for more details refer to reference [5].

Table 7 : Radial Elastic Displacement Equations Used by the Developed Software

Radial Elastic Displacement	
Permeable	$u = r * \frac{1}{E} \left[P_w * (1 + \nu) - (\alpha * P_w) * (2\nu - 1) - (1 - \nu) * (\sigma_t^{\Delta t} + 2\eta (P_w - (\alpha * P_p))) \right] - (\nu^2 - 1) * (2(\sigma_H - \sigma_h) \cos(2\theta) + 4 * \tau_{xy} * \sin(2\theta)) - \sigma_H - \sigma_h + \nu * \sigma_v$ (23)
Impermeable	$u = r * \frac{(1 + \nu)}{E} \left[P_w - \frac{(2\nu - 1)}{(1 + \nu)} * (\alpha * P_p) - \frac{(1 - \nu)}{(1 + \nu)} * \sigma_t^{\Delta t} - \frac{1}{(1 + \nu)} * (\sigma_H + \sigma_h - \nu * \sigma_v) - 2 * (\nu - 1) * ((\sigma_H - \sigma_h) \cos(2\theta) + 2 * \tau_{xy} * \sin(2\theta)) \right]$ (24)

V. DELIVERABLES OF THE SOFTWARE

Several figures are generated, which would assist to improve individual analysis quality and provide a simple visual way of analyzing. The following points show the main figures that displayed by the developed software:

- Well profile.
- Safe mud pressure window.
- Volumetric change of the open borehole section.
- Change in the Equivalent Circulating Density (ECD).
- Open borehole section condition.

VI. INTERNAL WORKFLOW DESCRIPTION

Sequential steps are performed at the back ground of the software in order to achieve the main objectives of the software. Figure 2 below depicts these steps. As it is illustrated in Figure 2, the process starts by computing the annular pressure loss between the casing and drill string, here the given casing depth and drill string geometry are used. Then the software starts fetching the data point from the master file, one by one, each time several steps are performed, the steps are repeated for each single data point till the last data point. Eventually the cumulative volumetric change of the open borehole section and the change in Equivalent Circulating Density (ECD) are computed and graphically displayed for different flow rates. The change in (ECD) referred to here is the difference between the theoretical (ECD) [Calculated based on the original shape of the open borehole section] and predicted (ECD) [Calculated based on deformed shape of the open borehole section].



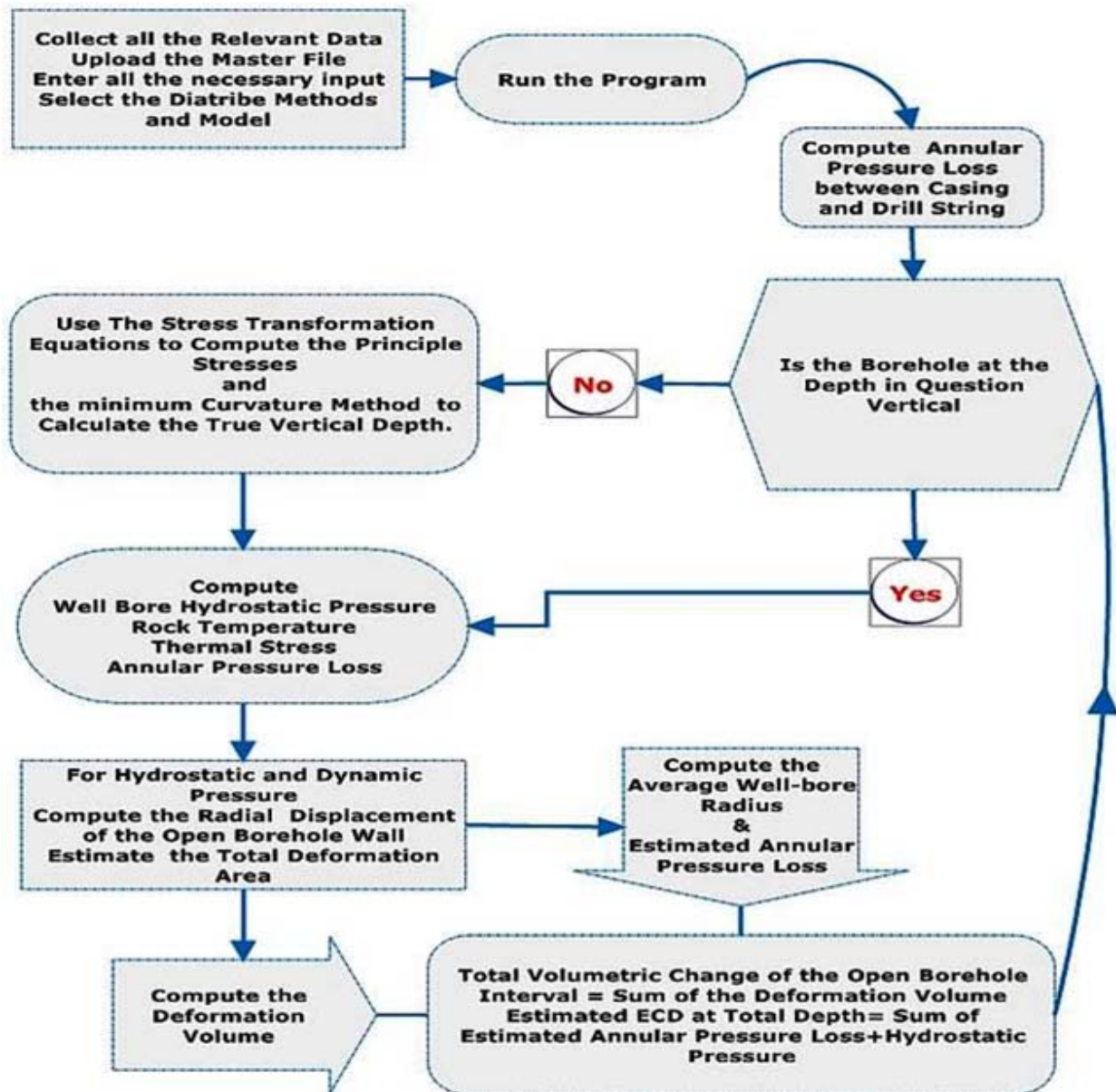


Figure 2 : Internal Workflow of the Developed Software

VII. CASE STUDY

Necessary analysis for the presented case study performed using historical data belonging to two wells. The main objectives of the study were to measure the effects of different controllable and uncontrollable parameters on the volumetric changes of the open borehole section and to evaluate any expected changes which would occur to ECD saccordingly. The initial well condition for the example mentioned can be seen in Table 8.

Table 8: Well Characteristics and the Relevant Data used for the Study

	Well A	Well B
Last Casing Size and Depth [ft]	9 5/8" - 12600	7 5/8" - 16500
Well Type	Vertical	Slightly Deviated
Total Measured Depth [ft]	13400	19050
Open Hole Section Thickness [ft] and Size [in]	800 - 8 1/2"	2550 - 6 1/2"
Mud Weight [ppg]	10	11.5
Hydraulic Model Used	Bingham	Herschel Bulkeley
Fracture Initiation Pressure Method Used	Eaton	Bellotti & Giacca
Collapse Pressure Method Used	Modified Lade	Mohr Coulomb
Drill Pipe length [ft] and Size [in]	12800 - 4 1/2"	17500 - 3 1/2"
Heavy Weight Drill Pipe length [ft] and Size [in]	200 - 5"	800 - 3 1/2"
Drill Collar length [ft] and Size [in]	400 - 5 1/2"	750 - 4 3/4"
Initial Flow Rate [gpm]	500	700
Viscometer Reading [600-300-6-3] [1/sec ⁻¹]	26-20-8-6	38-26-6-5

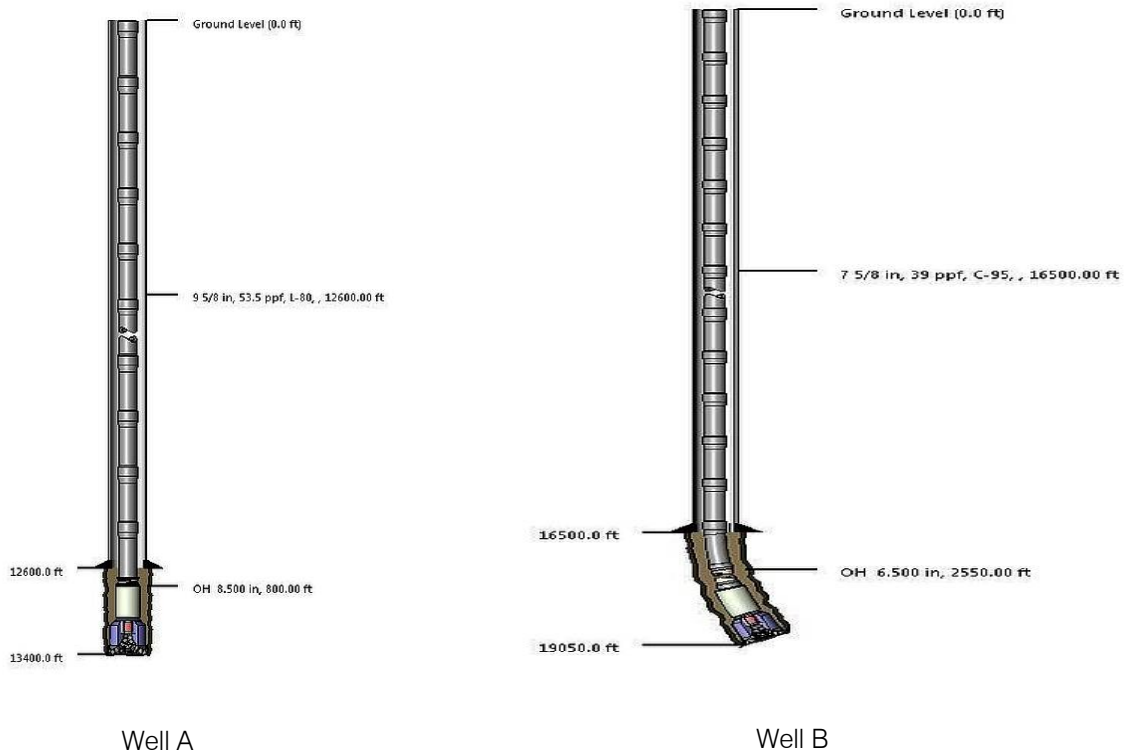


Figure 3 : Wellbore Schematic

Three different scenarios have been studied as following:

- In first scenario, the initial well condition was applied (Table 8).
- In the second scenario, the effect of the mud weight was investigated.
- In the third scenario, the influence of drilling fluid temperature was studied.

In each scenario the pump flow rate was gradually increased from the initial rate to maximum allowable rate.

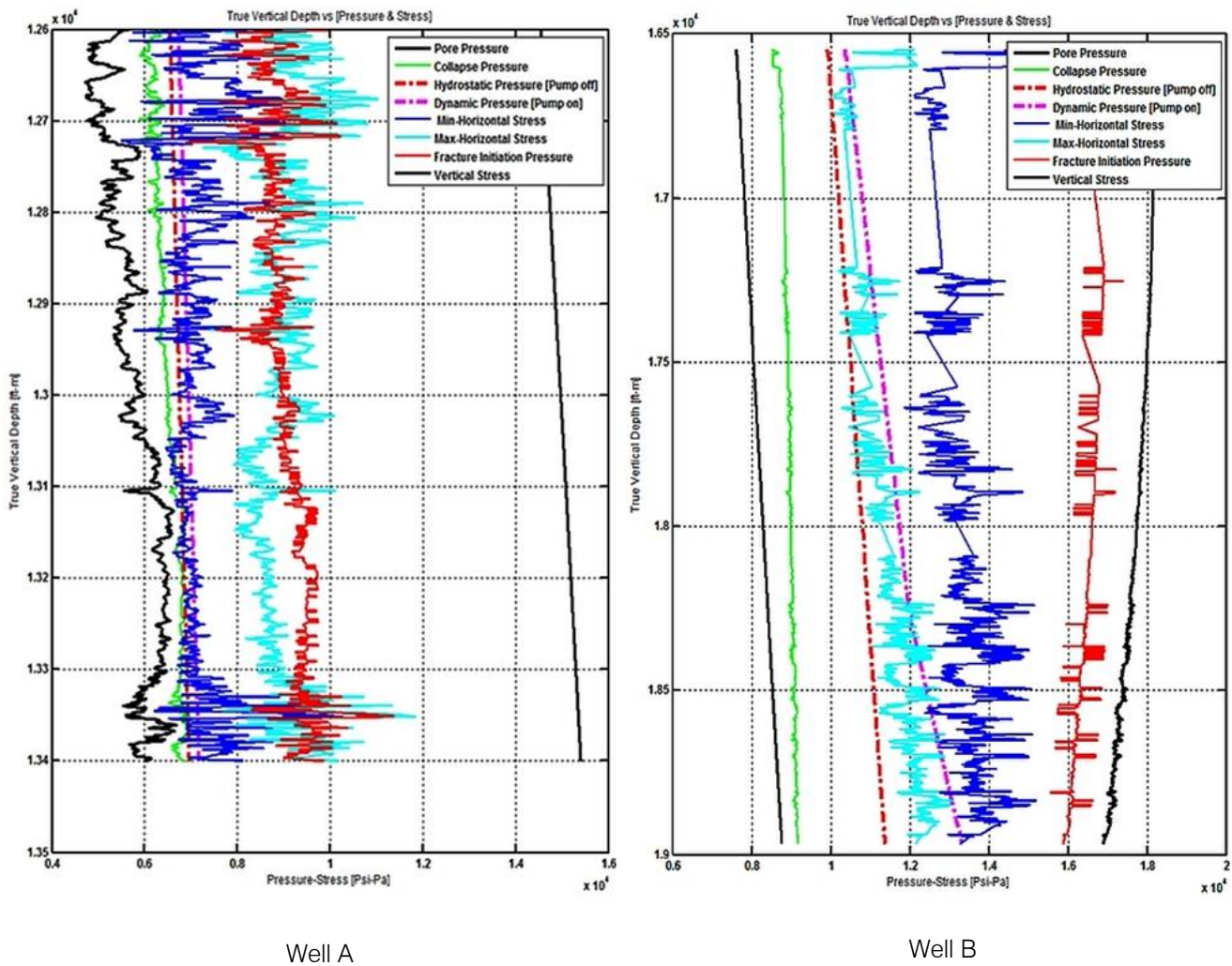


Figure 4: Safe Mud Pressure Window

a) Well A

As it is clearly indicated in Figure 4, this well can be characterized as the one with narrower safe mud pressure window consequently the maximum permissible pump flow rate was limited to 1000 gpm. Figure 5 depicts the results of the studied scenarios. In general, the volumetric change of the open borehole section and change in ECD increase with increasing the pump flow rate. However the changes are not significant and they can be ignored. Although in second scenario the mud weight was higher, it did not make remarkable changes, the reason for that mainly related to the contraction and expansion of the open borehole, in all scenarios, the borehole was always in contraction status even with higher flow rate [Figure 6].

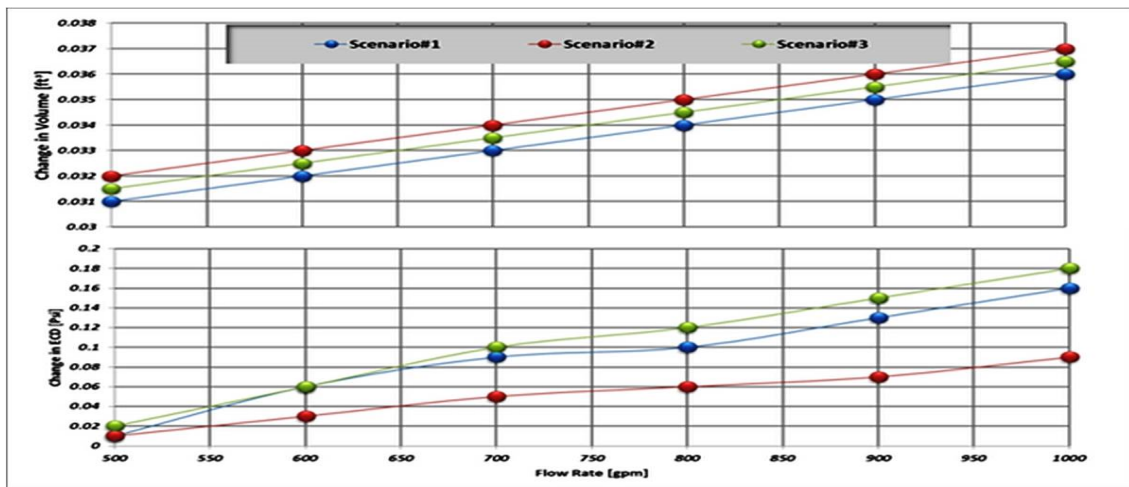


Figure 5: Expected Change in Open Borehole Volume and ECD for Different Pump Flow Rate [Well A]

[In the second scenario the mud weight was increased to 10.5 ppg instead of 10 ppg, while in third scenario, the drilling fluid temperature is assumed to be 127°C for the entire open hole section and 0.925 [°C/100ft] used as thermal gradient]

The results show another important observation that the change in ECD in second scenario is always less comparing to the other scenarios, again the main reason of that is the borehole condition. Increasing mud weight would intend to change the borehole from contraction condition to expansion condition, hence the average radius of the deformation borehole increases and the cumulative annular pressure loss at the bottom

of the borehole decreases accordingly. Comparing the third scenario with first scenario, slight increase in the volumetric change of the open borehole section can be noted, it is caused mainly by the thermal stress. The existence of the thermal stress will cause the drill-induced stresses to increase, consequently the open borehole shrinks and the annular pressure loss increases. Therefore, higher dynamic wellbore pressure is expected, it cause the open borehole section to expand, due to this expansion, the difference in deformation volume between the pump on and off is higher.

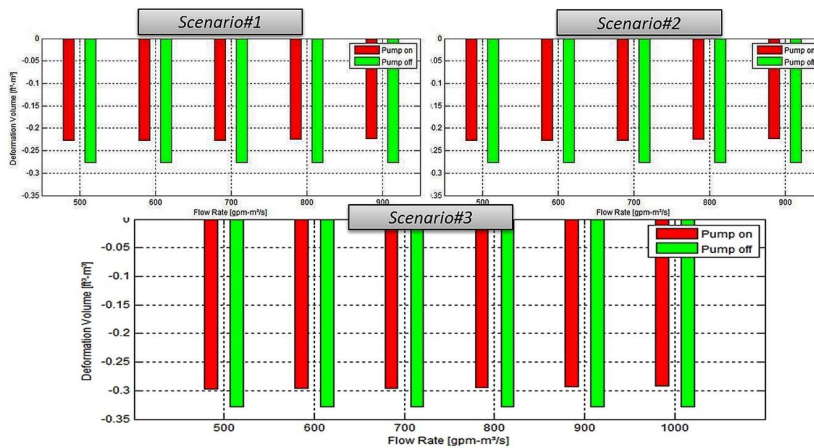


Figure 6 : Cumulative Deformation Volume of the Open borehole section for Different Pump Flow Rate [Well A]

[The red bar shows the borehole condition under static status [pump off], whereas the green bar illustrates the borehole condition under dynamic status [pump on]. the negative number indicates that the borehole is under contraction condition]

b) Well B

This well has wider safe mud pressure window, which makes it a good example to study the impact of the borehole condition in term of contraction and expansion on volumetric change of the open borehole

and change in ECD. Three important observations can be extracted from the 3 scenarios are;

- The volumetric change of the open borehole and change in ECD increase constantly with pump flow rate.
- In the second scenario, the borehole condition changes from contraction status to expansion status, consequently the volumetric change is higher and the change in ECD is lower comparing to the first scenario. The change in ECD in this case is

negative, in other words, the predicted ECD at the bottom of the hole is less than the theoretical ECD.

- The slight increase in volumetric change and the change in ECD in the third scenario are due to the thermal stress effect.

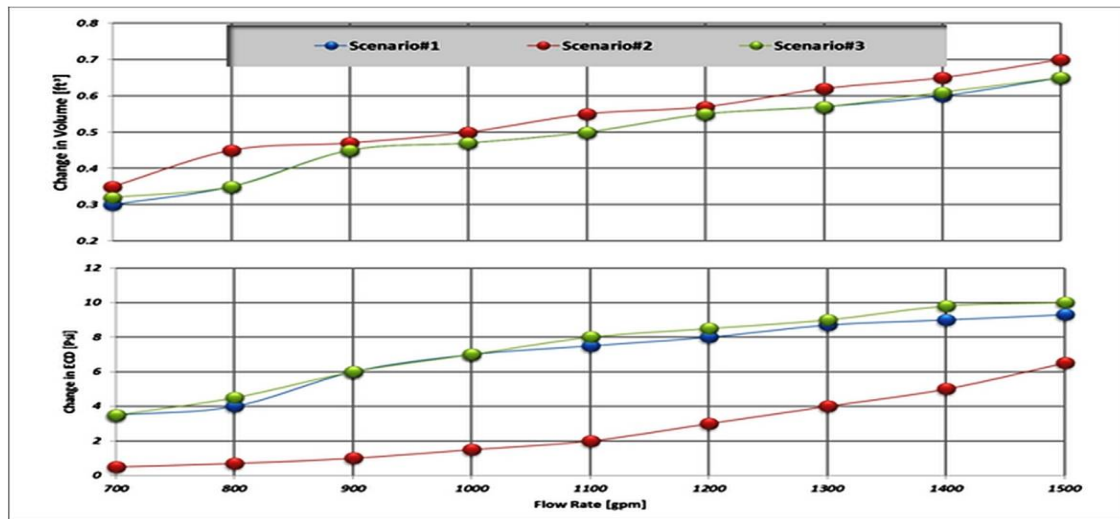


Figure 7: Expected Change in Open Borehole Volume and ECD for Different Pump Flow Rate [Well B]

[In the second scenario the mud weight was increased to 13.5 ppg instead of 11.5 ppg, while in third scenario, the drilling fluid temperature is assumed to be

177°C for the entire open hole section and 0.925 [°C/100ft] used as thermal gradient]

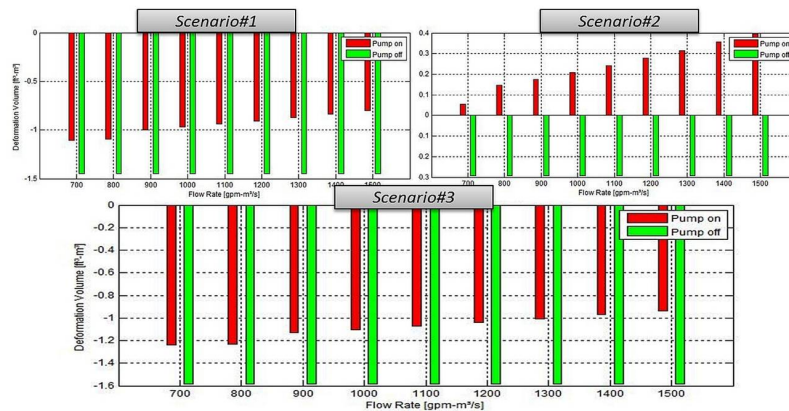


Figure 8: Cumulative Deformation Volume of the Open Borehole Section for Different Pump Flow Rate [Well B]

[It is obvious that the open borehole is under contraction status in first and third scenario, in contrast it is under expansion status in the second scenario.]

VIII. CONCLUSION

The main conclusion of the presented work can be summarized in the following points:

- For the purpose of accurately quantifying the volumetric change of an open borehole section and its impact on the hydraulic system, Standalone software has been developed, it has multiple features and it is able to estimate the volumetric change of an open borehole section and to predict any possible change might occur to the ECD for any

given well by utilizing the Geotechnical Model data, geo-mechanical properties of the rocks and subsurface data.

- Detailed description for all the equations and models of the developed software have been provided.
- Since the graphical analysis is always preferable hence the developed software generates multiple charts, these charts collectively are comprehensive and readable that leads to valuable analysis.
- The findings of two case studies can be concluded as following:
 - The elastic deformation of an open borehole section wall certainly occurs and its severity

depends on geotechnical properties of encountered formation, magnitude of the in situ principle stresses, induced stresses, well geometry, well profile and the operational margin between dynamic and the hydrostatic pressure.

- o The volumetric change of the open borehole section and change in ECD increase with increasing the pump flow rate.
- o The static condition [pump off] of an open borehole section in terms of contraction and expansion is mainly driven by the status of the in situ principal stresses and the drilling fluid weight.
- o The changing magnitude of ECD depends mainly on the open borehole static [Pump off] condition, if the borehole is under contraction status when the pump is off, two cases could exist once the pump is started:
 - The borehole could continue to be under contraction status; in this case the change in ECD will be positive [the predicted ECD will be higher than the theoretical ECD].
 - The second possible situation occurs if the open borehole condition changes from contraction to expansion, in this case the predicted ECD will be less than the theoretical ECD and consequently the change in ECD will be negative.

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NOMENCLATURE

P_l	Pressure Loss [Psi/ft, Pa/m]
ρ	Density [ppg]
PV	Plastic viscosity [cP]
v	Mean velocity [Ft/second]
Y_p	Yield point [lb/100ft ²]
D_1	Drill string outer diameter [in, m]
D_2	Casing inner diameter, open hole diameter [in, m]
n	Behavior Index [Dimensionless]
k	Consistency Index [EqcP]
f	Friction Factor [Dimensionless]
C_a	Herschel Bulkley variable [Dimensionless]
Q	Flow rate [gpm, m ³ /second]
P_f	Fracture initiation pressure [Psi,Pa]
ϕ	Rock friction angle [°]
σ_v	Vertical principle stress [Psi,Pa]
α	Biot's elastic constant [Dimensionless]
P_p	Formation pore pressure [Psi,Pa]
ν	Poisson ratio [Dimensionless]
σ_h	Minimum horizontal principle stress [Psi,Pa]
σ_H	Maximum horizontal principle stress [Psi,Pa]
$\sigma_t^{\Delta t}$	Thermal stress [Psi,Pa]
T	Rock tensile strength [Psi,Pa]
p_{wc}	Collapse pressure [Psi,Pa]
S_o	Rock cohesive strength [Psi,Pa]
I_1	First stress invariant [Psi,Pa]
I_3	Third stress invariant [Psi ³ ,Pa ³]
η	Material parameter related to friction [Dimensionless]
σ_{11}	Major effective principal stress [Psi,Pa]
σ_{22}	Intermediate effective principal stress [Psi,Pa]
σ_{33}	Minor effective principal stress [Psi,Pa]
σ_{rr}	Effective radial stress
$\sigma_{\theta\theta}$	Effective tangential stress
σ_{zz}	Effective stress along the borehole axis
θ	Angle around the borehole measured anticlockwise from the azimuth of σ_H
$\tau_{\theta z}$	Shear stress in $[\theta, z]$ plane [Psi,Pa]
τ_{xz}	Shear stresses in $[x, z]$ plane [Psi,Pa]
τ_{xy}	Shear stresses in $[x, y]$ plane [Psi,Pa]
τ_{yz}	Shear stresses in $[y, z]$ plane [Psi,Pa]
S_1	Material parameter [Psi,Pa]
u	Radial elastic displacement for the borehole [in, m]
r	Wellbore radius [in, m]
E	Young's modulus [Psi,Pa]
η	Poroelastic stress coefficient [Dimensionless]
P_w	Borehole Pressure [Psi,Pa]
σ_H°	Transformed maximum horizontal stress [Psi,Pa]
σ_h°	Transformed minimum horizontal stress [Psi,Pa]
σ_v°	Transformed vertical stress [Psi,Pa]
τ_{xy}°	Transformed shear stresses in $[x, y]$ plane [Psi,Pa]
τ_{xz}°	Transformed shear stresses in $[x, z]$ plane [Psi,Pa]
ω	Borehole azimuth [°]
δ	Borehole inclination [°]
DL	Dogleg severity [°]
RF	Ratio factor [Dimensionless]
ΔTVD	Change in true vertical depth [ft,m]
ΔMD	Change in measured depth [ft,m]

APPENDIX

Mohr Coulomb

General failure Equation is;

$$\sigma_{11} - \sigma_{33} = 2 * S_o * \text{COS}(\phi) + (\sigma_{11} + \sigma_{33}) * \text{SIN}(\phi) \text{ (A1)}$$

Well bore collapse is expected to occur at the azimuth of σ_h , in other word at $\theta=90^0$, hence the induced stresses can be calculated using the following equations;

$$\sigma_{rr} = P_{wc} - (\alpha * P_p) \text{ (A2)}$$

$$\sigma_{\theta\theta} = 3\sigma_H - \sigma_h - P_{wc} - (\alpha * P_p) + \sigma_t^{\Delta t} \text{ (A3)}$$

$$\sigma_{zz} = \sigma_v - (\alpha * P_p) + \sigma_t^{\Delta t} + 2 * \nu(\sigma_H - \sigma_h) \text{ (A4)}$$

$$\tau_{\theta z} = 2 * (-\tau_{xz}) \text{ (A5)}$$

Since P_{wc} is unknown for comparison it is assumed that $P_{wc} = P_p$

Case#1

$$\sigma_{rr} \leq \sigma_{zz} \leq \sigma_{\theta\theta} \text{ Therefore}$$

In Equation A1

$$\sigma_{11} = \sigma_{\theta\theta} \text{ and } \sigma_{33} = \sigma_{rr}$$

Insert EqA2 and A3 into Eq A1, after few mathematical steps and arrangements we end up with the following Equation for collapse pressure:

$$P_{wc} = \frac{(3\sigma_H - \sigma_h + \sigma_t^{\Delta t}) * (1 - \text{SIN}(\phi))}{2} - S_o * \text{COS}(\phi) + (\alpha * P_p) * \text{SIN}(\phi) \text{ (A6)}$$

Case#2

In case two the following condition is assumed

$$\sigma_{rr} \leq \sigma_{\theta\theta} \leq \sigma_{zz}$$

Therefore in Eq A1

$$\sigma_{11} = \sigma_{zz} \text{ and } \sigma_{33} = \sigma_{rr}$$

Now by inserting A2 and A4 into Eq A1 collapse pressure for the second case can be derived:

$$P_{wc} = \frac{1}{(1 + \text{SIN}(\phi))} * [(\sigma_v + \sigma_t^{\Delta t} + 2 * \nu(\sigma_H - \sigma_h)) * (1 - \text{SIN}(\phi)) - 2 * S_o * \text{COS}(\phi) + (\alpha * P_p) * \text{SIN}(\phi)] \text{ (A7)}$$

Modified Lade

$$\frac{I_1^3}{I_3} = 27 + \text{ (A8)}$$

$$I_1 = (\sigma_{11} + S_1) + (\sigma_{22} + S_1) + (\sigma_{33} + S_1) \text{ (A9)}$$

$$I_3 = (\sigma_{11} + S_1) * (\sigma_{22} + S_1) * (\sigma_{33} + S_1) + 2 * \tau_{xy} * \tau_{xz} * \tau_{yz} - (\sigma_{11} + S_1)\tau_{yz}^2 - (\sigma_{22} + S_1)\tau_{zx}^2 - (\sigma_{33} + S_1)\tau_{xy} \text{ (A10)}$$

$$S_1 = \frac{S_o}{\text{TAN}(\phi)} \text{ (A11)}$$

$$\eta = \frac{4 * (\text{TAN}(\phi))^2 * (9 - 7 * \text{SIN}(\phi))}{(1 - \text{SIN}(\phi))} \text{ (A12)}$$

Because the collapse occurs at $\theta=90^0$, Eq A9 and A10 for cylindrical coordinate will have the following form:

$$I_1 = (\sigma_{rr} + S_1) + (\sigma_{\theta\theta} + S_1) + (\sigma_{zz} + S_1) \text{ (A13)}$$

$$I_3 = (\sigma_{rr} + S_1) * (\sigma_{\theta\theta} + S_1) * (\sigma_{zz} + S_1) - (\sigma_{rr} + S_1)\tau_{\theta z} \text{ (A14)}$$

By substituting σ_{rr} , $\sigma_{\theta\theta}$, σ_{zz} and $\tau_{\theta z}$ in Eq A13 and A14 with Eq A2, A3, A4 and A5 respectively

$$I_1 = \sigma_v - 3 * (\alpha * P_p) + 2 * \sigma_t^{\Delta t} + 3 * S_1 + \sigma_H * (2\nu + 3) - \sigma_h * (2\nu + 1) \text{ (A15)}$$

$$I_3 = (P_{wc} - (\alpha * P_p) + S_1) * (3\sigma_H - \sigma_h - P_{wc} - (\alpha * P_p) + \sigma_t^{\Delta t} + S_1) * (\sigma_v - (\alpha * P_p) + \sigma_t^{\Delta t} + 2\nu(\sigma_H - \sigma_h) + S_1) - (P_{wc} - (\alpha * P_p) + S_1) * (4 * \tau_{xz}^2) \quad (A16)$$

Now back to Eq A8 rearrange it

$$I_3 = \frac{I_1^3}{(27 + \eta)}$$

Finally replace I_1 , I_3 , S_1 and η with Eq A15, A16, A11 and A12 respectively in Eq A8, the right side of Eq A8 is independent of P_{wc} , while the left side is a quadratic expression in P_{wc} . Therefore by solving Eq A8 the collapse pressure P_{wc} can be obtained. Since two solutions are expected, the collapse pressure equals the lesser one.



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Indian E-Governance System: Opportunities and Challenges

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Abstract- The empowering part of the Information and Communication innovation (ICT) in the conveyance of administrations in the general population and government segment has picked up acknowledgment. Accordingly, an insurgency as far as administration is occurring everywhere. E-Governance accepts more prominent significance with regards to administration of today's legislative structures to achieve fast monetary development and enhanced personal satisfaction. The innovation and the techniques utilized as a part of E-Governance venture give a guide to proficient conveyance of administrations at the entryway step. In today's chance the advancement of any nation relies on upon the employments of E-Governance furthermore their entrance. Improvement of any nation can be judge by the extent of E-Governance in that nation.

Keywords: E-governance; india; government.

GJCST-H Classification: J.1 K.5.2



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Indian E-Governance System: Opportunities and Challenges

Ashok Kumar ^α & Vijaypal Singh Dhaka ^σ

Abstract- The empowering part of the Information and Communication innovation (ICT) in the conveyance of administrations in the general population and government segment has picked up acknowledgment. Accordingly, an insurgency as far as administration is occurring everywhere. E-Governance accepts more prominent significance with regards to administration of today's legislative structures to achieve fast monetary development and enhanced personal satisfaction. The innovation and the techniques utilized as a part of E-Governance venture give a guide to proficient conveyance of administrations at the entryway step. In today's chance the advancement of any nation relies on upon the employments of E-Governance furthermore their entrance. Improvement of any nation can be judge by the extent of E-Governance in that nation.

It has introduced straightforwardness in the administering procedure; sparing of time because of procurement of administrations through single window; lessening in defilement, accommodation and strengthening. There are numerous difficulties which making issues for Indian government to run e-administration. In this paper we need to investigate the convenience of e administration for the administration organizations and subject of India. We need to distinguish the segments those are profited through e-administration strategy furthermore introduced a thorough rundown of E-Governance ventures which is as of now being utilized as a part of India.

Keywords: E-governance; india; government.

I. INTRODUCTION

E-Governance is utilization of web innovation as a stage for trading data, furnishing administrations and executing with residents, organizations, and different arms of government. E-Governance gives a sound methodology to fortify general administration. It cannot just enhance responsibility, straightforwardness and effectiveness of government procedures, additionally encourage supportable and comprehensive development. E-Governance additionally gives a component of direct conveyance of open administrations to the negligible fragments of the general public in the remotest corners, without dealing with intermediaries.

II. BENIFITS OF E-GOVERNANCE

- a) *Fast, Convenient and Cost Effective Service Delivery*
With the appearance of e-Service conveyance, the legislature can give data and administrations at

lesser expenses, in decreased time and with more prominent comfort. Case in point, after the computerization of area records in Rajasthan, agriculturists can get a duplicate of their Records of Rights, Tenancy and Crops (RTC) inside 30 minutes, as against 30 days that it used to take before. In addition, a printed duplicate of the RTC at booths costs 15 just, as against substantial fixes that one needed to pay before

- b) *Transparency, Accountability and Reduced Corruption*

Spread of data through ICT expands straight forwardness, guarantees responsibility and forest all defilement. An expanded utilization of PCs and electronic administrations enhances the mindfulness levels of nationals about their rights and powers. This diminishes the optional forces of government authorities and shortens debasement. Case in point, land enrollment necessities in Rajasthan after computerization can now is finished inside an hour with no official provocation or fixes.

- c) *Increased Participation by People*

With simple access to the government services, the confidence of the subjects in the administration increments and they approach to share their perspectives and criticism. Expanded openness to data has enabled the subjects and has improved their support by giving them the chance to share data and commitment usage of activities.

III. DIVERSE SECTORS BENEFITED BY E-GOVERNANCE

E-Governance is executed by government in verging on each field. From urban states to rustic regions and from legislative issues to instructing Governance has spread its root all over the place. Either its open or private part, basic man or representative all is generally reliant on e-administration. Here we have exhibited diverse territories where e-administration is generally utilized. In the accompanying segment, we are portraying the activities utilized as a part of urban and rustic territories of India

- a) *E-Governance ventures in urban zones*
i. *Key Projects for G2G (Government To Government)*
a. *Boss Minister's Information System:* (www.cmis.Rajasthan.gov.in) encourages checking of CM

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- declarations, spending declarations, ventures and different fiscally helped plans, Chief Minister's Schedule, issuing of different approvals from CM Relief Fund/BPL plans and so forth.
- b. *Fiasco Management System*: (<http://dmdr.Rajasthan.gov.in>): is a web empowered coordinated framework composed and created to screen and control different exercises being completed under help works.
 - c. *Right to Information Portal*: (<http://rti.Rajasthan.gov.in>): gives office to record RTI application and check the status on the web.
 - d. *Digitization and e-classifying*: (<http://ancientdocuments.rajasthan.gov.in>), (<http://ancientcoins.Rajasthan.gov.in>) Ancient archives, collectibles, antique mint pieces are being digitized and e-inventoried Departments include: [7]
 1. Rajasthan State Archives, Bikaner
 2. Rajasthan Prachya Vidyapratishthan, Jodhpur
 3. Dialect and Libraries Dept., Jaipur
 4. Prehistoric studies and Museums Department.
 - e. *Seconline*: An Intranet entrance for Secretariat Network for booking the gatherings and with the office of using the basic office application instruments and virtual products.
 - f. *Video Conferencing*: The office has been given to the 33 regions of the State and a Video Conferencing timetable for every one of the Departments has been issued. Every real office are using the administrations according to their prerequisites.
 - g. *Portable Video Conferencing*: The goal is to set up the two-way moment high limit correspondence join between State Head quarter and the remote site and used to encourage moment voice joins amongst organization and debacle affected spot to prepare and to give the satisfactory backing. These connections are likewise being used to have voice/video conferencing between State organization and District/Village organization for the grievance evacuation of the influenced individuals. Two versatile Video Vans have been made operational for G-to-C collaborations and for on location checking of field tasks. This office has been widely utilized as a part of Swasthaya Chetana Yatra and Gram Sampark Abhiyan by Medical and Health Department.
 - h. *SI and PF*: The State Insurance and the General Provident Fund subtle elements of all the State Government workers has been electronic profiting every one of the representatives. The redesigned data of the strategies, New Pension Index points of interest, Mediclaim Insurance Policy subtle elements and so on are likewise accessible at <http://sipf.rajasthan.gov.in>.
 - i. *LITES*: (<http://lites.rajasthan.gov.in>): A Web based Litigation Information, Tracking and Evaluation System (LITES) actualized on the model Initiative taken by Justice Department. It is being utilized by a large portion of the Departments for successful checking of legitimate cases. More than 1.00 Lac cases being observed by 200+ Departmental prosecution officers with around 1400 cases checked on consistent schedule. LITES 2008 - Upgraded Version dispatched with comprehensive Query Reporting and At A Glance reporting highlights for the Top level Administration empowering internet observing of suit.
 - j. *Vikas Darpan*: A GIS device for decentralized arranging - A GIS based instrument for decentralized arranging - Vikas Darpan - has been made operational. This framework gives complete maps of the State, 32 Districts, 241 Tehsils and 41,000 towns connecting financial profiles and demographic information of Census 2001. Vikas Darpan gives access to the general population and also to State Government offices in a shut client bunch (CUG) mode. Online GIS application <http://gis.rajasthan.gov.in> has additionally been produced.
- b) *Key Projects for G2B (Government to Business)*
- i. *Extract Department*: (<http://rajexcise.org/>) :
 - a. Web-based framework connecting all the 33 District workplaces of Excise Department with its Headquarter for era of different grants, bank challan stores, wholesaler, temporary worker invoicing, refinery creation and dispatches, permit records.
 - b. During the money related year 2009-2010, income to be produced through online exchanges:
 - Extract Department Rs. 2300 crore
 - Rajasthan State Breweries Corporation Rs. 1500 crores
 - ii. *VAT framework mechanization*: (www.rajtax.gov.in): actualized at all the 11 zonal central station and 56 consistent circles for Registration of merchants, upkeep of income gathering registers, Facility for e-installment and for recording e-returns. As of now, all profits are being documented electronically.
 - a. Rs. 4300 crores worth of income gathered by September 30, 2009 through this framework.
 - iii. *Mines and Geology Department*: (www.dmg-raj.org): The Department has been totally IT empower- red by executing a complete, widely inclusive electronic application.
 - iv. *e-Procurement*: (<http://eproc.rajasthan.gov.in>) Statewide E-Procurement System is being

executed in the state to achieve straight forwardness and lessen time imperative in acquisition methods in Government Departments. Effective pilots have been done in Rajasthan. Urban Infrastructure Project (RUIDP) and the Department of IT & C (DoIT & C). e-Procurement has been made obligatory for five Departments PWD, PHED, Irrigation, Medical and Health and Forest.

c) *Key Projects for G2C (Government TO Citizen)*

- i. *eMitra*: (<http://emitra.gov.in>) e-Mitra has been executed in every one of the Districts over the State. The venture is like CSC task actualized in Urban territories under which different administrations are being given through Kiosks. Legislature of Rajasthan propelled two-national driven administration conveyance extends in particular Lok Mitra and Jan Mitra in Bikaner (2006). Lok Mitra was fundamentally a urban driven undertaking with more push on utility installments, Jan Mitra was a coordinated e-stage to convey coveted data and administrations identified with different Government Departments at stands in towns. Government incorporated both Lok Mitra and Jan Mitra under new title e-Mitra which began working in 2007. The Primary target of the e-Mitra was to give incorporated administrations relating to Government Departments to the general population in a proficient, straight forward, advantageous and benevolent way utilizing IT to augment speed, responsibility, objectivity, reasonableness and availability from the point of view of the natives. Under the e-Mitra venture, subjects should profit three sorts of administrations from any e-Mitra stands over the State viz. On-line checking instrument accessible at <http://urban.emitra.gov.in>
- ii. *'At whatever time, Anywhere Registry'*: (<http://www.rajstamps.gov.in>): for enlistment of property independent of the locale of sub-recorder office. The task had been executed in 11 SR Offices in Jaipur on pilot premise. Other than this all the SR Offices have been IT-empowered.
- iii. *Aarogya-Online*: Complete IT-enablement of SMS Hospital, Jaipur. Application incorporates computerization of Outdoor Patient Department, Indoor Patient Department, Billing, Enquiry, Investigation (Central Lab), Diet/Kitchen, Pharmacy and Drugs, OT and so forth.
- iv. *Transport Department*: The division had taken the activity and had effectively mechanized the Registration of Vehicles and Issue of Driving Licenses all through the condition of Rajasthan. In the current monetary year, the Department is executing VAHAN – Vehicle Registration System

and SARTHI – Issue of Driving License in all the RTOs/DTOs of the State. (<http://www.transport.Rajasthan.gov.in>)

- v. *Income Department (Land Records)*: <http://apna.khata.raj.nic.in>: Database of Record of Rights (RoR) covering 6.8 million landowners has been finished in all the 241 tehsils. Duplicates of RoR (Nakal) are being given to subjects through e-Mitra stands and other free channels.
 - vi. *Civil Corporations*: E-Governance Project has been actualized in 6 metropolitan enterprises at Divisional HQs under RUIDP viz, Jaipur, (<http://jaipurmc.org>), Jodhpur (<http://jodhpurmc.org>), Udaipur(<http://Udaipurmc.org>), Kota (<http://kotamc.org>), Bikaner(<http://bikanermc.org>) and Ajmer (<http://ajmermc.org>). The task covers complete computerization of back workplaces and a Service conveyance framework for issue of birth and passing testaments, open grievance redressal, Financial Accounting and so on.
 - vii. *Mandi Online*: It is a dynamic programming office accessible on <http://www.http://rajamb.com> which gives the day by day Agriculture Mandi costs for extremely vital farming wares exchanged the Mandi all through the State. The ware profile records all real wares of Rajasthan and gives helpful data about the horticulture situation in the State.
 - *RSRTC*: (<http://www.rsrtc.gov.in>): Rajasthan State Roadways Corporation has online reservation and ticketing framework over all regions in the State as a team with private segment in around 48 Bus stations. E-ticketing an internet ticketing office has been acquainted which encourages the travelers with book their forward and return tickets for the VOLVO, A/c and Deluxe transports employing between Jaipur-Delhi and Jaipur-Agra.
- d) *IT Infrastructure Projects*
- a. *State Data Center (SDC)*: It is the focal store of all the essential information relating to State Government area and has been operational since August 2005. This server farm would go about as a center of the State level data base which thus would coordinate topographically disseminated information depositories. This would empower the legislature to work better, yield higher income development and lessen costs separated from adjusting residents' needs as at no other time. Nationals would have the capacity to openly associate with different government divisions whenever, anyplace with negligible exertion. This thus would likewise help in powerful usage of Right to Information as all data would be accessible in electronic structure for access to natives. All the basic correspondence and processing types of

gear like Core switches, Routers, Firewalls, IDS, SAN, database and web servers obtained under various leader ventures have been introduced at SDC. The Data Center would take a shot at 24 X 7 premise. Notwithstanding the over, this Data Center would go about as the Nerve community for the Networked Government framework, Network Operations Center for Secretariat Network (SecLAN) and Jaipur City Metropolitan Area Network (M.A.N) furthermore as Network Operations Center for up and coming Rajasthan State Wide Area Network. Being widely utilized for facilitating 154 Web Sites, Several Applications and Data Bases like: Vikas Darpan, Registration and Stamps, VAT-IT Project, e-FIR, e-Procurement, e-Mitra, Transport, CSC, Mail Server, Internet Gateway for Sec-LAN and MAN. In the long run every single Departmental Server/Applications are to be facilitated at SDC.

- b. *Secretariat Networking Project Sec-LAN-MAN*: It is best in class Voice, Data and Video system interfacing around 5000+ clients through PCs and IP telephones. IP Phones to 32 District Collectors (barring Pratapgarh) have been given utilizing NIC Network. Under Metropolitan Area Network (MAN) 40 Government structures in Jaipur are between connected utilizing diverse advances. It is a piece of e-administration activity of the Government and would help leaders in the legislature examine the data/information with choice bolster applications for arranging, executing and overseeing government programs.

b) *Other E-Governance Services in different States of India*

i. *Transportation*

Services gave by e-administration around there are Issuance of Time Table of transports, Provision of booking office for Interstate transport, Transportation Improvement Program, Regional Transport plans, Congestion Management Process, Transportation Demand Management.

Different Projects [1]

1. *CFST*: Citizen Friendly Services of Transport Department by Rajasthan government to give administrations, for example, Issue of learner licenses, Issue of driving licenses, Renewal of driving licenses etc.
2. *Vahan and Sarathi*: The backend applications Vahan and Sarathi help in speeding the general work stream in the vehicle office however Rajasthan Government.
3. *OSRTC*: The Orissa State Road Transport Corporation venture was begun to give transport related offices online.

ii. *Online installment of bills and charges*

Services gave by e-administration in this area's:- Online Transaction, Payment of Bill, Payment of duties, Payment of house EMIs

Different Projects

1. *Companions*: This anticipate is begun by Kerala Government for its subjects to make online installment of power and water charges, income charges, permit expenses, engine vehicle charges, college charges, and so on [1].
2. *E-SEVA*: Electronic seva by Rajasthan government to pay service charges, benefit of trade licenses and execute on government matters at these offices.
3. *BWSSB, water charging, and accumulation framework*: This e-administration undertaking is begun by the Bangalore government. In this consistently bills of houses are created through BGS programming

iii. *Municipal administrations*

Services gave are as: House Tax Assessment, Billing and Collection, Maintain records of Land and property, Issue of Death Certificates, Registration and Attorneys of properties, Review and endorsement power for site arranges.

Different activities:

1. *E-Panjeeyan*: It is begun by Assam government to manages the computerization of the Document enlistment work at Sub Registrar Office.
2. *SDO Suite*: By Assam government. This framework helps in issuing different declarations like Land deal Permission, Legal beneficiary testament, Issue of Passport Verification Certificate, Birth and Death Report,

Zones of e-administration in provincial regions:

In country ranges e-administration has its effective effect. Here, from horticulture to nearby data everything is done through e-administration.

iv. *Agriculture*

Following are the activities utilized as a part of Agriculture.

1. *Gyandoot*: In the State of Madhya Pradesh it is an Intranet-based Government to native (G2c) administration conveyance activity.
2. *BELE*: It is an electronic application with 3-level engineering for catching and observing the significant exercises and administrations.
3. *AGMARKNET*: It is a venture endorsed by Department of Marketing and Inspection (DMI), Ministry of Agriculture, and Government of India.
4. *Neighborhood data*: For nearby data, for example, costs of seeds, composts, credit rates and so forth government has begun e-administration Service around there moreover.

Different ventures

1. *E-JanSampark*: Services and Information available to the regular man in his territory to meet his fundamental need. This anticipate is begun by Jaipur.
2. *Prajavani*: It is begun by the Government of Rajasthan, it is a Web taking into account line Monitoring of Public Grievances.
3. *Web Portals for Jaipur Police*: It is composed by Jaipur, created and facilitated with numerous energizing open utility components like Safety tips for all subjects, verification status of Passports, Stolen vehicles etc.[1]
4. *Land record administration*: By facilitating administration around there, a huge number of area records can be keep up in a brief timeframe range.

Significant tasks around there are

1. *Bhoomi*: It is the main e-Governance land records administration framework venture which is effectively actualized for the advantages of the normal man by the Government of Rajasthan.
2. *Far reaching Modernization of Land Records (CMLR)*: This anticipate is begun by the legislature of Rajasthan. It permits incorporating elements of property enlistment, transformations and redesigning of field overview maps.
3. *Land Record Computerisation*: The target of the task is to modernize new assignment, land exchange, regularization of involved area and so on related actives of the Dept. of Land Management at locale level.

c) *E-Governance in Health*

Administration gave by these ventures are Availability of solutions, Special wellbeing camps, Facilities at Anganwadi jogs

Different ventures

Online Vaccination Appointment for International Traveler: Citizen driven application with the end goal of immunization of the persons continuing abroad and issuance of International Health Certificate

SMS based Integrated Disease Surveillance System: It is a SMS based Integrated Disease Surveillance System encourages to report the events of illness, number of persons influenced from the territory of events instantly to the concerned power.

Doctor's facility OPD Appointment: Hospital OPD Appointment System is another welfare measure embraced by Chandigarh Administration to make life of natives more straightforward

d) *E-Governance in Education*

Giving essential instruction (basic, essential, auxiliary) to youngsters, Providing PC training to kids, Results for 10th & 12th classes, Information on qualification for "Circulation of books" plan

Different Projects

1. *CASCET*: This anticipate is begun by the Rajasthan government for Education Department.
2. *Online Scholarship Management System*: It is implied with the end goal of circulation of grants and charges repayment.
3. *AISES (All India School Education Survey)*: This anticipates is begun by Assam government. This anticipates is utilized for looking over the quantity of schools in region. Enumeration

Challenges

In spite of the fact that the legislature has thought of a few activities to encourage the entrance to open administrations, the coveted results are yet to be completely figured it out. This can be to a great extent credited to different front-end and back-end challenges that the administration keeps on confronting. Front-end challenges identify with client particular issues, for example, high absence of education levels, non-accessibility of utilization friendly interfaces, and insufficient force supply in provincial territories, low broadband entrance and above all, absence of familiarity with e-Governance activities.

Then again, back-end challenges identify with specialized, procedure or human asset issues inside the legislature. These issues incorporate absence of frameworks mix inside an office, absence of mix crosswise over government offices, constrained information of utilizing PCs at different levels of administration and arrangement of innovation without legitimate procedure re-designing.

IV. CONCLUSION

There are different difficulties for the usage of e-government in India. These difficulties resemble low proficiency, absence of awareness, low broadband entrance, absence of framework mix inside an office, and every single other reason. A dream is required to execute the e-government in India. To meet the vision the difficulties in the usage of e-government ought to be overcome. At that point the earth should be created for the viable execution of e-government in India. In any case, in spite of all challenges India has number of honor winning e-administration ventures. Along these lines we can say that e-Governance is the way to the "Great Governance" for the creating nations like India to minimize debasement, gives proficient and successful or quality administrations to their nationals.

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Impact of Information Technology on The Efficiency of Civil Secretariat Employees of Education Department Peshawar, Pakistan

By Mr. Hakim Ullah, Yasir Khan Khalil & Jianliang Wang

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Abstract- The computer and information system are very vital element of any organization especially administrative level in education department in this age of computer and internet working. Computer really works in minimizing the work burden and brings efficiency in working profile. The history shows that those nations and organizations which focused on their technological improvement proved very successful organizations and nation on the planet. This study has been conducted in an education administrative department where most of the work was done manually rather than using the advanced computer infrastructure and information system. The study surveyed 150 employees of the civil secretariats administrative department of education in Peshawar where both junior and senior level.

Keywords: Information technology, information system, internet, web, infrastructure, architecture, administrative staff.

GJCST-H Classification: K.5.2 H.1.1 J.1



IMPACT OF INFORMATION TECHNOLOGY ON THE EFFICIENCY OF CIVIL SECRETARIAT EMPLOYEES OF EDUCATION DEPARTMENT PESHAWAR, PAKISTAN

Strictly as per the compliance and regulations of:



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Impact of Information Technology on The Efficiency of Civil Secretariat Employees of Education Department Peshawar, Pakistan

Mr. Hakim Ullah ^α, Yasir Khan Khalil ^σ & Jianliang Wang ^ρ

Abstract- The computer and information system are very vital element of any organization especially administrative level in education department in this age of computer and internet working. Computer really works in minimizing the work burden and brings efficiency in working profile. The history shows that those nations and organizations which focused on their technological improvement proved very successful organizations and nation on the planet. This study has been conducted in an education administrative department where most of the work was done manually rather than using the advanced computer infrastructure and information system. The study surveyed 150 employees of the civil secretariats administrative department of education in Peshawar where both junior and senior level. The study used stratified random sampling technique creating strata's for both junior and senior level employees. The self-administered 15 items questionnaire was used tested for validity and reliability. The results found that both type of employees have been benefited from the application and use of computer and information system.

Keywords: Information technology, information system, internet, web, infrastructure, architecture, administrative staff.

I. INTRODUCTION

The emergence and advancement in IT, advance technology and internetworking infrastructure and architecture has caused dramatic revolution in all aspect of human endeavor. The technological advancing, IT applications and technological elements have changed the demonisms and dynamics of businesses and organizations. The IT and IS advancement and internetworking has really changed and shifted human being from industrial age to computer and information age (Digital age) and world become digital world in which every activities strictly done over IT and different IS are interlinking by communicational network internet and internet is live oxygen though which the whole world is connected). IT applications and strong internetworking infrastructure has caused sources of opportunities in business and organizations. The technological advancement and computer modernization has made the transformation of information easy, speedy anytime and anywhere. IT and IS based system applications and internetworking infrastructure has improved the efficiency functionality and flexibility of the organizations and business. Through IT based strategy have perhaps even changed the

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business models of the organizations and has made them much diversified organizations. Computer applications and internetworking infrastructures have become the more indispensable vehicles of the vital development, improvement and have made the actualization of resources.

Debela (2009) stress that IT automata have really affected the performance of blue color workers. He argued that a computer application has made them more efficient workers than before. Computer technology is very vital for both public and private organization as it helps in org planning, controlling, directing, budgeting and reporting.

The computer technology applications and internet has key contribution and usefulness in the society. Its importance has been witnessed in health, military, judiciary, business, education and other parts of the country society. Computer technology has caused improvement in service delivery, operation execution, transformation and finishing of the products. Pakistan is a developing country in transition phases of computer technology and internetworking infrastructure .most of government t organization have adopted the application of computer ,internet and web based information system in their operations and decision making process. This research is aimed is public secret rerate employee of Peshawar.

II. PROBLEM STATEMENTS.

Pakistan is a developing country in which most of the organizations process data and services delivery manually .public secret rate Peshawar is among the public sector organization which has adopted the application of IT and IS practice. as to know how to much the organization has succeeded in covering the improper and poor means of information and processing .this research investigate the impact of computer and information system on the efficiency of employees.

III. OBJECTIVE OF THE STUDY

The main objectives of conducting this research study are the following

1. To investigate the impact of computer technology, internet and information system in the efficiency of

Peshawar secretariat employees of education sector.

2. To find the contribution of IT and information system in the organization planning, controlling, coordination, budgeting and reporting.
3. To know the importance of computer technology applications, internetworking (internet) and web based information computerized system as compared to the manual information (Traditional information system).
4. To suggest measures on the bases of findings of this research.

IV. LITERATURE REVIEW

The IT (information Technology) and IS (information system) based strategy bring positive revolution in the performance of the organization such are business firms, health care centers, battle field management, traffic control system in area of critical operational management and decision making in complex situation for the operational managers and executive managers. The IT & IS strategic planning having greater opportunities such are improved employees performance, standardization of services, strong collaboration various activities, strong and sustainable consumers relationship from the services and from employee of the organization and real time communication to consumers and organization achieved their goals effectively in shorter time by investing limited resources and limited financing.

Through the implementation of IT & IS based strategic planning the organization become intelligent and due to intelligence the administration and operation of organization will be effective so the organization become smart and smart organization achieved the their objectives successfully.

Different IT techniques like data base management system for data management of the organization, data warehouse, data mining, cloud computing, virtualization, remote computing, data grading, mobile computing, crowd sourcing, GSM, GPS, ubiquitous computing techniques and information system centralized, distributed and web based information system similarly the modern infrastructures and architecture of IT also play a important contribution in smart organization.

Debela (2009) stress that IT automata have really affected the performance of blue color workers. He argued that IT applications have made them more efficient workers than before. Computer technology is very vital for both public and private organization as it helps in org planning, controlling, directing, budgeting and reporting. IT implementation and IS support and improves the delivery of services at very excellent pedestal due to high processing and better quality of management and the performance in both private and public organization definitely increased the technology

based strategy in the organization help in operations like transaction, controlling the transaction, other offices automation daily customers recording, employees attendance record, security concerned issue, budgeting, reporting and IT & IS based strategy also support critical decision which are taken by the organization managers, operation managers and executive managers of in shorter time with accurate analysis design best decision making in complex situation, IS is the strategic engineering of IT infrastructure and architecture disciplined to combine people, software technologies, hardware technologies, telecommunication network technology and data base technologies that accept data from external environment, process data, stored the information/data and produces output reports to external environment for various sort decision maker of the organization.

Fountain (2007) suggest that government organization require to distribute the work of organization because work distribution bring great revolution in services and management and the administration will be effective by decomposing /splitting the structure of organization so performance will be improved. This only possible by implement IT based strategic planning for administration and services distribution and the cost, time and resources will be better managed.

Zambran(2008) recommend that IT based strategy planning the services of the organization improved instead of manual information system in organization. He suggested that IS is reliable and cost effective and computerized based system eliminate the problem redundancy of data in the organization, bring accuracy, sharing of information in the organization and their consumers, reliable backup facilities, up gradation and maintenance facilities, integration and integrity, free infrastructure data advisability, security and privacy so all these are IT based planning through which the performance of the organization

Aribisala (2008) asserted that IT infrastructure is absolutely important for better and effectively managing and coordinating the health care organizations, battle field are very necessary for day world. In health center the patient monitoring effectively computerized based system is important and similarly when army deployed in battle field the proper coordination is necessary for real time operation so without IT based techniques it obviously difficult in this age of technology, similarly industrial processing system the different activities monitoring at real time is important like product designing industries temperature and cooling condition detection is so critical important and IT based strategy is necessary for communication in organization because traditional communication are costly and IT based calling system are reliable for communication

Harthony (1990) stated that heterogeneous infrastructure and different architecture are available for

communication of text, audio, video, image, voice data and now web based system carry strong GPRS in reliable manners different companies manufactured and designing the communication network equipment like hub, switch, router, terminal devices like laptop, desktop, mobile devices and wireless and wire media and speed of internet bring effective communication infrastructure and communication become chippers and reliable. Olorunsola and Ekong (2006) stressed that e mail is reliable and cost effective and secure method of data transferred in the organization this also a great contribution of IT in organization

Ajayi and Ayodele (2002) stated that IT bring excellent changed in GDP of country and the economy become emerging economy so puts vital importance in economy development. According to Bhuiyan (2011) the web based computerized information system the for business firm assist the business and all the business activities are linked to web so the business become e business and e business all the activities are strictly done over the web so its also called web based business all supported activities or subcategories like e marketing commerce, e banking mailing shopping purchasing, e trade, e knowledge learning, e ordering all activities defiantly support business. If INFORMATION TECHNOLOGY based strategic planning are deployed for business today then business can achieved the objectives in shorter time with limited resources. INFORMATION TECHNOLOGY based business has various benefits for the firm and consumers. e business, customer satisfaction is high and strong and sustainable relation build with customer, INFORMATION TECHNOLOGY based business will be globalized because internet based marketing worldwide customer are created so customers purchased ratio to sale will be high and ultimately business firm getting high revenues which is main goal of every business firm in shorter interval of time, price reduction, standardization of services, customers feedback, competitive advantage, 24 hours engagement of customers, and free services and employee services performance is vision of INFORMATION TECHNOLOGY based tactic of business.

V. RESEARCH HYPOTHESES

H0: There is no impact of computer and internet working on the efficiency of civil secret rate employee of Peshawar in education sector.

H1: There is positive impact of computer and internet working system on the efficiency of civil secretariat employee of Peshawar in education sector.

H0: There is no significant difference between the efficiency of junior and senior level employees due to computer and information system.

H2: There is significant difference in efficiency of junior and senior level employee due to computer and information system

VI. METHODOLOGY

This is a descriptive research. The data of this research was collected from 150 employees of civil secretariat education sector in Peshawar. The employees of the civil secretariat education sector in Peshawar were segregated in different stages. The employees were distributed in junior and senior levels. So the stratified random sampling technique was adopted in this research study.

The questionnaire of this research was comprised of 15 items. The research questionnaires was self-administrated, the questionnaire was validated and checked for reliability. T- test has been applied to conclude the results.

VII. DATA ANALYSIS

The below tables indicating the result of the impact of computer and information system on the efficiency of civil secretariat education department employees. In the below table 1 represent junior level employee and 2 represent senior level employees. The results suggest that there is no difference in the efficiency of junior level employees and senior level employees. The levene, s test suggest that the impact of computer and information system has an impact on the efficiency of the civil secretariat employees of education sector and there is no difference in the efficiency of both junior and senior level employees. As the Levins, test value is insignificant at 5% probability. Both employees level showing similar responses to computer and information system on the employee's efficiency. All classes of employees are benefited from the uses of computer applications and information system.

Group Statistics					
	employees	N	Mean	Std. Deviation	Std. Error Mean
Computer and information system	1.00	120	3.8319	.13564	.01086
	2.00	30	3.7302	.17730	.02997

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Computer and information system	Equal variances assumed	2.757	.098	3.777	189	.000	.10175	.02694	.04861	.15489
	Equal variances not assumed			3.192	43.351	.003	.10175	.03188	.03748	.16602

VIII. CONCLUSION

The IT (information Technology) and IS(information system) based strategy bring positive revolution in the performance of the organization such are business firms, health care centers, battle field management, traffic control system in area of critical operational management and decision making in complex situation for the operational managers and executive managers. The IT & IS strategic planning having greater opportunities such are improved employees performance, standardization of services, strong collaboration various activities, strong and sustainable consumers relationship from the services and from employee of the organization and real time communication to consumers and organization achieved their goals effectively in

achieved their goals effectively in shorter time by investing limited resources and limited financing.

This research was aimed at knowing the impact of computer and information system on the efficiency of the employee in education department of civil secretariat Peshawar. The research was conducted using self-administered questionnaire analyzing 150 junior and senior level employees for the purpose. The results revealed that computer and information system has positive impact on the employees of efficiency in this particular organization employees. The results suggest that computer has same impact on both level employees.

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Probability Testing a Component of Advance Software Testing

By Debashis Ghatak

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Abstract- The present invention relates to the Probability Testing which is a new testing technique under Software Testing. This invention belongs to Software Testing, especially a new intellectual testing technique. The Probability Testing introduces a new mathematical formula in Software Testing as well as Software Engineering. Probabilistic Testing Architecture which gives a brief idea of Probability Testing before the start of the software testing.

Keywords: *knowledge, thinking, assumption.*

GJCST-H Classification: *B.8.1 D.2.5 K.7.3*



Strictly as per the compliance and regulations of:



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Probability Testing a Component of Advance Software Testing

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Abstract- The present invention relates to the Probability Testing which is a new testing technique under Software Testing. This invention belongs to Software Testing, especially a new intellectual testing technique. The Probability Testing introduces a new mathematical formula in Software Testing as well as Software Engineering. Probabilistic Testing Architecture which gives a brief idea of Probability Testing before the start of the software testing.

Keywords: knowledge, thinking, assumption.

1. INTRODUCTION

Each and every incident in this world has done its own logic which can be fabricated by a set of mathematical rules. It has been noticed that technological people have some fabrication knowledge that software development section established by logic or follows the rules of mathematics whereas Software Testing section doesn't follow any logic or any mathematical rule. But this concept is truly wrong. Suppose a logic for calculating two amounts like x and y and get the result in z like " $x+y=z$ ". During the time of software development, a developer can assemble this logic with the help of "DATA STRUCTURE" and different programming language. Similarly, a "Software Tester" can check the entire development, according to the requirement as well as in a different way like "Mandatory Fragment, Mandatory Sub Fragment, Dependent Mandatory Sub Fragment, Different Condition, Boundary Value Analysis, Statement Coverage, Equivalent Partitioning and Exit Criteria". All the respective checking is directly or indirectly related to "Mathematics" or some "Mathematical Rule". The backbone of any Software stands on five unique sections such as "REQUIREMENT, LOGIC, DESIGN, CODE GENERATION, TESTING" (See Fig 1).

When a Software scamper in the real time scenario at that time it has been observed that the software has been failed due to a different unique situation rather than traditional scenario. Origination of Probability Testing is to avoid such kind of different unique situation which happens during the time of real time scenario. "Probability Testing" belong to two phases such as first "PLANNING" secondly "ACTING". "Software Tester" first prepares a mock unique situation that may be or must be happening during real time. Software tester will make a decision that which field is required to create such kind of scenario and activity (See Fig 2).

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Human intelligence comes from inherent thinking power and way of thinking of a person. It varies from person to person wise. Planning is the blossom of THINKING and the ASSUMPTION power of the person. Before the preparation of any planning, it requires an extensive area of THINKING, ASSUMPTION and thoroughly KNOWLEDGE about that particular item. Probability Testing belongs to the "Real Time" unique situation oriented Testing. In the "Probability Testing", a Software Tester must be needed three things

1. KNOWLEDGE
2. THINKING
3. ASSUMPTION

Details Architectural Diagram of "Probability Testing" is as follows (See Fig 3).

In the "Probability Testing" corresponding "LOGIC" segment will prepare different mock real time "Logical Scenarios". "PLAN" is the consequence of "KNOWLEDGE + THINKING + ASSUMPTION". The mother of any intelligent logic comes from the methodically "KNOWLEDGE". Application of the "KNOWLEDGE" comes when the steam of "THINKING" starts on that "KNOWLEDGE". At that time it has been noticed that different types of "ASSUMPTION" will come in the mind automatically and then different types of "ASSUMPTION" will be converted into the different "PLAN" like "PLAN1, PLAN2, PLAN3,, PLANn".

Any Software works on the basic functionality of some "Mandatory Fragment", "Mandatory Sub Fragment", "Dependent Mandatory Sub Fragment", "Different Conditional Fragment" and related non-functional Fragments. It is following "TOP DOWN" architecture of the "Data Structure" model.

The objective of "Probability Testing" is the good choice for "Software Testing". According to the derived formula for a total number of "Test Case" generation for "Software Testing", it has been noticed that "Software Testing" is a combination of the different level of Fragment in different in different ways. In terms of mathematics, it is called "Permutation". Any software is a combination of various "Mandatory Fragment", "Mandatory Sub Fragment", "Dependents Mandatory Sub Fragment", "Conditional Fragment" and "Nonfunctional Fragment". "Fragment" dependency can arise any part of any "Software" according to the requirement. Probability Testing follows the "Probability Theory" that is "Permutation" of n distinct objects has taken r at a

time such that $nPr = n! / (n-r)!$. Where some of the fragments are obtained as concealed in the test design.

During the time of "Probability Testing", the tester will generate different mock real time situation, according to the business requirement and business logic. According to the different mock probable scenario which may be happening in the real time on the basis of that Software Tester try to find out the different kind of defects on the basis of various scenarios for taking requisite corrective measures in the software coding and eliminating the defects.

After a release of the software globally there are a numerous number of bugs has been found in multiple specific situations. "Probability Testing" is very much required to avoid such kind of situation before releasing the software globally. "Probability Testing" is the place where testers have a freedom of thinking and implement the said, thinking capability during the time of real-time testing. Considering the following relation in the software testing,

$$P_i = \sum_{i=1}^n M_i + \sum_{l=1}^n CF_l$$

Where $CF = nCr$

Let "M" belongs to the "Mandatory Fragment". "CF" which also belongs to the others "Child Fragment" which is correlated with "Mandatory Fragment" and chooses a different combination of respective "Child Fragment" corresponding "r" at a time. The above formula will help for the tester that in which way and how a Software Tester will prepare different mock real time scenario during the time of "Probability Testing" also it will track the total count of the mock real time scenario throughout the operational time.

Every different "Fragment" has a relationship as like as "Parent" with "Child" as "Mandatory Fragment" with "Child Fragment". During the time of "Probability Testing", each individual "Fragment" can be prepared by using the above formula.

Formation of mock real time situation, corresponding "Mandatory Fragment" should be treated as "Parent Fragment" related sub-fragment is treated as "Child Fragment". Creation of the Mock real time situation during the time of "Probability Testing" is basically a "Top down" approach and corresponding relational diagram will go into synchronously from Parent to Child (See Fig 4).

"Child Fragment" will come up according to the mock real time situation and in every different, unique case will diverge according to the different mock real time situation. During the time of "Probability Testing", a tester will generate mock real time scenario like

Any Unmanned Ground vehicle (UGV) or Unmanned Arial vehicle (UAV) directly controlled by satellite or some elevated power wireless communication system. The "Unmanned Ground vehicle (UGV) or

Unmanned Arial vehicle (UAV)" will perform their assignments in the inaccessible area where human meddling is impossible. This is traditional system and traditional testing, which is sufficient for such kind of scenario. But "Probability Testing" is quite different, suppose if they said "Unmanned Ground vehicle (UGV) or Unmanned Arial vehicle (UAV)" moves under a long tunnel or hilly dense forest where satellite network or wireless communication system is not reached or not available such kind of situation, how the "Unmanned Ground vehicle (UGV) or Unmanned Arial vehicle (UAV)" will rescue and reinstate the communication with respective satellite or wireless communication system such kind of scenario based testing have done by Probability testing.

In the general insurance for a "Private Car Package" product, suppose a car owner has a private car like "Mercedes Benz". During the time of "Policy Generation" of the said new vehicle owner was taken the "Sum Insured" that is "\$100000" along with that several "Risk Cover" was taken like "Theft", "Accessories" etc.. After a few days later person was filed an endorsement that is "Change in Sum Insured" Endorsement from "\$100000" to "130000". After successfully passed the said endorsement the owner of the vehicle faced an accident where one person was dying and one person was severely injured. Both family members were filed different claims like "Death & Injury" against the policy of the receptive person. "General Insurance Company" was appointed a surveyor against the said claim to find out the authenticity of the respective claims. Suddenly the said owner of the vehicle drove on the hilly road and faced on the "Land Slide". The owner was spot death along with that vehicle was smashed.

In the above type of cases, the family members of the owner will file a "Death" as well as "Own Damage" claim against the respective policy number. Software Tester will test what types of defects have been generated such type of mock real time situation that has been created during the time of "Probability Testing".

"Probability Testing" will testing will test such kind of mock real time scenario oriented testing and find out the defects against that incident. In the above mock real time situation based testing is not possible either in "Integration" or "Regression Testing". Because "Integration" and "Regression Testing" have done on the basis of "Test Cases" and "Probability Testing" has done on the basis of "Mock real time Test Scenario". Knowledge, Assumption & Thinking ability are the key of "Probability Testing".

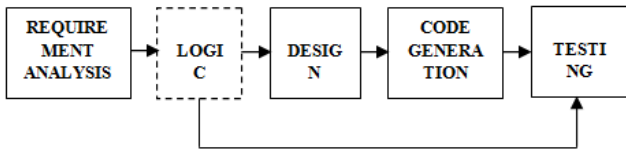


Figure 1: Enhance Software Design Architecture

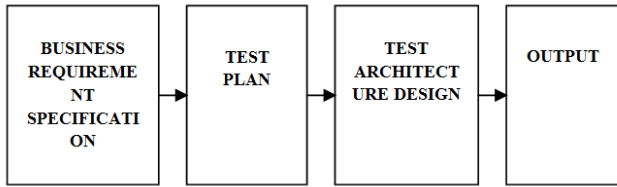


Figure 2: Basic Test Design Architecture

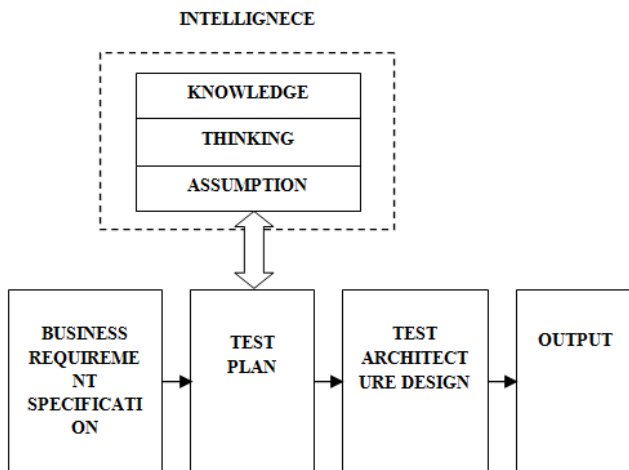


Figure 3: Probability Testing Architecture

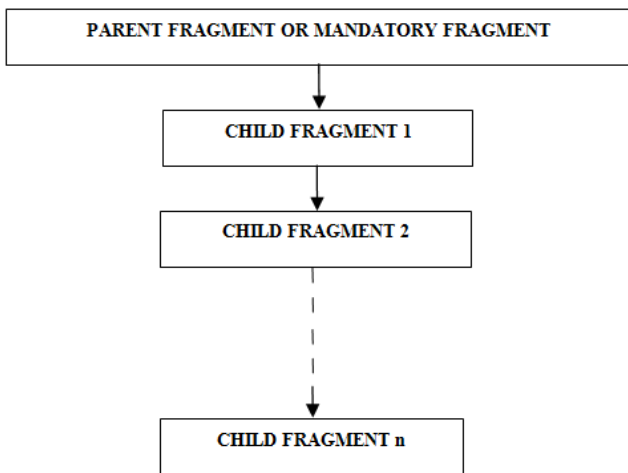


Figure 4: Probability Testing Fragment Relation

II. CONCLUSIONS

“Probability Testing” of Software Testing Which comprises, create mock real time intellectual situation, that the scenario which will probably happen in future during runtime and test the software on the basis of that scenario.

Said Software testing can be performed only after completion of “Integration Testing” and “Regression testing”. KNOWLEDGE, THINKING, ASSUMPTION is the key of Probability Testing.

III. ACKNOWLEDGMENT

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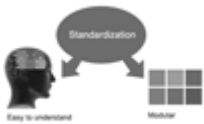




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	A-B	C-D	E-F
<i>Abstract</i>	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
<i>Introduction</i>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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