EXPLORING THE DYNAMICS AND POTENTIAL OUTCOMES OF AN INTEGRATED LAND INFORMATION SYSTEM FOR LAND DEVELOPMENT

A case study of the City of Johannesburg's Land Information System

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Bachelor of Science with Honours in Urban and Regional Planning.

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Declaration

I declare that this research report is my own unaided work. It is being submitted for the degree of Bachelor of Science with Honours in Urban and Regional Planning to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

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Abstract

As we delve deeper into the 21st century, the progressive diffusion of technology in our daily lives is becoming more apparent. The world is fundamentally changed due to the relentless pace and nature of technological advancements. Governments across the globe have recognised the importance of information technology in information management and public sector reform. Information technologies allow government to capture, store and maintain large volumes of information. This shift towards an electronically driven government has facilitated the implementation of information systems.

With society becoming increasingly connected and spatially enabled, the expectation of government to perform has increased significantly. Access to reliable and efficient information is the cornerstone of the planning profession. The sharing of information electronically has an enormous potential for integration and coordination in planning within government. This report seeks to accentuate the immense potential of a Land Information System. These systems hold much potential for the contemporary planner.

The research identified the importance of information in the realm of planning, as the basic resource in any decision making process. It is argued that the majority of local government functions are dependent on the same property data and that an integrated information system can enhance the effectiveness and efficiency of the decision making process in land development.

The City of Johannesburg was the first metropolitan municipality in South Africa to undertake such an initiative. Through information integration, it was possible to implement a revolutionary database as a single source of property information. This research seeks to uncover the dynamics and potential outcomes of such a system. It uncovered how an integrated information system can be utilised to mechanise, optimise and revolutionise information usage. Land development could be enhanced through the implementation of a Land Information System, which involves process of property data collection.

Acknowledgements

First and foremost, I would like to thank my heavenly Father, my Lord and Saviour for providing me this opportunity to undertake this research report. It is through your love and grace I am where I am today.

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Acronyms

BAS	Building Application System
CGIS	Corporate Geo-Informatics
CoCT	City of Cape Town
CoJ	City of Johannesburg
CoT	City of Tshwane
DPSA	Department of Public Services and Administration
FIG	International Federation of Surveyors
G2B	Government to business
G2C	Government to citizen
G2E	Government to employee
G2G	Government to government
GCR	Gauteng City Region
GCRO	Gauteng City-Region Observatory
GDS	Growth and Development Strategy
GIS	Global Information System
GMS	Growth and Management Strategy
IBM	International Business Machines Corporation
ICT	Information Communication Technology
IDP	Integrated Development Plan
ISIS	Integrated Spatial Information System
JPC	Johannesburg Property Company
JRA	Johannesburg Road Agency
LIS	Land Information System
MSA	Municipal Systems Act
NDP	National Development Plan
NDPC	National Development and Planning Commission

PAIA	Promotion of Access to Information Act
SAIRR	South African Institute of Race Relations
SALGA	South African Local Government Association
SAP	System Application Program
SPLUMA	Spatial Planning and Land Use Management Act
TAS	Township Application System
UNDP	United Nations Development Programme

Chapter 1

Introduction to the Research

Title: *Exploring the dynamics and potential outcomes of an Integrated Information System for Land Development: A case study of City of Johannesburg's Land Information System*

1.1. Introduction

Information has and will always be at the cornerstone of the planning profession (van Helden, 1994). The basic resource in the decision making process is information. Dale (1991: 2) argues that the value of information and effectiveness of the decision-making process are directly related to the quantity of information and the manner in which it is made available. Although the use of information in the planning profession is not entirely new, the use of information and communication technology (ICT) to supply this information is new and expanding at a rapid rate (van Helden, 1994: 483). As a result the use of ICT within planning has become widespread. The use of ICT has opened up a plethora of innovative means and methods that can optimise the manner in which land development occurs. In practice, decisions are generally made on the basis of inadequate information or in a fragmented and incremental manner, and for that reason, decisions are made in a subjective nature.

Planning and development are dynamic fields that are not static as they are constantly changing (Lewis, 2008: 133). Planners cannot be ignorant or naive to the changes around them, as the field in which they operate is nebulous. The presence of ICT's has influenced and transformed virtually every profession, and planning can certainly be classified as one of them. It is evident that planning within a South African context, has been slow in adopting technological advancements. It is only within recent years that ICT has been recognised and introduced into the realm of planning. The profession is reaching a stage where it can no longer circumvent the presence of ICT. It has to recognise and embrace it, or stand the risk of lapsing into a state of technological limbo (Sandercock, 2010).

It is evident that the face of society is undergoing change into a information / knowledge-based / network society (Belissent, 2011; Karlenzig, 2012; Smith, 2000). It is hard to fathom everyday life without such technological advancements. In the opinion of Mandarano et al, (2010: 123) we as society have developed into "digital citizens". Planning has been defined as a profession that advocates the public interest, dedicated to advancing the "public good" (Platt, 2004: 1), therefore it must synchronise accordingly with the rest of society, that is, the context in which it operates in.

Since the advent of the internet and digital connectivity, significant improvements in ICT's have become ubiquitous in the private sector with the use of e-commerce (Pina et al., 2010; Ndou, 2004). This has placed a tremendous amount of pressure on public sector reform, as citizens and businesses nowadays expect quick, efficient and effective means of information service delivery (Asgarhkani,

2005; Fang, 2000; Ho, 2002). This has led to the paradigm shift in Public Administration in the early 1980s, known as electronic driven government (hereafter referred to as e-Government) initiatives (Finger, 2005; Ho, 2002).

This research report seeks to elucidate the importance of technology and the internet as vital aspects of our daily lives. According to Nkomo (2010) offering online platforms for service delivery by government and public institutions in the 21st century is a necessity. The researcher deems it essential that the use of these platforms are leveraged by the planning profession to their full potential, so as to keep up with the times.

The importance of land and the information about it cannot be overemphasised. Issues and challenges related to land has become a major concern not only in contemporary South Africa but across the globe. Land is a multi-laden commodity and the management thereof is a complex and technical procedure. The mechanisation of land information through ICT initiatives can effectively support land management, land development and decision making process (McLaren and Stanley, 2012).

This research will utilise the City of Johannesburg's (CoJ) Land Information System (LIS) as a case study. The CoJ proudly advocated that it is "the first municipality in South Africa to have a single integrated property database system in place" (CoJ, 2009a). The results and findings that will be presented in the following chapters will be based on this case study. The remainder of this chapter then will frame the background of the research; outline the problem statement; provide a rationale for investigating this topic; construct the scope of the research; present the research question and sub questions; briefly outline the context within which this research is to be conducted and finally, conclude with a chapter outline of the report.

1.2. Background

Land in South Africa can be defined as a finite commodity (FAO, 1993), and an economic resource that is not static (Dale and McLaughlin, 1988). It is always susceptible to change in terms of rights vested in the particular parcel of land and the nature of the development it accommodates. Thus, any person that owns land can apply to a local authority in terms of the *Town-Planning and Township Ordinance - Ordinance 15 of 1986* or *Removal of Restrictions Act 84 of 1967* (and recently the new *Spatial Planning and Land Use Management Act of 2013*, section 41), depending on which is applicable to their case of amending rights and or associated development restrictions. The *Constitution of South Africa*, (1996: 83) in section 151(1) states that, "local government has executive authority in respect of and has the right to administer matters listed in Part B of Schedule

4". Part B of Schedule 4 lists "municipal planning" as one of its responsibilities. It is evident that this sphere of government is legally mandated to carry out development applications submitted to the relevant local directorate.

The 21st century has been defined by two significant epochs: unprecedented urbanisation and the pervasive use of technology (Farmer et al, 2002; Tibaijuka, 2009). The United Nations Habitat (2012: 1) states that "more than half of the world is now urban – the world has been rapidly urbanising, at an unprecedented pace". According to the World Bank (2013: 1) approximately "60 per cent of the world's population will reside in urban areas by 2030". The SAIRR (2013: 1) notes, "two-thirds of South Africa's population live in urban areas", and the recent 2011 Census results, further exemplifies the CoJ's urban growth. What these statistics prove is how the rapid rate of urbanisation has brought about monumental development pressures in local government to apply and facilitate planning measures such as the planning and management of land. Watson and Agbola (2013: 2) believe that, "planning is the single most important tool that governments have at their disposal for managing rapid urban population growth and expansion".

Land management seeks to 'control and co-ordinate' the way in which development takes place (Cloete, 1999: 15; Oranje, 1995). The *Town-Planning and Townships Ordinance - Ordinance 15 of 1986* refers to land use planning as "the co-ordinated and harmonious development of an area – in such a way as will most effectively tend to promote the health, safety, good order, amenity, convenience and general welfare of such area as well as efficiency and economy in the process of such development" (Ordinance 15 of 1986: Section 19). At present, the most publicised problem about the development of land is delays. Delays in the development approval process have now become an accepted way of life by developers and planning consultants. The term 'land development', for the purpose of this research will refer to "the erection of buildings or structures on land, or change of use of land, including township establishment, the subdivision or consolidation of land" (SPLUMA, 2013: 12).

The use of ICT has the potential to revolutionise, enhance and act as a facilitator in such development. However, Houghton et al (2013: 1) have noted that “the rapid and increasing use of ICT is changing patterns of communication and behaviour, participation and accessibility of information”. Therefore, it is vital that planning mechanises and utilises the potential that ICT holds in achieving 'controlled, co-ordinated and harmonious development' that takes 'efficiency and economy' into consideration.

Subsequently, the CoJ has sought to develop a unified repository of property information within its jurisdiction (Tjia and Coetzee, 2013: 262). In the past, CoJ departments administering property information operated in isolated databases and systems (Tjia and Coetzee, 2012; 2013). This made the mode of operation for property information sharing across numerous departments extremely tedious. As a result, information and data duplication occurred.

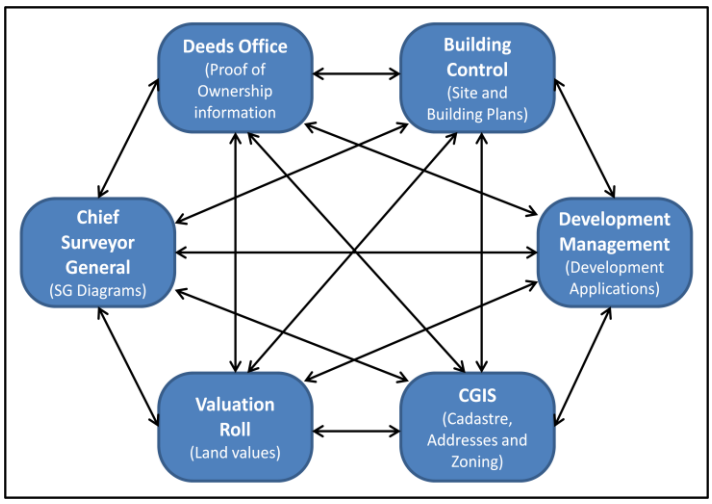


Figure 1.1: (Left) *Flow of Information Diagram*: this diagram shows graphically how easily information is inevitably fragmented. The diagram does not acknowledge external departments and agencies involved in land development. The lines connecting each department illustrates the flow of information and communication. These lines of information symmetries illustrate fifteen points of interrelated channels of communication. This makes information and data sharing imprecise. **Source:** Momberg, 2014.

Operating in silos meant that any information captured could not be utilised to its full potential due the fragmented databases, leading to the misinterpretation of information. The integration of data sets between departments has been elusive in local government operations. Tjia and Coetzee (2013: 263) have argued that the lack of integration of property data and information systems have affected the overall service delivery turnaround times for development applications.

These applications comprise of township establishments, rezoning, subdivision, consolidation, site development plans, building plans and so forth. This, in turn, severely impede on the economic growth and development of the CoJ (Tjia and Coetzee, 2013). Given that various departments utilised their own independent databases, customers such as the general public, developers and planning consultants were required to traverse various departments in order to obtain a complete set of property data. This made engaging with the CoJ inextricably frustrating and impacted negatively on the customer's experience.

Facing this backdrop of legal obligations and development pressures, the City inaugurated the "revolutionary" LIS, in early 2007 (CoJ, 2009a). According to city officials the implementation of the LIS has facilitated in: "greater billing accuracy, improved turnaround times for development applications, easy access to property information and faster resolution of queries – allowing for better service delivery and improved customer relations" (*ibid*).

1.3. Problem statement

A trip to any government department is often regarded as a nightmare, engaging with a bureaucratic system, standing in long queues, cramped spaces, strenuous paper work, resulting in a lot of frustration (Nkwe, 2012). Conversely, city officials find public engagement increasingly time consuming and costly (Fang, 2002). With ICT taking centre stage in the contemporary information age (Goodspeed, 2008), governments desire the potential benefits of e-Government initiatives (Pina et al, 2010).

The delivery of efficient service is vital for the survival of a modern democracy or government (Nkomo, 2010). Such a paradigm shift to service delivery and access to information has the potential to ameliorate a citizen's experience when engaging with local government. Glore (1993, cited in Fang, 2002: 436) goes further and explains that such initiatives "will allow citizens broader and timelier access to information and services through efficient, customer-responsive processes – thereby creating a fundamental revision in the relationship between federal government and everyone served by it".

Benjamin Franklin once proclaimed in 1748 that "time is money", and in this case, if the time spent processing an application is truncated from inception to finalisation, additional resources would be available for further development, yielding economic related spin-offs (Lewis, 2008: 144). However, Colin Green (cited in De Kock, 2011: 18) the Director of Rabi Property Group has argued that "the rezoning process is becoming increasingly complex and time consuming, which makes it difficult for developers to respond quickly to an upturn in the market". It is evident that local government, particularly the CoJ is under a tremendous amount of pressure to reform, and therefore, perform. This has been further exacerbated by the billing crisis[1] the CoJ has been attempting to rectify (CoJ, 2011a). Keith Brebnor (cited in Rees, 2011: 21) the CEO of the Johannesburg Chamber of Commerce and Industry, explains that the 'billing crisis' has worsened the plight of those seeking to rezone property. This unequivocal series of events has resulted in the local authority being taken to court due to 'unnecessary delays', in the processing of development applications and engaging with bureaucratic officials.

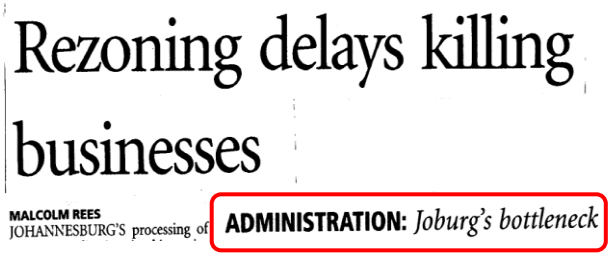
Delays are often at the cost of the developer, increasing their risk to incur a derelict monetary loss. This can further discourage development led investment in the land market, as the developer may choose to invest in another municipal jurisdiction based on previous experiences. If these challenges are not adequately addressed or rectified, it can inhibit the development of land thus impacting

[1] The billing crisis has plagued media headlines to present day, and has tainted many property owners experience with the CoJ. This stems from information discrepancies, technological setbacks and general mismanagement, which has caused the invoicing of erroneous bills, and the disconnection of basic services such as water and electricity.

negatively on the land markets (Lewis, 2006; 2008). Other obstacles that have been identified in this regard include the weakness in coordinating planning amongst departments, as well as the lack of cross-boundary planning with neighbouring municipalities. These issues have contributed towards the elusiveness of integration in planning and decision making process.

The Land Information System (LIS) has been in operation for 7 years and city officials advocate its successes. However, media articles have surfaced expressing concerns around problematic situations the public faces when it engages with the local authority. The table below is used to unpack some of media articles that express such concerns or difficulties the public has experienced whilst engaging with the CoJ. It should be noted that these articles were all published after the implementation of CoJ's LIS, which is from the year 2008, onwards. The newspaper articles used to develop this table are included in the annexure of the report.

Newspaper article	Summary of article
2008: *Business Day* **Joburg suffers setback in tussle with developers**	Within this article Krew (2008: 8) describes the hostile environment, and disputes that has surfaced between the CoJ and developers.
2010: Business Day **Court stops developers using fast-track zoning**	According to Krew (2010: 7) property developers were making use of a loop hole in the processing of development applications. In an attempt to fast-track applications, property developers would approach provincial government and utilise the Development Facilitation Act (which is no longer valid, due to the invalidly of numerous chapters in the Act) to alleviate the time consuming process when dealing with CoJ.
2011: *Star* **Millions of rands owed in zoning mix-up** ANNA COX THE CITY of Joburg, in Owners of upmarket properties pay agricultural rates	Cox (2011: 2) has described CoJ's administrative departments as being in a "bungle". The mismanagement of property information has resulted in the municipality losing millions of Rands due to incorrect rates being levied to residents in a upmarket equestrian estate due to zoning anomalies. Young (as cited in Cox, 2011: 2) the chairperson of the Vorna Valley Resident Association has expressed her concern regarding this monumental problem facing property owners. According to Young (ibid, 2011: 2) residents

	experience problems when trying to sell their homes. Some residents were forced to rezone their property whilst others were not required to do so.
2011: *Citizen*  Rezoning delays killing businesses MALCOLM REES JOHANNESBURG'S processing of **ADMINISTRATION:** *Joburg's bottleneck*	According to Rees (2011:21) Johannesburg's processing of rezoning applications is taking twice as long as it should, severely hampering the small business sector. In addition to this, CitiBusiness (citied in Rees, 2011) note that the process of rezoning land has become excessively slow and is getting progressively worse. Van Schoor and Limacher (*ibid*) believe that the lack of institutional capacity and experience within the municipality tasked with handling rezoning applications has worsened the plight of those seeking to rezone a property.
2011: *Business Day*  Rezoning process is hampering developers	Colin Green (cited in the De Kock, 2011:18) the director of Rabi Property Group has argued that "the rezoning process is becoming increasingly complex and time consuming, which makes it difficult for developers to respond quickly to an upturn in the market". In addition to this Green (*ibid*) stresses his concerns as he points out "a simple rezoning application which complies with all relevant municipal policies and all legislation typically takes in excess of three years, while the more complicated cases are likely to take five or more years".
2013: *The Herald*  **R30m system still not in use** Database supposed to help ease land issues	It should be noted that this is system is currently in operation in **Nelson Mandela Bay Municipality** and not the CoJ, however, this article vindicates the lack of capacity as the underlying cause of the systems failures. The lack of institutional capacity nullifies the overall purpose of the system, rendering it ineffective. De Kcock (2013:4) has noted that the "slow processing of applications has been singled out by organised

	business leaders as one of the major reasons it is difficult to invest in the city – delays have cost the municipality millions of Rands in potential investment".

1.4. Rationale

From literature reviewed, it can be deduced that the area of research this report will focus on has not received a sufficient amount of attention. This is because a limited amount of research has been carried out in this field in contemporary South Africa. In a study carried out by Baldwin et al (2011), they make a point that the impact of ICT-driven mechanisms on professionals, particularly public officials, is still comparatively understudied. In addition to this, Odendaal (2010) has noted that the impact of ICT mechanisms and web-based platforms within a South African context have not been adequately divulged in academic literature. Literature orientated around this topic generally emanates from "the global north and attains a northern bias" (*ibid:* 14). The countries within literature do not consider or address dynamic complexities such as informal land management systems that are largely prevalent within the South African landscape. The lack of context-relevant material and literature thus creates a challenge for systems to learn from. Barry and Roux (2012: 302) lament this debacle by explaining that "there is a dearth of critically developed theory which has been subjected to rigorous testing in LIS [Land Information Systems], but no lack of practical guidelines on what constitutes best practice".

In a South African context, Tjia & Coetzee (2012, 2013) are the only known academics to have carried out some form of analytical research on the LIS within the CoJ. Their work sheds light on key aspects of information sharing, suggesting "a need for a comprehensive data model for all property information to support data management" (Tjia and Coetzee, 2013: 260). They have also raised their concerns regarding the disjuncture between existing departments, each managing their own dataset of property related information (*ibid*). It is worth mentioning that van Helden (1993; 1994) and Plandata (1992 cited in van Helden, 1993) conducted some form of research on information systems within a South African context, however academic literature seems to subside hence this domain holds much potential to carry out further investigation.

Local governments across South Africa are in the process of implementing similar information systems to manage development incentives. The City of Cape Town for instance, unveiled an 'Integrated Spatial Information System' in mid-2012, and has recently launched the first phase of its 'Development Application Management System' in August, 2014 (CoCT, 2014). The City of Tshwane, has also announced that they are in the process of developing an electronic system for the

administration of land-use applications (CoT, *undated*). It is evident that ICT's within a government context have the potential to transform the manner in which planning is done as a whole, as this can be seen in new forms of data assimilation, forward planning mechanisms and participatory processes. However, Houghton et al (2013: 1) have pointed out that "little is known about how urban planners perceive ICT and its current and potential future role in the planning process". The widespread adoption in ICT-driven initiatives seen across the globe indicates the importance of conducting research on newly emerging information system within a South African context.

The research is not aimed at uncovering an appropriate land use management system for contemporary South Africa, but rather, seeks to provide an insightful and practical understanding how access to information can support land development activities and decision making. It examines land use planning and monitoring mechanisms within the context of information handling. According to Zhao (2010) a LIS is one of the most important components in the construction of e-Government. Such systems can standardise processes, ensure visibility and transparency at every step of the development process, which is urgently required by local government.

The researcher has practical experience in a land use management directorate. Working within a local authority in contemporary South Africa has exposed the researcher to the hidden functioning and thereby, shortcomings of land development. This municipality is similar to many others in South Africa did not have an operable LIS in place. The primary means of handling information within this particular local authority is paper based. Any department in government, dealing with this form of communication yields a large volume of physical information and labour. The immense amount of paper work makes it difficult to assimilate information into a single unified database and promote synergies amongst departments. In addition to this, work is carried out in silos increasing the compartmentalization of information between departments (Ndou, 2004). Literature surveyed suggests that this means of interaction is cumbersome and outdated (Dada, 2006; Hull and Whittal, 2013; Ndou, 2004; Nkomo, 2010, Nkwe, 2012). Dealing with this means of communication increases the risk of misplacing legal documents, which, in turn, has the potential to prolong the process of land development further (Hull and Whittal, 2013). In addition to this time consuming process, the planner is often called on to manage data administrator duties, such as filing, photocopying and compiling objection contact details for Development Tribunals. Such mundane tasks plague the planners' ability to perform, and

Figure 1.2: (above) Paper based means of conducting a development application, **Source**: Momberg, 2013

simultaneously undermines the professionalism and qualifications of the planner. Whilst collaborating with members of the public, developers and planning consultants the researcher shared their frustrations, whether it was accessing property related information or navigating the development application process. It is therefore essential for research to be conducted on how government can utilise ICT as an "enabler" to improve service delivery and responsiveness to citizens, thus generating greater trust in government (Farelo and Morris, 2006; Markoff, 2000; Ndou, 2004). This will enable land development to take place in a transparent, accountable and ultimately more efficient manner, which in turn should, hypothetically, entice and attract developers to invest in the CoJ land markets.

The CoJ's LIS has developed into a precedent and has set the platform for other municipalities throughout South Africa to follow suit. The transition towards an electronic database system is necessary and should be regarded as inevitable in the 21st century. Various spheres of government (including national and provincial) cannot afford to be left behind, playing catch-up with such systems and technological advancements available. It should be noted that the CoJ's LIS has had 7 years to mature, evolve and adapt. It is therefore important to analyse how much has changed since then, and develop an understanding of whether or not the LIS has fulfilled the statements city officials have made.

1.5. Aim of the research

The overall purpose of this study is to uncover and dissect how the use of ICT has influenced land development in the CoJ. It also addresses how this unified database is being utilised. In so doing, this research seeks to reveal whether the implementation of the LIS has facilitated efficient decision making as the LIS permeates into numerous departments, agencies and parastatals. It is important to note the legislation and policy that frames the operability of such a system. This research will thus explore relevant documents that enable, aid and facilitate such mechanisms guiding its limitations and parameters. This includes existing policy guiding electronic communications, information technology and land use management. The LIS ultimately operates within a complex labyrinth of policies, legislation and strategies that determine its feasibility.

In this research the term 'e-Government' is viewed as the overarching concept. The implementation of a LIS fits under this concept with various other forms of ICT driven mechanisms, epochs and initiatives. This forms part of the theoretical framework as the researcher deems it necessary to identify the outcomes of the use of ICT in land development. Throughout literature, there are countless arguments around e-Governance initiatives transforming and improving government management processes and outcomes (this will be elaborated on in chapter 2). However, as

mentioned above, it is a field that is yet to undergo rigorous investigation within a South African context. The usage of information technology tools for collaboration and the enhancement of land development in a local sphere of government is in need of a significant amount of attention.

The benefits and challenges of ICT's operating within government have been discussed throughout the literature surveyed. The research seeks to divulge whether or not such challenges apply within a South African context, more specifically the CoJ. Therefore, this research seeks to shed light on the potential ramifications of such an information system on land development, taking into account the challenges the CoJ faces.

It is evident that the CoJ has invested a significant amount of capital, effort and expertise into developing this integrated information system. Consequently, questions arise, seeking to answer whether the system is performing to its said standards, and note what it has achieved. In addition to this, the research seeks to probe the future potentials of the system and develop a discussion based on how the information within the database can be further utilised.

The research sought to gain insight from the city officials who utilise the information system and their opinion of it. This will provide a clear understanding of the operability of this tool, its achievements and future potential. In addition to this, the research wishes to extract information from planning consultants. These external agents have been engaging with the CoJ prior to, and subsequent to the implementation of the LIS. Their ongoing engagement with the CoJ will allow the qualitative research to attain an 'external' perspective and will provide an additional narrative component to the research findings. The final aim of this research report is to reflect on literature and propose a set of recommendations related to the use of information systems for land administration and development.

1.6. Research question and sub-questions

This research report is concerned with access to land information and how this has influenced the decision making process in both public and private sectors. The research will magnify the scope of the information system adopted in the CoJ – in terms of why it was adopted, how it functions, the benefits and challenges faced by city officials with this means of synthesising copious amounts of information and raw data. The research is also concerned with the dynamics and potential outcomes of the information assimilated into this dataset. Therefore, the primary research question posed is:

How has the implementation of an integrated Land Information System enhanced Land Development in the City of Johannesburg?

The research question seeks to uncover and describe the implementation of an LIS within local government – as encapsulated by the "how" of the question. In so doing, the research will explore the rationale behind its adoption and investigate "why" the development of the LIS was necessary. The sub-questions that will be posed will delve into the "how" and "why". The research does not seek to improve or chastise the LIS or the existing land use management system, but it is rather concerned with how this unified database has facilitated in the integration of information amongst departments and how it has "enhanced" the decision making process in land development. Within this context, the term "enhanced" alludes to the improvement (in terms of cost, time and quality of decisions), intensification and extent of development.

The sub-questions presented below are interwoven and in some instances, may overlap. However, they all seek to aid in answering the main research question. Before the main research question is addressed, it is important to recognise the presence of ICT's in both the private and public sphere. The progressive diffusion of ICT in daily life cannot be denied; and as a result, this needs to be briefly addressed.

a) *Why has the appropriation of ICT-driven mechanisms permeated into land information management reform?*

The following sub-question will be interrogated through the use of existing literature and academic research regarding this topic. Once the background has been covered, it will then be possible to investigate the main research question through the aid of the following sub-questions (b – h).

b) *Why is it necessary for local government to develop such a sophisticated LIS?*

Having an overall understanding of how ICT's have been adopted in the internal workflow processes of local development, more specifically the CoJ, it is possible to understand the LIS's adoption.

c) *How does a LIS align itself within e-Government and Land Management Policy?*

The operability of the system is dependent on existing legislation, policy and city strategies. This forms the backbone of the LIS as it guides and frames the context within which it operates. It is the legal foundation that validate and legislates its feasibility. This will be done through policy analysis and key respondent interviews with city officials.

d) *What was the rationale behind the CoJ adopting the LIS? Were there any strategies advocating its adoption in local government?*

This question aligns closely with the previous question, as it unpacks the various influences and motives behind its adoption, and notes whether or not it aligned to what the city was advocating at the time of its adoption.

e) *How reliable is the information? How often does the LIS database get updated?*

This needs to be addressed as it determines how relevant the system is. It will address critical aspects such as how information is collected, updated, processed and distributed amongst departments and citizens.

f) *In terms of accessibility, how transparent is this information? Is it easily accessible?*

The processes enacted by the CoJ need to be open and transparent to all its stakeholders (such as government, property owners, developers and planning consultants). This question addresses how the city has made this information available to the aforementioned stakeholders. Moreover, it also uncovers how the city seeks to make such services available to sections of society without the convenient access to such systems.

g) *What are the challenges and obstacles facing the general operations of the LIS?*

It is inevitable for any ICT driven mechanism to experience setbacks and malfunctions. These challenges need to be raised and addressed accordingly, and will be in this question.

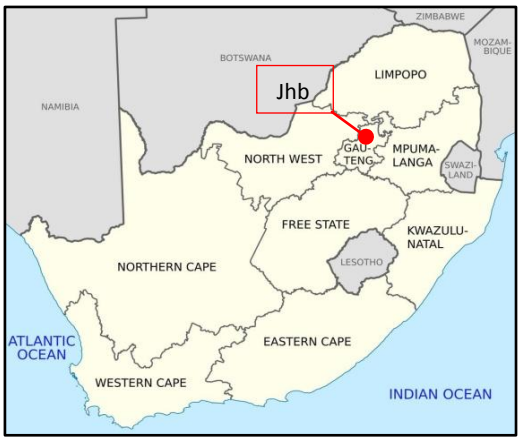
h) *In what ways can the use of a LIS be improved and what are the future potentials?*

In moving forward, it is important that the city recognises and acknowledges the challenges facing the LIS. The recommendations will be formulated from the findings and debates around the challenges and future potential of the LIS. In doing so, it will uncover how it can further support forward planning and growth management mechanisms for the city.

The sub-questions are a means through which the main research question will be answered. It is hoped that this research will shed light on how integrated information systems have benefited the decision making processes and enhanced land development in the CoJ.

1.7. Context

The research is based on an information system that connects the City's Property Value Chain (PVC), Property Information, and Billing System in the CoJ. The system is aimed at assisting property owners, developers and planning consultants in service delivery through spatial information integration with the Corporate Geo-informatics Directorate (CGIS) and standardised the process of development applications where possible, ensuring accountability and transparency at every step of the process. The information recorded on this system is related to land within the jurisdiction of the CoJ. The geographical location of Johannesburg in relation to Southern Africa is illustrated alongside in Map 1.1.



Map 1.1: (above) Geographical location of Johannesburg (Jhb), Gauteng in relation to Southern Africa. **Source**: (http://upload.wikimedia.org)

Map 1.2: (above) Municipal boundary of the CoJ, divided into seven regions, **Source**: (IDP, 2012: 13)

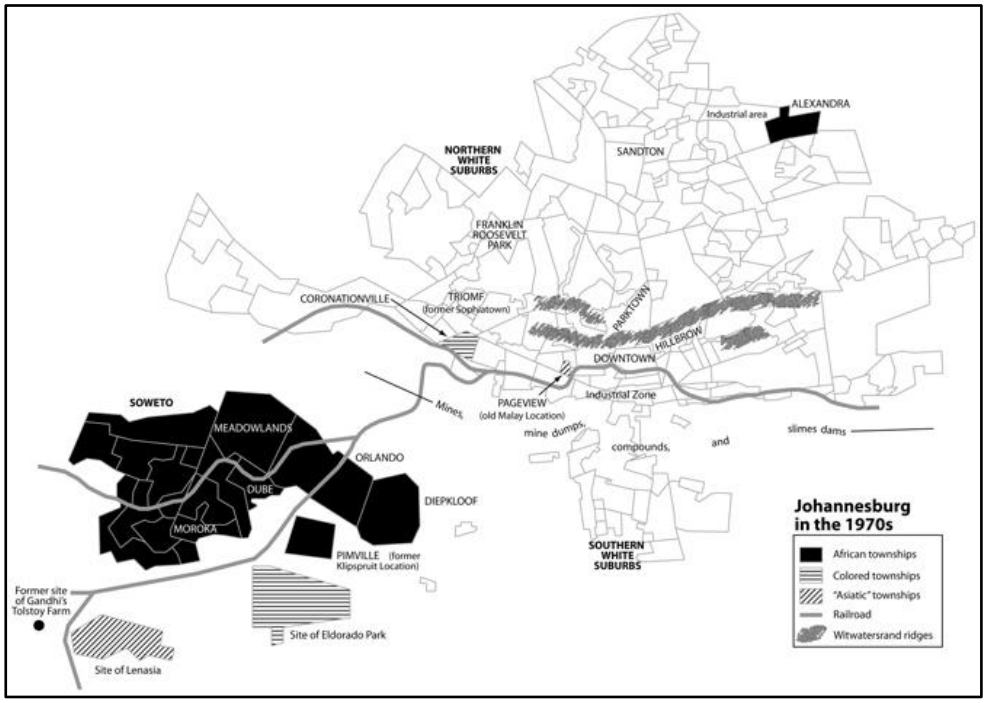
Despite the city having the highest Human Development Index (0.75) in the country, it is still faced with global challenges (Gotz and Kibirige, 2014). These challenges comprise of rapid urbanisation and inward migration (Todes, 2012a); an unemployment rate of 25 per cent, a fragmented economic landscape, an inundated backlog of basic service delivery and infrastructure investment, whilst simultaneously attempting to create conducive economic growth, providing adequate shelter and creating sustainable human settlements, to name a few (CoJ, 2011a).

The CoJ is one of three metropolitan municipalities within the context of the Gauteng City Region (GCR) and is responsible for the largest city in South Africa, Johannesburg (CoJ, *undated*). It serves as the economic and financial epicentre contributing towards 17 per cent of the country's gross domestic product (*Ibid*). Since 2001, the city's population has grown at a rate of 3,18 per cent and approximately 4.4 million reside within an area of 1645km^2 (StatsSA, 2011). The rapid rate of

urbanisation pose significant challenges to effective management by the CoJ. The municipal boundary of the CoJ is illustrated in Map 1.2 (as seen on the previous page).

1.7.1. Skewed development disparities and inequality

Cities in South Africa have developed in a unique manner and attain an inimitable heritage. South Africa is still classified as a developing country, wherein access to resources and opportunities are not distributed evenly amongst its citizens. The CoJ resembles a skewed development pattern based on racial and economic disparities. Under policies of segregation and later Apartheid (from 1948 to 1994), the CoJ along with many other cities in South Africa became divided and fragment along racial lines (Todes, 2012b). The *Group Areas Act,* 1950 which was enacted by the Apartheid State was at the helm of this (Mammon, 2008). Planners during this era sought legitimacy and recognition from the State. As a result, planners were indoctrinated with modernist planning ideologies and principles, advocating stringent land use patterns and development controls. Such planning mechanisms and systems sought to segregate different ethnics groups as seen in Map 1.3.



Map 1.3: (*above*) Model of an Apartheid City: Johannesburg spatial configuration in the 1970s, under policies that advocated racial segregation, **Source**: (Nightingale, 2012)

According to Smith (2003) the majority of the population at the time were severely oppressed and marginalised from economic and social opportunities. The proliferation of racial divisions, stifled economic growth in African townships as African land ownership was prohibited. This resulted in poor revenue generation and service provisions in African townships, which in turn discouraged major development and investor's confidence (*ibid*).

The demise of the Apartheid era ushered in a democratic government led by the ruling party, the African National Congress (ANC). This transition laid the foundation for new beginnings in the transformation process and the dismantling of its legal framework (Ahmad, 2010). New policies and legislation were enacted to support government-led initiatives and land management policies, such as the *Development Facilitation Act* of 1995 (which has since been repealed), the *Land Use Bill* of 2002, the *Municipal Structures Act* of 1998, the *Municipal Systems Act* of 2000, numerous shades of Green and White Papers of *Development and Spatial Planning* of 2000, and recently the *Spatial Planning and Land Use Management Act* of 2013. Such policies share the same objective, to create an environment that dispels and rectifies any form of Apartheid Planning ideals, restructuring cities by advocating integration, and equal economic and social opportunities (Ovens et al, 2007, cited in Rubin, 2007: 2). Oranje (1995: 22) states that the realignment in legislation bares testament to the severity of the criticism that emerged out of the new government.

K'Akumu and Oyugi (2007: 94) have raised concerns regarding such skewed development, alluding to the fact that African cities are "rooted in their historical, social, economic and physical development process intertwined with ineffective development policies". Watson and Agbola (2012: 2) in relation to this notes, "urban planners in Africa are confronted by a daunting task". This long standing history of racial oppression has undoubtedly been difficult for the country to rectify and address. Odendaal (2006) laments this debacle noting that South African cities are still tainted by inequality and division, with visible remnants of the Apartheid legacy. The National Development Plan (NDP) 2030, recognises that there is no quick fix for transforming the functionability of human settlements and the workings of the space economy in South African cities. With this in mind, it is imperative that an understanding of the development context within which the CoJ operates is clear, as this is the realm in which planning takes place.

The CoJ has undergone rapid spatial change since the demise of the Apartheid era. The historic monocentricity of the city as outlined by Bertaud (2001), has transmogrified into a form that is increasing polycentric (Ahmad, 2010). Todes (2012a) points out that the city experienced a rapid decentralisation of development since the 1970s. The expansion of new economic nodes and agglomerations of firms proliferated towards the north of the city, in areas such as Rosebank, Sandton and Midrand (*ibid*). This form of spatial growth and development has undeniably reinforced the skewed development pattern of the city.

In an attempt to address the aforementioned challenges, the CoJ under the guidance of the NDP and *Gauteng Vision 2055* has embarked on various development initiatives to readdress imbalances from the past. The CoJ has aligned development initiatives and decision making based on: an Integrated

Development Plan (IDP), Growth and Development Strategy (GDS), Growth and Management Strategy (GMS) and various sectoral and local plans. The Spatial Development Framework (SDF) provides the desired spatial growth and vision for the CoJ (SDF, 2010). These are tools for guiding public and private development in the CoJ. In addition to this, they assist in directing investment and managing the growth of the City. The City is constantly adapting and growing, and thus, it is seldom static. It is for this reason that cities are often referred to as "growth machine[s]" (Logan and Molotch, 1987, cited in Berke et al, 2006). Both development and alterations of land uses expand and contract in response to an array of forces such as: population and economic growth, public and private sector decisions, and land markets or government influence (Berke et al, 2006).

The status of over 800 000 registered parcels of land in the CoJ is constantly changing as a result of development and the transfer of land (Erasmus, 2014). Additionally, 62 per cent of these properties are classified as formal households whilst 28 per cent are classified as informal, which poses a further challenge (CoJ, 2013). The growth of the City, in terms of land information and the administration thereof needs to be captured and monitored for decision making processes. Land is one of our most valuable resources the administration of this good requires an optimised approach (Steudler and Williamson, 2002). The progressive adoption of a LIS in local government seeks to accelerate this process, making information readily available to the public, regardless of their economic and social status, thus, enhancing and guiding development within the jurisdiction of CoJ.

1.8. Structure of the report

The aforementioned chapter sets the parameters for the study. The report comprises of six chapters, commencing with an introduction of the study.

In chapter one, a brief background is provided of the research topic, its relevance to the planning profession and preliminary issues on land development and information systems. The research problem, aim of the research, rationale and context for conducting this study frames the realities into a workable research topic.

Chapter two provides a literature review on e-Government and Innovation in Local Government, more specifically within the context of the CoJ. It unpacks the multi-laden term of e-Government and pieces together the legislation and policy surrounding its adoption in South Africa.

Chapter three provides a literature review on Land Information Systems in land administration, management, development and decision making. Drawing from the themes and concepts that emerged out of the literature review, a conceptual / theoretical framework is constructed.

Chapter four crystallises the research methods utilised to obtain the necessary information and data for the research. Within this chapter, the case study research method is outlined as an integral facet for the purposes of this report.

Chapter five develops a synopsis of the results collected from the research methods. The findings are then scrutinised and discussed in relation to the conceptual / theoretical framework presented in chapter three.

Chapter six culminates the research and provides the reader with some overall thoughts and insight on the study as a whole. Drawing from the findings and results of the research, the researcher postulates recommendations that could guide further development of the LIS. It also outlines the limitations of the research and proposes areas of future research.

Finally, a glossary is provided in which technical or linguistically complex terms are defined, as these terms may not be clearly understood in the text of the report. An annexure is also provided subsequent to the glossary, which includes an explanation of information systems, screen shots of the of the Deeds Office and Surveyors-General web portals, and the interview questions utilised as guides in the qualitative interviews conducted.

1.9. Conclusion

This chapter has provided the reader with an introduction to the study. It has provided a brief summation of the research report, presenting the problem statement, rationale and aim of the research. The focus area and context within which this research will be carried out has also been outlined. This framed the point of departure and contextualised the purpose of the study. The research seeks to answer all the research questions proposed, and concludes with recommendations addressing areas of concern. The following chapters will lay the foundations for the report by delving into literature and unpacking nebulous concepts by placing them into a contemporary South African context.

Chapter 2

Literature Review

The Diffusion of Information Communication Technology in Local Government

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2.1. Introduction

The purpose of this chapter is three-fold. The first section acquaints the reader with the transcending leitmotifs of ICT's in both the public and private sectors. At the heart of this state of affairs aptly dubbed the 'Information Age', is the relentless pace and nature of advances in ICT's. The second section focuses on the overarching concept of 'e-Government' and the events that have led to its adoption. This concept frames the implementation of any technologically driven mechanism in government, such as a LIS. It thematically examines the existing body of literature on e-Government, the importance and ramification thereof. A brief summation of e-Governments globally acts to places South Africa into context. The purpose of this literature review is to work towards a theoretical framework that will be utilised to scrutinise the findings in subsequent chapters. The third section of the chapter will unpack the presence of e-Government within South Africa, examining the relevant policy and legislation framing its implementation. It will then address e-Government within a local context, and specifically show how the CoJ has spearheaded this development paradigm through policies such as the Growth and Development Strategy (GDS), and Growth and Management Strategy (GMS). It should be noted that the aforementioned concepts are inextricably interwoven and will be of great importance to the research.

2.2. Information and communication technology in public and private sector reform

The 21st century has brought with it a plethora of paradigm shifts and institutional re-alignments. Information and Communication Technologies (ICT) can be classified as one such impetus to this change (Corey and Wilson, 2011). Heeks (1999: 3) defines ICT as an "electronic means of capturing, storing and communicating information". This change is transforming the manner in which government agencies engage with citizens, businesses and external government entities (Asgarhkani, 2005: 157; Fang, 2002; Ho, 2002; Makoza, 2013; Ndou, 2004). Budthimedhere et al (2002: 228) writes that "since the mid-1990s, increasing number of people are using the internet, and this is transforming the way the world works". The ubiquitous use of ICT allows one to "reconsider the way we conceive, use, develop and control physical space in cities" (Firmino et al, 2008, cited in Huang, 2012: 2). This is reiterated by Karlenzig (2012: 1) as he notes "ICT's present innovative ways of managing our cities".

The presence of ICT's in improving information management is not a new concept. Private sectors have embraced this mechanism in management for many years. As a whole, public sectors have fallen behind the private sector and now that we are in the "Information Age" it is time to expedite these technological advancements (Asgarhkani, 2005: 158). The World Bank (2014: 1) has noted that

a 10 per cent increase in high-speed internet is associated on average with a 1.4 per cent increase in Gross Domestic Product (GDP) in developing countries.

Halchin (2004) and Heeks (2003) provide evidence that governments all over the globe are embracing e-Government driven initiatives. They note that such development can be seen across the globe, from developed to developing countries. National to local spheres of government have earmarked the importance of ICT and are placing crucial information online, automating previously cumbersome processes and engaging electronically with citizens (Ndou, 2004). West (2002: 6) points out that, "fully executable, online services delivery benefits both government and its constituents. In the long run such services have the potential to lower the costs of service delivery and make services more widely accessible to the general public, because they no longer have to visit, write, or call an agency in order to execute a specific service". As more services are made available through online platforms, e-Government possesses the ability to revolutionise and enhance the relationship between government and citizens (West, 2002).

It is clear that ICT's are mutually dependent on the development status of a country. The implementation of e-Government initiatives is one of the possible strategies developing countries have to overcome. Von Haldenwang (2004: 417) believes that the use of technologies will enable developing countries a chance to "leapfrog" towards its developed counterparts. Farelo and Morris (2006) reiterate this point, as they note that the use of ICT's in the developing world poses the potential for reform, transformation and leveraging developing world economies up to developed economies. Government play a pinnacle role in supporting and enabling this transformation to take place (*ibid*). Heeks (2001: 3) provides a statement that synthesises these thoughts as he notes, "as is true all over the world, government in the developing nations cost too much, delivers too little, and is not sufficiently responsive or accountable. Good governance reforms aim to address these short comings. Yet progress - after many years of effort in implementing such reforms - has been much more limited than expected. e-Government offers a new way forward, helping improve government processes, connect citizens and build interactions with civil society".

de Guchteneire and Mlikota (2008); and Gaventa (2002) are in support of Heeks (2001) aforementioned argument. These academics note that over the last two decades there has been an increase in citizen dissatisfaction with governments' ability to perform. This has been illustrated in the number of media articles that inundate local newspapers and developer tabloids. This has resulted in a widening gap in the relationship between citizens and government institutions (de Guchteneire and Mlikota, 2008). The Quality of Life Survey recently conducted by the Gauteng City-Region Observatory (GCRO) revealed that 37 per cent of the participants [surveyed] expressed a

form of trust and faith in the CoJ, whilst 53 per cent expressed a form of dissatisfaction with the CoJ's performance (GCRO, 2013). This figure has significantly increased since the 2009 survey that yielded a 34 per cent dissatisfaction result (*ibid*). Additionally, in a study conducted by Gaventa (2002), it was concluded that governments worldwide are faced with some form of governance crisis. The GCRO's executive director, Professor David Everatt (2014, cited in GCRO, 2014) places this into perspective, as he states, "people just don't want efficient government, they want clean and transparent government that is approachable". This accentuates the need to ameliorate the connection with government, planners and citizens. In the opinion of Conroy and Evans-Cowley (2006), the use of ICT's possesses the possibility to improve communication and engagement between citizens, government and planners.

This research is deeply embedded within an ICT driven mechanism in local government, and more specifically deals with the idea of implementing a LIS. It also discusses how this information is made available to citizens. The LIS is anchored on the centrality of the application of an ICT-driven process. The adoption of ICT's within government is regarded as e-Government. Therefore the next section will elucidate the term e-Government through the use of academic literature. It will provide a theoretical study of the concepts of e-Government as outlined and explained from various experts in this field of study.

2.3. Deciphering the multi laden term, e-Government

"e-Government is transforming the way government interacts with the governed. The process is neither quick nor simple. It requires a coherent strategy, beginning with an examination of the nation's political will, resources, regulatory environment, and ability of the population to make use of planned technologies" (World Bank, 2012: 12).

According to Bernhard (2013: 19) placing an "e" as a prefix in front of "the concepts, government and governance refers to governing through the aid of electronic tools". Löfstedt (2005: 40) notes, "e-Government remains a knowledge field in its exploratory stages and is consequently difficult to accurately define. Furthermore, it encompasses such a broad spectrum that it is difficult to find one expression that specifies what e-Government really represents". Although the term e-Government is relatively new in academic literature, it has attracted a significant amount of attention. Many studies have defined and approached the multilane concept of e-Government in different ways (Heeks, 2003). However over the years, academics, scholars and international agencies have given acceptable and similar definitions of the term.

The term e-Government can be defined as the delivery of government information and services through ICT driven initiatives such as the internet or any other digital means (Coleman, 2006; Cresswell et al, 2003; Heeks, 2001; 2003). From the literature surveyed, the implementation of such ICT driven strategies seeks to 'enhance, improve, mechanise and ameliorate' a customer's experience when interacting with any government agency, resulting in less corruption by providing transparent workflows, efficient management, revenue growth and cost reductions (Fang, 2002; Ho, 2002; Heeks, 2003; The World Bank, 2011).

Given the aforementioned definitions, "it is clear that e-Government is not merely the computerisation of government systems, but a belief in the ability of technology to achieve high levels of improvement in various arenas of government, thus transforming the nature of politics and the relations between government and citizens" (Dada, 2006: 1). This poses a significant challenge to its adoption within local government and will be discussed in detail, later in the chapter.

2.3.1. Relationships within e-Government

The sharing of information through electronic platforms can be distinguished by varying types of relationships. According to Yildiz, 2007, cited in Makoza, 2013: 269) e-Government can be classified into four relationships, "based on the users of the electronic services". Ndou (2004: 5) categorises the e-Government web of relationship in respect of four main pillars that are as follows:

1. Government to Citizens (G2C) focus on making information available to the public via means of websites and other electronic mediums (Fang, 2002). Online platforms such as e-commerce, e-services and e-planning portals enhance the ease of access to information and allows the customer on-going interaction with government.
2. Government to Business (G2B) is intended to facilitate business interaction with government institutions. It is believed that this area has tremendous potential to facilitate economic development (*ibid*).
3. Government to Government (G2G) notably improves the interaction amongst national, provincial and local authorities (*ibid*). The sharing of information and collaboration between systems such as shared online databases, Web GIS and Intranets act as facilitators in this process (Goldfinch et al, 2011; Masser and Johnson, 2006).
4. Government to Employees (G2E) facilitates in the administration of civil services through the means of ICT's, undergoing internal workflow reform and thus migrating to a paperless system (Fang, 2002).

Although there are numerous variations of e-Government relationships and collaborations outlined in literature, these four main pillars categorised by Ndou (2004) are seen as relevant to the research.

The implementation of e-Government is an ongoing and progressive activity, which requires time to mature and adapt. The following section will unpack the development continuum of e-Government in relation to maturity models.

2.3.2. e-Government maturity models

As with any technological realignment, e-Government requires an organisation to undergo various stages of growth (Makoza, 2013). According to Gottschalk and Solli-Sarther (2009) the implementation of e-Government entails a series of activities and structures often referred to as stages or phases. These stages represent the development progress in terms of change in the use of ICT's and transformations of organised operations (Layne and Lee, 2001). These stages are analysed from various perspectives in literature (Cloete, 2012; Layne and Lee, 2001), however the models all describe "a transition from traditional paper-based services to fully digital services, ranging from elementary information provision through digitally enhanced and supported offerings to full inclusion of a public service" (Cloete, 2012: 129). In the opinion of Ngulube (2007, cited in Makoza, 2013: 273) these stage models "may appear to be mechanistic in approach, but they provide a useful tool to evaluate the development of e-Government in a given context".

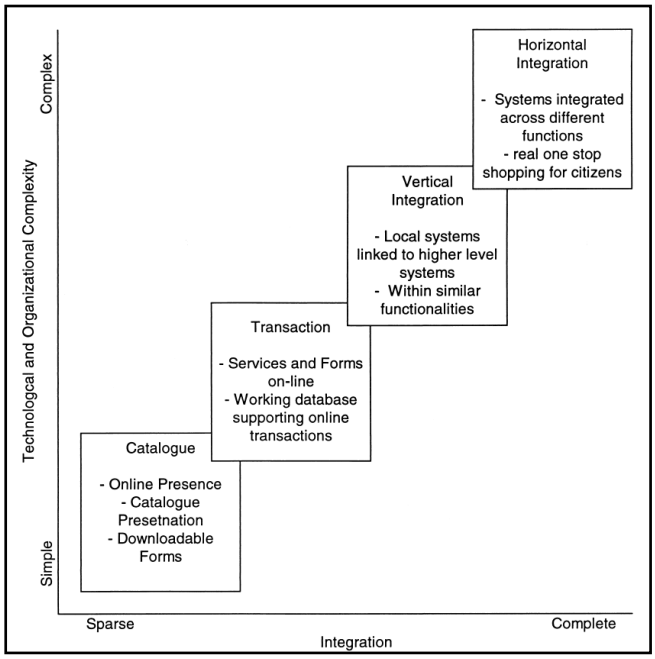


Figure 2.1: (above) Layne and Lee's interpretation of e-Government Development. **Source**: Layne and Lee (2001: 124)

In Layne and Lee's (2001: 123) research, they propose a four stage model to e-Government development, namely: "Cataloguing, Transactional, Integration and Horizontal integration". The stages presented by them are sequential in nature, beginning with a simple and limited facility, which then develops into a complex, integrated and complete system.

Web presence, which allows the customer access to public information, is the first stage of Layne and Lee's (2001) model. Websites provide the means to accessing information and allowing members of the public to interact with government (Parajuli, 2007). In the second stage, online transactions (e.g. EFTs) are made available to the customer. This reduces the customers time spent waiting in queues or travelling to government institutions to make payments. The third stage is the seamless integration between various spheres of government, from national,

provincial to municipal level. The fourth and final stage is the horizontal integration with other agencies and parastatals (Layne and Lee, 2001).

The various models presented in literature, illustrate that there is a need to evaluate government presence on the internet and the degree of mechanisation of ICT initiatives. The widespread recognition of e-Government by countries across the globe exemplifies the need to delineate the pros and cons of such a paradigm shift. The following section unpacks the contemporary challenges and obstacles countries generally encounter when implementing e-Government incentives.

2.3.3. Challenges facing the implementation of e-Government

Throughout literature the notion of failure in e-Government initiatives resonates in studies conducted by academics and scholars alike (Ciborra, 2005; Baldwin et al 2011; Heeks, 2002, 2003). For the purpose of this research, "failure is constituted as the inability of a system to achieve a predefined set of goals or previously unanticipated outcomes" (Dada, 2006: 2). A literature survey conducted by Avgerou and Walsham (2000 cited in Dada, 2006: 2) in this field of research states that, "successful example of computerisation can be found – but frustrating stories of systems which have failed are more frequent". This has been highlighted throughout literature, as adopting ICT's within public sector reform is a multi-laden process that requires a multitude of attributes supporting it, such as a strong legal framework and long term commitment (Basu, 2004). Trapscott (1996) goes further to suggest that, "it [e-Government] requires a radical rethink of the nature and functioning of the organisation and relationships between organisations".

Allen et al (2001) are in agreement with Trapscott's statement (1996) as they affirm that the problem facing e-Government goes beyond a technological realignment. e-Government calls for organisational and institutional structuring and additional skills development, new form of leadership and a transformation of public / private collaboration (Allen et al, 2001). This is vital, as investments in technology need to take place in conjunction with skills development. Hanna (2009, cited in McLaren and Stanley, 2012) deems the implementation of ICT's as "disruptive technologies" that calls for the realignment of bureaucracies, redistribution of power, and amendment of information confidentially. Jaeger and Thompson (2003) assert that, "an e-Government system would fail if government did not take a proactive role in educating citizens about the value and benefits of e-Government". This illustrates that the implementation of e-Government is co-constitutive of the actors and agents involved in the process.

In a study complied by Heeks (2003) who has conducted a considerable amount of research regarding the success and failure of e-government initiatives, it was establish that "more than one-third were total failures; furthermore half were considered as partial failures; whilst only one

seventh of the initiatives were successful". This does not go without noting that the failures outweigh the success. The results shed light on the complexity of implementation and the continuous maintenance of such technological intervention. The disturbing ratios provided in Heeks' (2001; 2003; 2006) studies, accentuate the need for best practice and supporting mechanism such as initiatives provided by the World Bank. Developing countries have access to a limited amount of financial resources, and cannot afford to prodigally spend copious amounts of funds typical of the abovementioned projects (Dada, 2006).

Nevertheless, developing countries have widely accepted and acknowledged the importance of integrating ICT mechanisms into government operations. Ndou (2004: 5) believes that the presence of ICT increases the possibility for economic development, as it plays a vital role in rapid economic development, productivity, and enhances a country's competitiveness on the global arena.

2.3.4. Innovation through e-Government

Local government generally exercise a direct or immediate relationship with the citizens they serve. Therefore, the means by which governmental organisations innovate and change their modus of operandi has a direct impact on the citizens they govern. The adoption of e-Government in local government can be seen as an innovative protocol in public sector reform (Howard, 2012). However, Rogers (1998) is of the opinion that innovation in a organisation, such as government does not have to invent the product or process. Rather innovation is quite simply the way in which new ideas, products and processes are adopted into a particular organisation. Innovation is referred to as "the introduction or implementation of a new product, service or policy" (Rogers, 1995: 11; van de Ven, 1980: 712 cited in Fimm, 2011: 3), thus it is concerned about change.

Advocates of innovation call for individuals in prominent positions to conceptualise, initiate or commence the innovation process in the organisational structure (Fimm, 2011; Howard, 2012). Amabile (1988, cited in Fimm, 2011) proposes a conceptual hierarchy for organisational innovation. Within this hierarchy, Amabile (*Ibid*) cites three quintessential components that facilitate in successful innovation within an organisation structure. These are namely, resources (both human and financial [capital] resources), techniques (skill base of employees initiating any innovative process, and the management thereof), and lastly motivation (individuals high up in the organisational structure need to empower, motivate and inspire individuals to act and work towards achieving the organisational objectives or goal). The linchpin in the notion of motivation is the presence of effective leadership in any organisational structure.

An organisation has to be adaptive and flexible to the changes around them if they are to facilitate the successful implementation of innovative. As an organisation comprises of various divisions and

levels, innovation spans across a multitude of actors within the organisational structure. This may pose an inherent challenge in any organisation. As Fimm (2011: 13) notes "the political reality of life in many divisionalised organisations is a major impediment to organisational flexibility", which consequently inhibits the possibilities of innovation in a rigid organisation such as local government. The more rigid or centralised any decision making process is in the organisation, can impede the possibilities of innovation (Fimm, 2011).

Howard (2012) has argued that the contextual situation or pressures of society greatly influence the decision to initiate innovation. Put differently, the presences of new ICT driven mechanisms can transform the workflow process in information management, coupled with the increasing amount of pressure and legal obligation to perform. These factors may have a tremendous impetus on the decision to embark on innovative processes in local government. Thus, the implementation of ICT's to streamline workflow processes, and assimilate data into a single dataset, referred to as e-Government can be classified as an innovative ideal (Fimm, 2011; Howard, 2012). Some benefits of the e-Government that have emerged out of literature are as follows:

1. Cost reduction, mitigation and efficiency gains (Tapscott, 1996).

2. [Increase in] quality of service delivery to businesses and customers (Asgarhkani, 2005; Kumar et al, 2007).

3. Improving information integration and data management (Dada, 2004).

4. Transparency, anticorruption and accountability (Allen et al, 2001).

5. Increase [in] the capacity of government (*ibid*).

6. Network and community creation (Kumar et al, 2007).

7. Improve[ment] in the quality of decision making (Nkwe, 2012: 41).

ICT's driven mechanisms offer governments the opportunities to enhance their overall performance in terms of transparency, efficiency and accountability. "The mainstreaming of ICT's within planning and design of development strategies helps to strengthen the establishment of efficient and transparent governance systems" (de Guchteneire and Mlikota, 2008: 2). If local government can become more proficient in their handling of development applications and approval rates quota; there will be an exponential increase in the CoJ's revenue generation, around service delivery, and it would provide a platform for monitoring and evaluating land development initiatives (McLaren and Stanley, 2012).

The pervasive diffusion of e-Government has transformed so rapidly that international organisations and institutions such as the United Nations and the European Union are auditing, evaluating and conducting research on the status and development of e-Government across the globe on a annual basis. The following section will place South African e-Government in perspective of a global context.

2.4. The development of e-Government globally

Governments across the globe have recognised the importance ICT's to improve accountability, efficiency, effectiveness and convenience of the public sector (Asgarhkani, 2005; Fang, 2002; Finger, 2005; Ho, 2002). The successful implementation of "an online service has rapidly become an important measure of effective public sector management" (Kaliannan et al, 2007: 2). Due to its increasing importance, international agencies such as the United Nations conduct annual surveys amongst various countries, as to determine their e-Government development. The e-Government Survey 2012 determines the e-Readiness status of governments to establish and apply e-Government initiatives successfully. The survey evaluates countries on the application of ICT by governments in countries across the globe, in both developed and developing regions (UNPAN, 2012). According to the results of the UN survey, South Africa is third to the Seychelles and Mauritius in terms of e-Government standings in the Africa continent. However, Nkomo (2010: 6) believes these figures "should not lull South Africans into believing they are doing well". The survey further notes that, "South Africa lost in comparative performance when compared to its counterparts" (UNPAN, 2012: 15). South Africa as a whole dropped four positions from the year 2010 to 2012, and is presently ranked 101 out of the 190 countries surveyed (*ibid*).

It cannot be denied that as a perquisite for e-Government application, South Africa has a reasonable network infrastructure when compared to other African counterparts (Nkomo, 2010). However, there are many unprecedented challenges and barriers holding back the successes of this paradigm shift. Mtimunye (2009, cited in Nkomo, 2010: 6) provides an insightful point noting that "e-Government in South Africa still finds itself perched between performance and promise, as we still have to experience its full potential in the country". This suggests that there is still much room for improvement within e-Government in South Africa. It has the ability to develop into a precedent to the rest of the world, in e-Government transformation.

The World Bank has additionally implemented an e-Government development initiative in response to the needs of its respective countries that are in the process of appropriating transformational principles enshrined in e-Government. This initiative termed, *The World Bank Group's ICT sector strategy* was inaugurated in 2012, and stems from the recognition that ICT's changes have occurred with a decisive impact on service delivery, innovation, productivity gains and improved

competitiveness (World Bank, 2013). This forms part of a conceptual and technical framework for public sector reform. The World Bank seeks to deploy this programme as a support mechanism "across the operational portfolio of the agency through technical assistance, leading and imparting of best practice knowledge" (*ibid*: 1).

2.5. e-Government in South Africa

With South Africa having entered its 20th year of democracy, it has developed into a prosperous country. Since 1994, government has enacted laws and policies to ensure an open and transparent society. The Republic of South Africa (1996: 15) has sought a electronic approach to government which enables ordinary citizens of the country to share information in the principles of an open and free society, as enshrined in the Constitution (1996).

Citizens engage with government at a local level, and it would seem that the adoption of e-Government services has taken place. This can be seen on the South African Local Government Association's (SALGA) online portal. SALGA outlines six objectives that allude to the adoption of ICT driven initiatives in local government:

- "To ensure the necessary representation of the voice or position of the local government in the ICT Policy and Regulatory Environment
- To focus on access, provision and maintenance of ICT infrastructure to ensure universal access at local level
- To facilitate the effectiveness of e-Government services and content at local level
- To promote digital inclusion and e-awareness
- To contribute to municipal transformation and improved service delivery through the effective use of ICT's
- ICT skills development and capacity building" (SALGA, 2011, cited in Nkomo, 2010: 10).

These objectives are further emphasised in both the *Gauteng ICT Development Strategy*, 2011 and *Gauteng Innovation and Knowledge Strategy*, 2012. SALGA goes further to delineate plans for the imminent assessment of e-Government and ICT awareness in local government, namely:

- "Preparing a report assessing the extent of diffusion and trends of ICT and e-services at a municipal level
- Municipal government's e-readiness position paper and research report" (*ibid*, 2010: 11)

In addition to this, SALGA has taken the initiative to draft *A Municipal Guide / Roadmap To Successful ICT Governance*, which provides suggestions on how municipalities can improve their ICT

Governance status and provides a guideline for municipalities to familiarise themselves with "the concept of ICT Governance" (SALGA, 2012: 14).

It is imperative that legislation and policy surrounding information transparency is set up prior the inauguration of ICT driven initiatives in government. The following section will piece together some of the most influential documents guiding the development of e-Government in South Africa.

2.5.1. Legislation and policy guiding e-Government in South Africa

Developing transparent and unambiguous legislation to support e-Government initiatives is essential to the feasibility, success and operability of the LIS. As e-Government is still a relatively new innovative paradigm, it requires clear and concise guidelines that will ensure its successful implementation. It is for this reason that the researcher deems it necessary to outline the overarching framework of legislation and policy guiding e-Government in South Africa. Although some legislation is not specific to e-Government – each piece of legislation noted below provides a framework and guidelines that need to be taken into consideration when any form of e-Government initiative is considered.

2.5.1.1. The Constitution of South Africa, Act 108 of 1996

The Constitution is the most important source of the law. It is the supreme law of the land against which all other law or conduct must be tested (Van Wyk, 2012). The Constitution is at the cornerstone of South African democracy empowering and instructing government to draft legislation. Government accountability finds further expression in the right of access to information. This right to information is contained in chapter 2, section 32 of the Constitution which provides members of the public the right to "access information held by the state; and any information held by another person in the protection of any rights" (RSA, 1996: 15).

2.5.1.2. The "Batho Pele" principles

In 1997, the Department of Public Services and Administration (DPSA) published a White Paper on the Transformation of Public Services. This White Paper introduced the concept of Batho Pele (Trusler, 2003; Kyama, 2005). Its aim is to progressively raise standards of services, especially for those whose access to public services have been limited in the past and whose needs are greatest (Batho Pele, 1997: 1). According to DPSA (2004) the concept of Batho Pele refers to its meaning in Sesotho, which is "People First". The name was chosen to express the key message – that the purpose of the Public Service is to serve all the people of South Africa (DPSA, *undated*, cited in Trusler, 2003: 2). The concept of Batho Pele is embedded in eight principles as noted in the table below,

Principle	Explanation
"Consultation	People must be consulted about the level and quality of public services they receive and wherever possible be given a choice.
Service standards	People should be told what level and quality of public services they will receive, so that they know what to expect.
Access	All citizens should have equal access to the services to which they are entitled.
Courtesy	All people should be treated with courtesy and consideration.
Information	People should be given full, accurate information about the services they receive.
Openness and transparency	People should be told how government departments are run, how much they cost, and who is in charge.
Redress	If a promised standard of services is not delivered, people should be offered an apology, an explanation and a speedy remedy. When complaints are made, people should receive a sympathetic and positive response.
Value for money	Public services must be provided economically and efficiently" (cited in DPSA, 2004: 4).

The inauguration of these eight Batho Pele Principles sent a strong message of government's commitment to a citizen centred approach to service delivery (Rapea, 2004, cited in Jantjies, 2010: 54). Trusler (2003: 2) believes that the concept of Batho Pele is South Africa's rather poetic means of moving towards a "citizen as consumers approach". This aligns well with what is advocated in contemporary e-Government literature (Fang, 2002; Ho, 2002; Heeks, 2001; 2003).

The concept of e-Government is progressive in that it requires a shift in its approach to management and public sector reform (Heginbotham, 2006). The Batho Pele paradigm recognises the need for change and emphasises that such modernisation of the public sector cannot occur without interaction from other factors, by stating that, "The introduction of a service delivery programme cannot be achieved in isolation from other fundamental management changes within the public services. It must be part of a fundamental shift of culture whereby public servants see themselves first and foremost as servants of the citizens of South Africa – it is a dynamic process out of which a completely new relationship is developed between the public service and its individual clients" (Batho Pele, 1997: 3).

2.5.1.3. Promotion of Access to Information Act, no. 2 of 2000

As government is legally mandated to draft and enforce legislation, chapter 2, section 32(2) of the Constitution allowed parliament to enact the Promotion of Access to Information Act (PAIA) in 2000. This Act outlines the rules, regulations, process and obligations ascribed to information held by the state. PAIA (2000: 9) main premise is "to give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights; and to provide for matters connected within". The success of any e-Government initiative is greatly dependent on this act. The right of access to information, in terms of the Act is limited by law of general application, the grounds in the list are specific and exhaustive. PAIA (2000, cited in, Heginbotham, 2006: 91) "aims to promote a notion of transparency and accountability in public and private agencies, and to ensure that citizens have effective access to information which will enable them to fully exercise and protect their rights".

2.5.1.4. The Electronic Communications Transaction Act, Act 25 of 2002

The Electronic Communications and Transactions Act provides the legislative framework within which e-Government initiatives can be carried out and conducted (Heginbotham, 2006). The Act promotes the use of electronic communications and transactions with public and private agencies, as well as institutions and society. The Electronic Communication Transaction Act (2002: 1) "encourages the use of e-Government services". It is the closest piece of legislation guiding e-Government initiatives in South Africa. Chapter 1, section 2(1) clearly outlines the objectives of the Act, denoting the importance of e-Government initiatives in fostering an open, transparent and accountable form of government. It goes further to note the importance of ICT's in e-service delivery and significance of an information economy for the social and economic development of South Africa.

2.6. Moving forward with e-Government in South Africa

It is clear from the abovementioned legislative framework that South Africa acknowledges the rights of its citizens, and thereby should "continue the transformation process in the public service by way of the implementation of e-Government policy" (Heginbotham, 2006: 94). Developing from the need for public sector reform and assure service delivery, the principles of the Constitution drawn up in 1996 lay the foundation for the implementation of e-Government in our country.

Bolstering this legislative framework, government must demonstrate that they can put ICT's into effect. If South Africa is to move forward and develop into a competitor in the global arena, international relationships need to be formed. Thus, adopting an "e" into its government systems is

vital for this modernisation and reform of South Africa to take place similar to many other governments across the globe.

In a world that is becoming more technologically driven, the social realities such as poverty, inequality and unemployment in the developing world are becoming more apparent. Houghton, et al (2013: 1) argues that "the rapid and increasing use of ICT is changing patterns of communication and behaviour and accessibility of information". The undulating presence of ICT's within society does not come without its pitfalls. The historical and social context of South Africa needs to be taken into consideration. Any ICT related initiatives need to be connected to a number of pressing realities (Trusler, 2003). The existing empirical research suggests that the successful implementation of e-Government has been challenging, particularly in developing countries (Dada, 2006; Heeks, 2003). These qualms have raised many concerns and debates in literature regarding the digital divide.

2.6.1. The digital divide and challenges facing the implementation of e-Government in South Africa

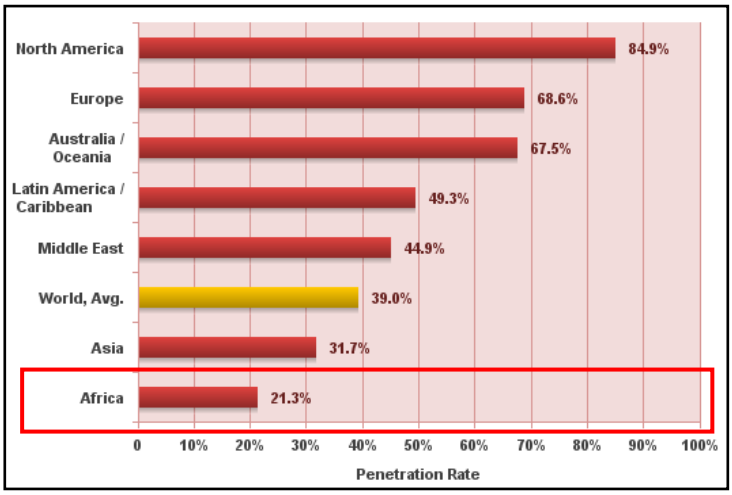
The digital divide is omnipresent and represents the resource and access gap between the digitally literate and digitally illiterate members of society (Cloete, 2004; Compaine, 2001). Trulser (2003) points out that South African Government is currently faced with the following challenges that impede on the success of technological interventions:

1. A high level of inequality, unequal access to ICT's commonly referred to the "digital divide";
2. A weak ICT infrastructure network, specifically in previously marginalised areas;
3. A lack of ICT readiness in government and its citizens;
4. A lack of trust in ICT driven services;
5. A lack of interoperability between departments databases (McLaren and Stanley, 2012).
6. More pressing demands in the public service sector that takes precedent over any ICT development, rendering it a lower priority in terms of budget allocation (Bwalya, 2009; Trusler, 2003);
7. A lack of human resources and skill base – user ability (McLaren and Stanley, 2012; Trusler, 2003).

The digital divide is significantly important in any e-Government initiative because it represents an formidable barrier, in that it will determine who will benefit from online services. Whilst e-Government can vastly improve services to citizens through information channels, the inability to provide online services to all citizens can limit the potential of the intervention. Goodspeed (2008: 6) insinuates that "from a planning perspective online initiatives may reach only a select group of residents or may be totally inaccessible to [certain members of society]". This has raised concerns

around who stands to benefit between the 'e-haves' and the 'have-nots' (Cater 1997, cited in Odendaal, 2003: 585).

In 2000, Molloch Brown, the Administrator of the United Nations Development Programme (UNDP), made an important statement regarding the digital divide. He made the claim that "If we fail to act now the Information Gap – or Digital Divide – risks being widened into an uncrossable gulf that increases global inequality and leaves the poor further behind" (UNDP, 2000). Ameliorating the adverse impact of the digital divide represents an important challenge to any government. According to Piazolo (2001: 29) the "digital divide is not only within countries but between the developed and developing regions of the world". This can be seen in the table below (Internet World States, 2013).



Graph 2.1: (above) World Internet Penetration Rates, 2013

Drawing from the data illustrated above, it is clear that there is a wide spread disparity with regards to access to information technology throughout the world. It is not surprising to see the African continent as a whole lagging behind the world average. However, this indicates that there is great potential for developing countries to benefit from ICT driven initiatives, if implemented correctly. However Dada (2006: 6) warns that "a solution in a country with high levels of connectivity will not necessarily work in a country with low levels". This is co-consitutive of a LIS, as each system has to be developed according to specified requirements whilst adhering to the political, social and economic context of the country.

Harfouche (2010: 73) affirms that, "The implementation of e-Government in developing countries can lead to a system where the greatest benefits from public online services will accrue to persons of high socio-economic status and education who may use their resources to employee the online services sooner and more productively than their less privileged peers". Odendaal (2006) warns that the adoption of ICT initiatives or services within government workings has the potential to perpetuate inequality. This is reiterated by Martindale (2002) who laments the fact that South Africa

has one of the highest digital divides between economic groups in the world. A point that needs to be taken into consideration because South Africa attains one of the highest Gini-Coefficient in the world, standing in at 0.63 (World Bank, 2009).

2.6.2. Enacting ICT and e-Government in local government

Whilst, the private and public sector grapples with the mechanisation of ICT initiatives, cities themselves are in a quest to revolutionise their modus of operandi. The comprehensive transition towards ICT's, enables cities to develop with competitive advantages and labour skill base. This term is often referred to in literature as the 'Smart City Ideal'.

2.6.2.1. The smart city ideal

The formulation of this concept is premised on the amalgamation of innovation with information technologies and the internet (Mooij, 2003). According to Caragliu et al (2009), a city can be classified as 'smart' when it investments in "human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance". The above mentioned statement alludes to the notion of governance within the concept of a smart city. Belissent (2011) argues that "smart governance" is at the core of the smart city initiative. It is worth mentioning that there is minimal literature on smart cities that sufficiently deal with issues relating to governance (Boulton et al., 2011).

The presence of leadership, as cited under the concept of innovation is of importance to good governance (Mooij, 2003). Similarly, Lam (2005) places emphasis on the presence of a "champion", an individual or leader that acquires the skills to collaborate with a variety of stakeholders, such acts are seen as a vital component for good governance in the Smart City Ideal. Johnston and Hasen (2011) make a good point about smart governance as they believe that the implementation of smart governance depends on infrastructure and willingness to facilitate in accountable, responsive and transparent governments. The presence of infrastructure will allow collaboration, information exchange, service integration and communications (Odendaal, 2003).

In South Africa, local government strategies are making long term commitments to the Smart City Ideal, partnering with leading industries such as, International Business Machines Corporation (IBM, 2014). Within the context of the CoJ, the *Joburg Growth and Development Strategy* (GDS) 2040 advocates for such technological advancements and realignments. The GDS 2040 for example has earmarked the 'Smart City Ideal' as one of nine development pillars in its vision for the future of the City. The CoJ (2013a: 1) classifies a Smart City as a "city that uses ICT as an enabler, to merge

dimensions of smart utilities, smart mobility, smart economy, smart environment, smart education, smart people, smart living, smart health, smart planning and smart governance".

The CoJ's current Executive Mayor, Mpho Parks Tau (2013, cited in CoJ, 2013a: 1) made a commitment to oversee this transition in a statement to the media. “The City of Joburg wants to become smart in all aspects, providing services that are easy to access and use, whilst simultaneously being efficient, responsive in an open and transparent way; and ensuring financial sustainability, environmental friendly city and delivering quality service”, said Tau (*ibid*). It can thus be noted that both the Smart City Incentive and e-Government are mutually dependent and inextricably interwoven with the feasibility of a LIS. The following chapter will outline the progressive steps the CoJ has undertaken to make Executive Mayor Tau's (*ibid*) statement a reality, through the example of a LIS.

The mechanisation, use and adoption of ICT’s by local government is influenced by the legislative and strategic frameworks discussed above, which are currently in place. The remainder of this report will focus on how the CoJ has made land related information accessible through the use of ICT’s. With this in mind the following chapter outlines the concept of an information system and how it relates to land administration, management, development and decision making, more specifically, in the context of the CoJ.

2.8. Conclusion

This chapter began by acquainting the reader with a background on research regarding ICT development. It unpacked the preceding series of events that culminated to the widespread adoption of ICT's in both the private and public sector. A thematic literature analysis of the overarching concept of e-Government including the importance and ramifications was outlined. The chapter then discussed the concept in relation to contemporary South Africa, indicating the relevant pieces of policy and legislation that deal with e-Government. This framework allows local government to implement strategies that align with the Smart City Ideal. The harmonisation of legislation within strategies has enabled the CoJ to implement technologically driven mechanisms, such as a LIS.

As alluded to throughout literature, city officials, developers, planning consultants and citizen require quick, efficient and reliable information regarding land. This forms the departure point for the following chapter. Land is a finite and limited commodity which needs to be managed efficiently. The aim of the following chapter is to outline how the mechanisation of land information has resonated throughout various departments in the CoJ. The combination of the themes, concepts and ideas presented in this chapter and the following chapter will assist the researcher in understanding, how the LIS has enhanced land development in the CoJ.

Chapter 3

Literature Review

Land Information Systems for land administration, management, development and the decision making process

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3.1. Introduction

The importance of land and information thereof cannot be overemphasised. This chapter identifies how the use of ICT within local government is effectively supporting land administration, land management, development and the decision making process. It begins by unpacking the concept of a Land Information System, revealing the potential benefits and challenges facing its progressive adoption. The manner in which land information is captured and the administration thereof is then provided. This chapter also recognises how the effective use of ICT is an integral element of good governance, and deals with the LIS within the broader e-Government arena. A brief summation of the existing policies guiding land management in South Africa will be provided.

The chapter accentuates the complexities of harmonising e-Government policy and city strategies with land related policies. The amalgamation of these policies and strategies needs to be taken into consideration, as they influence the operability of the LIS. Lastly, the role of the developer and planning consultant will be identified. These agents play a proactive role in the dynamics of land development and the land market. The above mentioned aspects underscore the premise of the research and further contribute towards the theoretical framework. The theoretical framework provides a succinct synopsis of key terms, themes and epochs that have emanated out of chapters two and three. The framework will assist in the analyses and discussion of the findings section, in chapter five.

3.2. Land Information Systems for land administration, land management and decision making processes

City officials, developers, planning consultants and citizens often require land information or spatial related data on a regular basis (Dale and McLaughlin, 1988; 1999; van Helden, 1994). Access to land information in both the public and private sector, is the prerequisite in any decisions related to land investment, development and management. Information about land reduces uncertainties by helping to identify and analyse a problem (Ememark and Sevatdal, 1999). However, the availability of correct information cannot prevent mis-management of resources nor incorrect decision making. It can, however reduce uncertainty and minimise the risk of ignorant action in the decision making process (Dale and McLaughlin, 1988).

Land information is a public good and resource (Berke et al, 2006). As with any other public good and resource, it needs to be administered efficiently in order to optimise its potential benefits (UN-ECE, 1996). The implementation of an information system[2] that deals specifically with land related activities and tasks possesses the potential to address the aforementioned concerns. An integrated

[2] An overview of the term *information system* is provided in the annexure A

information system can enhance the effectiveness and efficiency of the decision making process in land development (van Helden, 1994). Some of the most successful information systems of late deal with land related activities or tasks (McLaren and Stanley, 2012).

3.2.1. Land Information Systems

Land information relies on an array of different datasets, such as tenure, value and the use of land to name a few. The overall information requirements are becoming increasingly intricate, as planning by its very nature has permeated into numerous realms of applications, such as economics, social and environmental science and geography. According to Cruz (2004: 23) the "expected outputs are also becoming diverse as land information" is commonly used in various public sectors such as land valuation, taxation, development control, social service delivery, infrastructure projects, and general municipal development planning. Thus, the need to adopt a land information system extends beyond the realm of efficient data management, and also includes the delivery of a product or a service to the public.

The International Federation of Surveyors (FIG) defines a LIS as “a tool for legal, administrative and economic decision-making and an aid for planning and development. A land information system consists, on the one hand, of a database containing spatially referenced land-related data for a defined area and, on the other, of procedures and techniques for the systematic collection, updating, processing and distribution of the data. The base of a land information system is a uniform spatial referencing system, which also simplifies the linking of data within the system with other land-related data.” (cited in UNECE, 1996: 60).

Dale and McLaughlin (1988: 8) construe an information system "as a combination of human and technical resources, together with a set of organising procedures that produce information in support of some managerial requirements". An important aspect to note within the definition is the collaboration between "human and technical resources". As was illustrated in Nelson Mandela Bay Municipality, the lack of the "human resources" compromised the entire operations of the system. Merely computerising an information system that is outdated or an old process will not by itself improve effectiveness. On the contrary, the installation of ICT’s in a poorly designed information system will usually result in a perpetuation of the same types of errors and flaws as before (Dale and McLaughlin, 1988: 15).

Land information systems of late have been prominently manual, however the computerisation of such systems date back to the late 1980s (Dale and McLaughlin, 1988). The major impetus for this change can be seen in the advantages computerisation brings. The advantages of a computerised land information system include:

1. Less storage space is required due to the compaction of physical data
2. Information becomes easier to access and data can be manipulated accordingly
3. The use of geo-referencing tools allows layering of information making it easy to analyse land uses and infrastructure development
4. Digital images and data can be integrated into a single database
5. Information and data sharing can take place over numerous databases (Dale and McLaughlin, 1988).

McLaren and Stanley (2012: 368) note that the implementation of LIS to support land administration is a cumbersome process in itself, which is achieved over a period of time. A country implementing land information infrastructure can take up to a decade to achieve a comprehensive information network with a comprehensive set of e-service initiatives (*ibid*). This accentuates the need for long term buy-in and commitment in such support mechanisms, as funds in governments are in short supply. It is important to note that during this time period, a multitude of disruptions are inevitable and may threaten the true potential of such mechanisms. The major investment component in a LIS is the upkeep and maintenance of the land registry and parcel based information also referred to as the cadastre (*ibid*, 2012: 369).

The efficiency of such an information system will depend upon its "up-to-datedness, accuracy, completeness, and accessibility" (Dale and McLaughlin, 1988: 8). The single most common defect in existing systems has been the failure to maintain them, and keep the LIS up-to-date (Dale and McLaughlin, 1988; McLaren and Stanley, 2012). It is imperative that information can be transferred and updated across various departments and institutions. If the system is left redundant and outdated due to financial or human capital shortages, the entire database is nullified. This in turn compromises the accuracy of the system as it renders the exiting information inaccurate. As with other resources, land information needs to be carefully managed to utilise the system in a proficient manner.

3.2.2. Land administration

Land Administration is the study of how people organise land. According to Williamson et al (2010: 37) this comprises of "the way people think about land, the institutions and agencies people build, and the processes these institutions and agencies manage". The cadastre is seen as a crucial part of any land administrative system. The cadastre is the basis of land information and is seen as a crucial component in any LIS (Enemark and Sevatdal, 1999; Zhao, 2010). The FIG (1995: 1) defines a cadastre as "a parcel-based up-to-date land information system containing a record of interests in land such as rights, restrictions and responsibilities". These parcel-based information records are required in a wide range of activities, as seen in Figure 3.1 (Dale and McLaughlin, 1988).

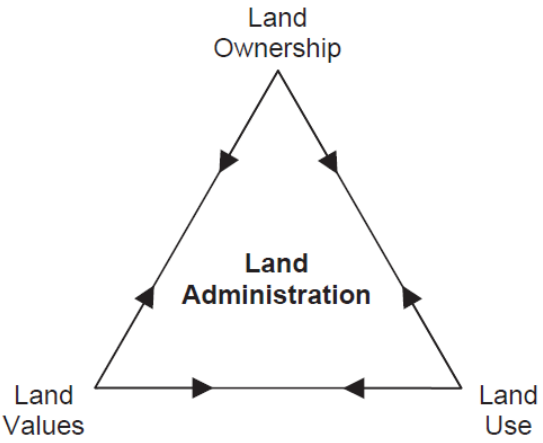


Figure 3.1: (above) Three key characteristics of land,
Source: (Dale and McLaughlin, 1999)

In its *Land Administration Guidelines*, the United Nations Economic Commission for Europe (1996) defines land administration as the process of determining, recording and disseminating information about the tenure, value and use of land when implementing land management policies. It is considered to include land registration, cadastral surveying and mapping, fiscal, legal and multipurpose cadastres and land information systems.

Dale and McLaughlin (1999, cited in Steudler et al, 2004: 372) go further by defining land administration as a conglomeration of processes that constitutes regulating land and property development and the use and conservation of the land, gathering of revenue from the land through sales, leasing and taxation and the resolving of conflict concerning the ownership and use of the land. The commonalities from the abovementioned definitions accentuate the importance of ownership, land value and use of the land as three key attributes (Dale and McLaughlin, 1999). Land administration should be underpinned by the principles of good governance (Enemark et al, 2010, cited in Steudler et al, 2004: 372). A modern land administration system should "support its core policy of sustainability and service the increasing needs of businesses for good governance and an enhanced quality of life" (Kalantari, 2008: 24, cited in Hull and Whittal, 2013: 345).

Land is partitioned for administrative and economic purposes. Steudler et al (2004) expounds on land administration, by deconstructing the term into four facets, namely:

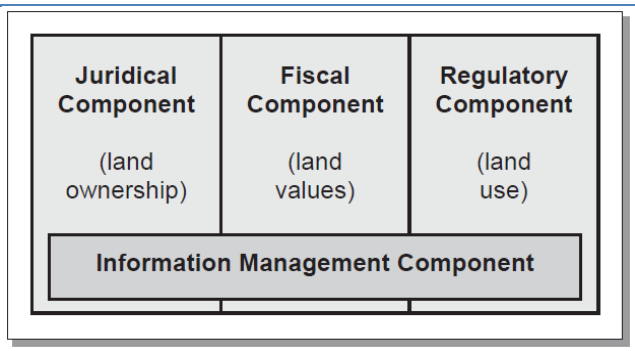


Figure 3.2: (above) Four crucial components of land administration. **Source**: (Steudler et al, 2004: 372)

Juridical – land ownership
Regulatory – Development control and land management
Fiscal – land valuation and taxation
Information management – an integral component fulfilling any information requirements required by the other facets (Steudler et al, 2004: 372).

The above mentioned definitions outline land administration as land ownership, land use, land valuation and land information management (Steudler et al, 2004: 372). These factors are all inextricably interwoven and are adopted as they are for the purpose of this research.

In the past, the cadastre has been dependent on paper-based recordable means (Borzacchiello and Craglia, 2012). These records comprise of two parts; firstly, [it deals with] a legal description known as a title deed, a numerical and diagrammatic description of the property (Zevenbergen, 2002). These records are generally stored separately and are managed by different government institutions. Within a South African context, each parcel of land has its own unique document outlining the above mentioned property information. This information can be found in the title deed, held by the Deeds Office and the Surveyor-General holds the diagram. The title deed is a legal document and prescribes ownership, value and rights vested in a particular parcel of land, whilst the Chief Surveyor General provides the geometric description of the parcel of land. This includes the existing boundaries measurements, coordinates and any servitude registered over the land parcel. Hull and Whittal (2013) notes that separation of these records increases the risk of duplication of information and increases the complexity and costs of accessing land information.

Nubi (*undated*, cited in Agabi, 2013) has made the claim that the presence of, "ICT in land administration can create accurate, accessible, secure, and complete information about land and property in an efficient way that promotes confidence between the public, its commercial enterprises and governments". It is evident that the presence of ICT's in the development process has had a significant role in the sharing and analysing land information amongst various agencies. Countries such as Denmark have established a mature ICT infrastructure network and information database. The implementation of online an e-planning portal will allow members of the public access

to property related information, such as zoning, valuations, proposed development applications and plans, municipal boundaries, results of development decisions and so much more (McLaren and Stanley, 2012). Karlenzig (2012: 2) reiterates this as he has argued that an e-planning portal, with meaningful content, can influence and attract developers to conduct business in particular area.

3.2.3. Land management

According to Enemark (2004: 6), "an efficient system for land administration is necessary but not sufficient to ensure the best use of land as a resource". Land is seldom static, and is constantly subjected to change. The need to record this change of land parcels stems out of proficient administration of land (Dale and McLaughlin, 1988). The term land management can be interpreted as a process by which the resources of land are put to good effect (Dale and McLaughlin, 1988). Land is the ultimate resource (UNECE, 1996: 10), from which all wealth is produced (Dale and McLaughlin, 1988; FAO, 2007). Thus, any improvements in the management of land are essential for the betterment of society on the whole (Dale and McLaughlin, 1988; Enemark, 2004; UNECE, 1996).

The management of land information is not an entirely new activity. Dale and McLaughlin (1988: 14) have indicated the existence of information systems since civilisation first took to sedentary agriculture. They note that when the "Babylonians occupied the realms between the infamous Tigris river and the Euphrates and the Egyptians cultivated the fertile land of the Nile, the need for orderly management of land was recognised" (*ibid*, 1988: 15). This resulted in the development of rudimentary land information systems. What is different today from previous generations is the quality, speed, manipulation and representation of data that technology has facilitated. The integration of technology and LIS's has become widespread. Both developed and developing countries have some form of LIS in operation, as can be seen in Denmark (Larsen, 2003), Lagos, Nigeria (Adeoye, 2013) and the Netherlands (Van Der Molen and Wubbe, 2007) to name a few.

A LIS provides "support to land management by providing information concerning land, the resources upon it and the improvements or alterations made to it" (Dale and McLaughlin, 1988: 16). The general operations of a LIS "includes the acquisition and assembly of data, their processing, storage, and maintenance; their retrieval, analysis and dissemination" of land information (*ibid*). Molen and Wubbe (2007) note that an LIS, in conjunction with e-transactions and e-conveyance is necessary for e-Government. Furthermore, citizen centred information systems is the overarching requirement for e-Government (Chen, 2010).

3.2.3.1. Land management in South Africa

Although the research does not seek to uncover an appropriate land management system for contemporary South Africa, the researcher deems it necessary to briefly typify the nature, characteristics and policy associated to land management within a South African context. This together with e-Government policy frames the general parameters a LIS operates within.

Literature that examines land management within a South African context delineates it as a mechanism in which land is "controlled, managed, planned, utilised and transacted" (Charlton, 2008, 2012; Lewis, 2008; Oranje, 1995; Rubin, 2007). Land management in South Africa is inextricably interwoven with the systems of land administration, land use management, land information management and land valuation and taxation (Rubin, 2007). Under the Apartheid regime, land use management, its principles, strategies and stringent land use regulations were utilised as a mechanism to control urban growth enforcing racial and spatial segregation (Todes, 2012a; Bollens, 2005), as has been discussed in detail in chapter one of the report.

One of the major hindrances that have become increasingly apparent in South African land management is the plethora of land use management and planning legislation that has been enacted and / or is in the process of being promulgated. Land policy can greatly influence the land market, for which examples have been alluded to in chapter one of the report. Despite policy and legislation emanating out of both national, provincial and local government, "there has been little advancement and innovation in thinking and practice around land management, and South Africa's towns and cities continue to develop without an adequate framework for managing land development in a way that supports the goals of democracy, equity, efficiency and sustainability" (Ovens et al, 2007, cited in Rubin, 2007: 2).

At present, land policy enacted in the CoJ still attains remnants of the Apartheid Planning era, as the bulk of existing land rights were derived under this regime. In addition to this, planners need to recognise the myriad of land management systems in effect, ranging from "highly formal and legally regulated to entirely informal systems" (Rubin, 2007: 6). Although certain policies have since been repealed, the processes and nature of land development is reminiscent to Apartheid led planning. This can be seen in the CoJ which utilises twelve different Town Planning Schemes within the City's jurisdiction, "each rooted in outdated principles and assumptions" (Ovens et al, 2007, cited in Rubin, 2007:16). Some of these land use schemes date back to 1975. However, accordaning to SPLUMA, 2013, chapter 5, section 24, the CoJ has since drafted a *Consolidated Johannesburg Town Planning Scheme*, 2011, which is currently under review. Such land use schemes form the backbone of

planning mechanisms for the city, as they play an integral role in controlling land use and development rights, whilst coordinating urban growth.

As mentioned above, the implementation of a LIS possesses the potential to support land management in South Africa. Notwithstanding that local government is legally mandated to keep a record of any amendments to land uses. According to SPLUMA, chapter 5, section 31, a local authority is required to keep a:

> "Record of amendments to land use scheme
> Section 31. (1) The municipality must keep and maintain a written record of all applications submitted and the reason for decisions in respect of such applications for the amendment of its land use scheme.
> (2) The written record referred to in subsection (1) must be accessible to members of the public during normal office hours at the municipality's publicly accessible office" (SPLUMA, 2013: 40).

This means local government is legally mandated to archive all land development applications promulgated within the jurisdiction of the specified municipality, in this case the CoJ. In addition to this, the amending or alteration of land use requires sufficient public participation to take place, as outlined in the section 45 of the *Town-Planning and Townships - Ordinance 15 of 1986* . Information regarding proposed developments and land use amendments need to be available for public inspection. The implementation of a LIS within a local government context can make the handling of this information easier, more transparent and easily accessible to members of the public. These are all characteristics promoted by the concept of 'good governance'.

3.2.4. Land Information Systems promote good governance

It has been noted that over the past two decades there has been an increase in citizen dissatisfaction with local government performance (de Guchteneire and Mlikota, 2008; Gaventa, 2002; Heeks, 2001). This has been exemplified by the recent Quality of Life Survey the GCRO conducted, as discussed in chapter two (GCRO, 2013). The lack of trust in governments' ability to perform its legal obligations has further exemplified the need to ameliorate a citizen's experience when engaging with local government. The implementation of an LIS aligns well with what is advocated in good governance, because both concepts share similar objectives and core principles, namely administrative efficiency, accessibility, accountability, transparency and trust (McLaren and Stanley, 2012).

Enemark et al (2010) describes governance as a process of governing. If this process of governing is improved through the appropriate use of ICT-driven mechanisms such as a LIS, governance can

become "good" (FAO, 2007). Whittal (2008) provides four guiding themes and concepts a LIS should strive to address. It constitutes a system that is: efficient and effective; transparent and accountable; accessible and equitable; and finally secure and preserves information integrity. However, Whittal (2008) cautions the feasibility of these and notes that they are "ideas rather than achievable objectives that should guide and inform the development of land information initiative". Enemark (2012: 5) goes further to note that good governance is "an ideal which may be difficult to achieve".

The four thematic attributes identified by Whittal (2008) are briefly unpacked in relation to a LIS, which in turn contributes towards promoting good governance:

Efficient and effective
In order for a LIS to be efficient and effective, it must be accessible (FIG, 1995). Information made available to the public sector should adhere to legal and privacy issues and must acknowledge any cultural sensitivity (*ibid*). Accessibility should be mindful of the potential user, prevent careless expenditure of government resources, and procedures should be kept clear and concise (Enemark et al, 2010). A LIS needs to be inclusive, acknowledging all forms of tenure and recognise all land parcels (FIG, 1995) such as those found in a developing country like South Africa. If implemented correctly an LIS can provide security of tenure for all (UN-FIG, 1999), whilst recognising diversity (FIG, 1995).
Transparent and accountable
Good governance requires a legal framework and a willingness to enforce it (McLaren and Stanley, 2012: 362; Enemark et al, 2010). It requires that no stakeholder or agent in the land development process stands above the law and must be held accountable to any surreptitious or prejudice action (Whittal, 2011). Additionally, information regarding government workings must be made available for public perusal (Enemark et al, 2010). Good governance is seen as an essential component in an LIS, because land administration within the public sector is susceptible to corruption (McLaren and Stanley, 2012).
Accessible and equitable
In the past, land administration systems have been notoriously difficult for some segments of society to reach and focus primarily on supporting formal land rights and tenure (McLaren and Stanley, 2012: 351). If an LIS is to ensure it is accessible to the broader spectrum of society it needs to address equity and fairness. Fairness seeks to provide equitable access to the system, this is addressed through the decentralisation of workflows, clear and concise procedures, and feasible fees (FIG, 1995). Such advanced systems need to be made available to the poor, and should be designed to bridge the 'digital divide' (as noted in the preceding chapter).

Secure and preserves information integrity
McLaren and Stanley (2012: 349) argue that, before investing in any ICT mechanism to enhance land information management, "it is essential that legislation and policies surrounding information transparency and access are updated", on a regular basis. Since a LIS deals extensively with information regarding public property, it needs to be secure and the integrity of the information needs to be adequately addressed (FAO, 2007).

Throughout the literature which has been surveyed, various forms of terminology are used to describe ICT driven mechanisms for capturing land information such as: a Land Information System (Dale and McLaughlin, 1988); a Land Management Information System (Cheo et al, 1991); a Land Information Management System (Fourie and Nino-Fluck, 1999); a Land Use Information System (Cruz, 2004); and lastly, e-Land Administration (Karim et al, 2010). The juxtaposition in the terminology of information systems which deal extensively with land suggests some form of uncertainty and ambiguity. Barry and Roux (2012: 306) assert that the lack of consensus can result in, "incompatible definitions may render [theoretical] comparisons unattainable".

For the purpose of this research, the term LIS has been adopted. The following section seeks to expand the term appropriated for the research. The implementation of a LIS has to adhere to e-Government policy. The previous chapter constructed the framework in which this LIS operates within, including legislation, policies and strategies enacted by government. This forms the departure point for any ICT driven mechanism in government, more specifically the CoJ. This serves as a backdrop to compare the CoJ's LIS and places it into context within contemporary literature.

The CoJ deals with voluminous amounts of property information on a daily basis. The manner in which this information is collected, updated, processed and distributed is important. An information system has the potential to 'revolutionise' this process in a proficient manner. The following section outlines the CoJ's LIS, which is the case study around which the research report is focused.

3.3. City of Johannesburg Land Information System

Research has shown that the majority of local government functions are dependent on the same property information (van Helden, 1994). The operational and administrative functions of municipal entities often require information regarding land. According to Tjia and Coetzee (2013) departments dealing with land information developed their own databases independently, to serve a specific purpose. As a result, departments allocated resources to the collection and processing of land information. Murdick (1980: 221) refers to this as "islands of mechanisation". This phenomenon was common practise in the CoJ, prior the inauguration of the LIS in 2007 (CoJ, 2009a). Before the development of the LIS, data management in the CoJ was confined to the compartmentalisation of

information in standalone databases amongst various departments. As a result customers were referred to different departments to obtain a complete set of property information. This had a tremendously negative impact on the customers' experiences, as it was a time consuming processes. Working in silos also resulted in the duplication and fragmentation of information and reinforced the inoperability of databases (Tjia and Coetzee, 2012, 2013; Erasmus, 2014).

3.3.1. City of Johannesburg's Property Value Chain

The creation of any parcel of land or amendment of rights and development thereon initiates a cycle along the Property Value Chain (PVC). Figure 3.2 illustrates the PVC on which the LIS is based on.

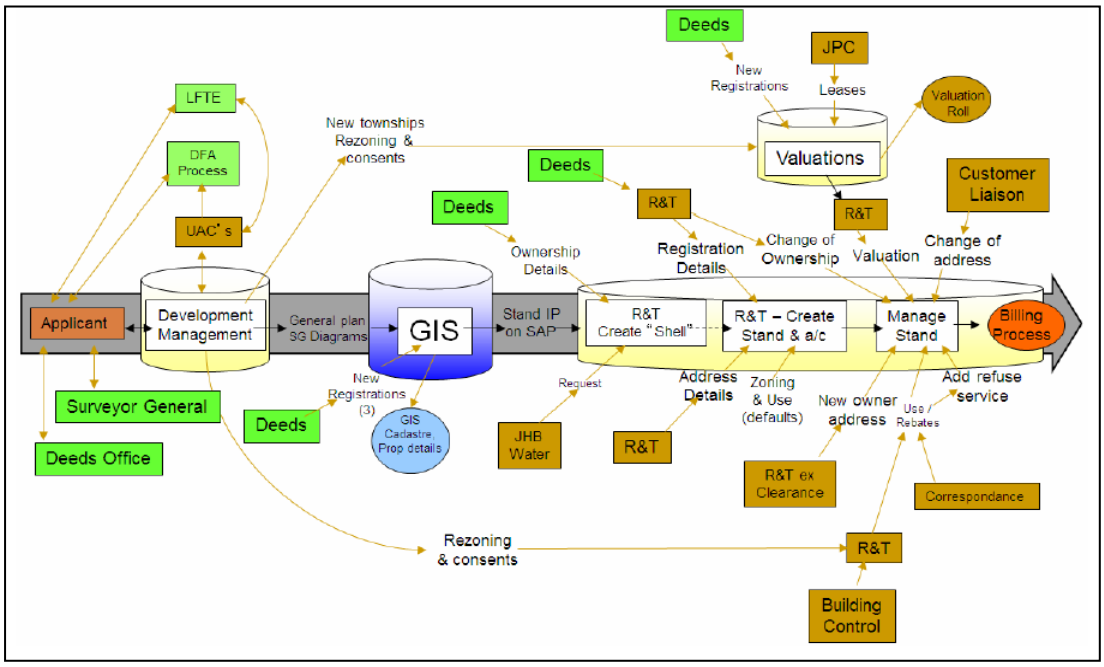


Figure 3.3: (above) *City of Johannesburg Property Value Chain*: Graphical representation of the property value chain, **Source**: CoJ (2013b: 42)

A number of entities operating within and outside the CoJ are involved in the development of land. This value chain can be described as a complex labyrinth, whereby various departments and parastatals feed information into any land related strategy or development process. The diagram further depicts the flow of information through the property value chain. If information concerned with land is fragmented between numerous departments, data duplication and the misrepresentation of data can occur. Thus, information is inevitably scattered. This in turn hinders the functionality of any development process.

3.3.2. The Land Information System

The implementation of the information system sought to unify four departments; the Deeds Office, Valuations, Corporate Geo-informatics Directorate (CGIS) and Department of Development Planning databases into a single point of reference (Tjia and Coetzee, 2013). The Corporate Geo-Informatics Directorate (CGIS) is at the forefront within the CoJ with regards to the assimilation and management property related information such as the cadastre, street addresses, zoning, administrative boundaries and aerial imagery (in 3 year intervals). The directorate plays a vital role in facilitating numerous departments' access to spatial and non-spatial related information.

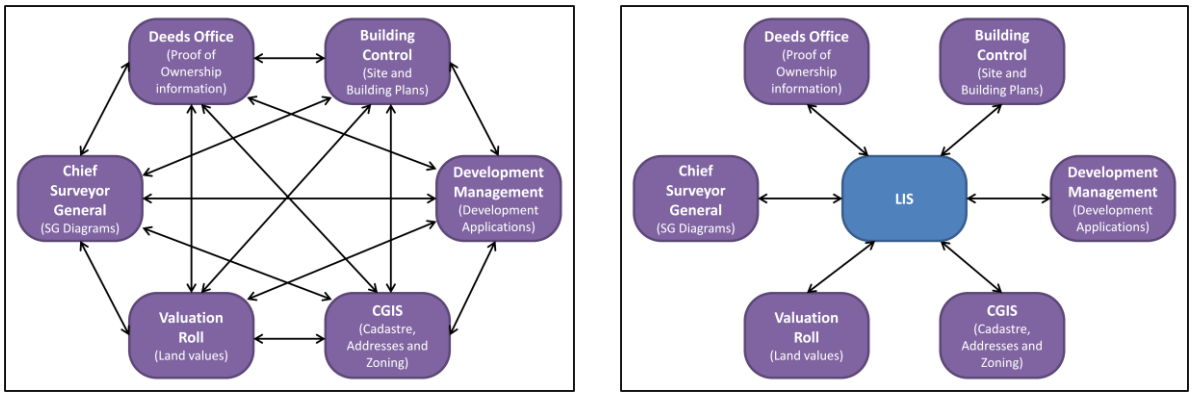


Figure 3.4: (above) *A conceptual diagram of the LIS*: 'before and after' Information captured from the various departments is unified into a single dataset. **Source**: (Momberg, 2014)

The LIS operates alongside various departments and parastatals, such as Johannesburg Road Agency (JRA), Johannesburg Water, City Power, City Parks, Gauteng City-Region Observatory (GCRO), Pikitup and Telkom. The directorate also facilitates as an information server to the Johannesburg Property Company (JPC) and the Economic Development Department. The progressive collation of data over a specific time period assists in various forms of analysis and planning measures. This data can also be manipulated and rendered into graphical maps to illustrate how areas change geographically over time (GCRO, *undated*).

Figure 3.4 provides a simplified depiction of the LIS in the CoJ. One can see how information is collated into a single unified database. The streamlining of this workflow data can be used in the land development process. Julies (2014) acting Legal Administrator in the CoJ has pointed out that the LIS enables the city to determine its net worth (how much revenue it is generating on a monthly to yearly basis). This will undoubtedly assist in financial forecasting, estimation processes and overall auditing of the City's assets, that is, determining where and how much land the CoJ owns. Thus, the LIS is integral to revenue generation and maximisation in the CoJ (IDP, 2012).

The LIS enables the City to monitor the supply of buildable land and its capacity to accommodate urban growth within its administrative boundaries. It also supplies planners with an inventory of existing land uses and available land for future development or redevelopment (Berke et al, 2006). With this unified source of information, planners can immediately identify a developments location and advise or discourage further land development. Coupled with the latest census data, economic forecasts, land use constraints and potentials, environmental restrictions, information regarding infrastructure networks can help planners understand the dynamic nature of current and future growths strains of the City. This can be seen in the GMS strategy for the CoJ (GMS, 2008).

The GMS is a complementary strategy to the City's SDF. Succinctly put, it seeks to align infrastructure investment with spatial planning for the CoJ. More importantly, the GMS aligns to the values and principles enshrined in the GDS 2040, namely "ensuring social inclusivity in market-driven growth areas; aligning development to emerging public transport networks and infrastructure; and stimulating a diversity of development and economic opportunities in marginalised areas, those areas located far from job centres, social services and public transportation links" (CoJ, 2012: 1).

The implementation of the LIS seeks to reduce any potential delays and anxiety experienced when engaging with the above mentioned departments. Departments involved in the development process now have access to a unified data set that they can cross-reference queries with. For example, when a development application is received by the CoJ Registration Department, they can utilise this platform to verify the existence of the parcel of land, its ownership, as well as its existing and permissible zoning rights. Similarly, the Development Management department can use this data set to check whether or not rights have been amended (identify if there are any registered servitude over the property or if a relaxation of a building line is required) to allow for the approval of building plans submitted to the department.

ICT advocates argue that the use of an online platform can notably increase a citizen's access to government information, as they no longer are required to physically visit the relevant department for strategies and policies (Budthimedhere et al, 2002; Conroy and Evans-Cowley, 2006). Information captured by the CGIS Directorate is made available to property owners, planning consultants and potential developers via a Web GIS platform on the CoJ's, e-services web portal (CoJ, 2014). Mundane activities which were only able to be carried out in person, can now be carried out electronically. Property owners can check and query their municipal invoices, pay accounts, access valuation rolls, log complaints and peruse an online Web GIS map of the City. In addition to this the portal allows access to planning aspects such as tracking and tracing building applications, known as the Building Application System (BAS).

3.4. Land development in City of Johannesburg

Land development "is the continual reconfiguration of the built environment to meet society's needs. Roads, sewer systems, houses, office buildings, and the urban entertainment centres do not just happen [but rather] someone must motivate and manage the creation, maintenance, and the eventual re-creation of the spaces in which we live, work and play" (Berens et al, *undated*, cited in Berke et al, 2006: 199).

The development of land in the CoJ is a cumbersome process itself involving a myriad of actors with varying interests and resources. This usually involves varying stages of the development process and numerous forces shaping the development of land. The development of land is shaped by the behaviour of the different actors in question. According to Lichfield (1956: 4, cited in Yong: 2003: 17) these actors include “the original landowner or any subsequent purchaser of the land; the developer who undertakes the process; the building industry, including the professions connected with it; the legal profession; the public authorities; the person lending money; the ultimate consumer who may be a tenant or owner of the finished development”.

3.4.1. The role of the developer and planning consultant

Cities are "growth machines", whose primary agents are entrepreneurs who strive for financial returns (Logan and Molotch, 1987). These entrepreneurs are known as property developers and planning consultants. They are agents in the business of changing land uses and assisting in the development of land. Clawson (1971, cited in Yong, 2003) reiterates this point as he notes that developers are regarded as key agents in the development and or redevelopment of land, who are interested in financial gains. Thus the role of the developer as a entrepreneur has been highlighted throughout literature (Harvey, 1982; Lewis, 2008; Yong, 2003).

Land management systems of late in the CoJ have become notoriously difficult to navigate. Rubin (2007: 14) notes that "only the most seasoned professionals with a great deal of experience have been able to attain the land and the approval that they require". Hence a planning consultant is often called upon by land owners and developers to utilise their unique set of skills. The land development process may range from a few months to a few years (depending on the nature of the application). There are various reasons for this, one of which is certainly that there is now public consultation and review of development proposals before they are approved. There are also a large number of issues that need to be taken into consideration that were neglected in the past, such as capacity constraints of electricity and water supply, and environmental impact assessments (EIAs). However, these factors do not exonerate the complex compartmentalisation and lack of coordination in the development process. In fact, much of the planner's job in the approval process

is not centred on the assessment of the merit of the scoping proposal, but rather, the guidance of the developer through the labyrinth of the city's administrative system.

3.4.4. Common challenges facing developers and planning consultants

Planners, more specifically, land use planners from both the public and private sector are constantly confronted with an array of challenges relating to land development (Lewis, 2008). These challenges have a direct impact on built environment professionals such as developers. Developers need to be well aware of these challenges as this can impact on the development process when it is least expected, with possible ramifications on the feasibility of a project. When confronted with these obstacles, developers, in most instances have little to no control over the situation. Cloete (1999: 123) explains that there are certain factors, which a developer or investor has limited or sometimes no control over. Lewis (2008) argues that the planner must adopt the responsibility to overcome and rectify these challenges. Therefore, developers should play an active role in assisting planner to identify and address these challenges. If these challenges are not identified and addressed adequately, it can influence urban land delivery and thus impact negatively on the urban land markets (*ibid*).

3.4.4.1. Lack of capacity

A well renowned dilemma facing the planning profession within South Africa is the lack of institutional capacity. Academics such as Todes and Mngadi (2007) and Berrisford (2006) have conducted studies on the number of accredited planners in South Africa. Both studies produced identical results, as they conclude that there is a shortage of planners in the country. This poses a significant challenge to land development as a lack of capacity can constrain development tremendously. A lack of land use planners in a municipality will inevitably lead to a growing backlog, as land applications will be dealt with at a slower rate.

According to the National Development and Planning Commission (1999: 12, cited in Lewis, 2008: 136) the "lack of capacity is one of the most serious issues facing the planning system (specific reference can here be made to Land Use Management systems) in South Africa". K'Akumu and Oyugi (2007: 99) argue that "a lack of capacity on decision making level is indicative in the quality of decision making". This in turn could jeopardise the financial feasibility of a proposed development due to the time delays incurred due to a cumulative backlog. Limacher (*undated*, cited in Rees, 2011: 21) believes that the "lack of experience and capacity at Johannesburg's administrative branches charged with the processing the applications and extends to the transfer of property ownership". Furthermore, developers and planning consultants such as van Schoor, Limacher and Brebnor

(*undated,* cited in Rees, 2011: 21) all raise concerns about the "lack of experience and capacity at the CoJ municipal departments", which are legally mandated to handle land development applications.

3.4.4.2. Lack of information

If planners in both the public and private sectors do not have adequate information of a region to be planned, it is extremely difficult to advise and develop in a proficient or viable manner. Developers often require information to make trade-offs regarding where, when and what to develop (Berke et al, 2006). If these external agents do not have access to reliable information, it can impact on their decision making process, which can in turn influence the land market and overall development of the region.

Planners need access to accurate and reliable information about the City. This includes a supply of buildable or [re]developable land within the jurisdiction of CoJ, so as to develop land use plans and spatial policy that efficiently align with the available land supply and future land market demand for developable land. "Without this information, they may over constrict land supply, inflating land and property markets and forcing desired development into other, less restrictive market areas" (Berke et al, 2006: 212). With the development of a LIS, land use planners can provide developers with vital information about growth trends and assist them in the decision making process. Developers and planning consultants need reliable information to inform them when, where, and the timing of, their proposed developments, thereby helping the property development industry "avoid the problems of boom-and-bust that are due, at least in part, to a lack of information concerning market capacity to absorb new space" (McClure, 2001: 285, cited in Berke et al, 2006: 200).

3.5. Conceptual / theoretical framework

This section provides the reader with a brief synopsis of the quintessential themes and concepts that have emanated out of the literature surveyed in both chapters two and three. The framework forms the basis of the research and will be utilised at a later stage of the report.

Conceptual diagram

The implementation of a LIS hinges on an array of internal and external facets, pressures, risks and threats (such as those alluded to in the preceding chapters). However, for the purposes of this research four main themes / component were earmarked as being crucial in this regard. These are namely, access, enablement, optimisation and leadership. Each of these themes / components is mutually dependent on each other and will be unpacked in greater detail below. It is worth mentioning that within these themes there are pressing concepts that have to be taken into consideration. These concepts can overlap into the aforementioned themes such as the presence of innovation. In this framework, if one of the four concepts, (which can be regarded as 'pillars') identified are weak or not present, it can have an adverse impact on the entire functionality of the LIS. Thus, the implementation of a LIS can yield either greater collaboration between departments and citizens, or it can further entrench, subjugate and limit the potential for sharing of property information in the organisational structure.

Theme / component	Description and explanation
Access	-The term access in this regard is how the information is made available to the user, being both internal and external. -Access goes beyond the realm on making information readily available, it also needs to acknowledge the multiple forms of land tenure and the digital divide (citizens with limited access to online portals). -Does the LIS make property information more easily accessible or inaccessible? -Land information is a public resource, thus the LIS provides a single source of property information. -Establishment of e-planning portal, designed for a specified user base? -The harmonisation of policy and legislation has an integral role - as enshrined in the Promotion to Access of Information Act, Act 2 of 2000. -Trust relationships in the information that is shared, accuracy, transparency and readily available need to be established. -Access to integrated, quality information that is correct accurate and reliable.
Enablement	-If access to property information is strengthened, it can further spatially enable the user (whether it is the planner or property owner) to make an informed decision, whether to invest in the land market.

	-Technology has enabled society to become increasingly connected and spatially enabled. Thus, it has been earmarked as a perquisite and a necessity in this 21st century. -Reintegration of information - Layne and Lee's four stage maturity model (Cataloguing, Transactional, Integration and Horizontal integration) -New way of operation - a shift away from silo mentality to across organisational boundaries. -Greater knowledge management, archiving and documentation of land development applications, tracking and monitoring development. -Radical institutional realignments' in the organisational structure. -Provides the opportunity to measure performance levels and initiate 'benchmarking programmes'. -Workflow processes and activities are transparent and accountable, aligns with the principles of good governance.
Optimisation	-Technological advancements are exponential in nature, needs to be updated regularly. -Legal requirements need to align with the system to ensure the legality and viability of the system put in place. -The integration of multiple databases can optimise local governments performance. -The optimisation of information management can yield further planning benefits, such as forward planning mechanisms, and informed decision making. -Optimisation of resources (systems and people) Greater efficiency of information workflows - achieved through G2G; G2C; G2B and G2C collaboration. - Facilitate in an accurate billing process. -Enhance information synergies between departments. -The degree / level of optimisation is based on five pivotal components namely, human capacity (skill base), existing telecommunication infrastructure, hardware, software and existing data captured into the LIS.
Leadership	-Government need to lead the way in public sector, meeting the requirements of businesses and the public. -Is there a presence of strong or weak leadership, these are individuals that mobilising ICT's as effective mechanisms? -Needs to be consistent, it cannot be sporadic or intermittent. -Coherent direction, goals and objectives shared throughout the organisational structure. - Organisations are often required to adapt to change in meaningful and constructive ways. -Initiator of change which equates to innovation in a organisation.

3.6. Conclusion

This chapter has shed light on the complexities of land and establishes the importance of land information as a crucial resource in the decision making process. It has uncovered how the use of ICT within local government is supporting land administration, management and development processes. An analysis of discourse revealed the numerous debates around the concept of a LIS. Policy and legislation integration is seen as vital in determining the feasibility of an LIS in this regard. Planning and the management of land is inextricably intertwined with the administrative functioning's of local government. The adoption of a LIS within the context of CoJ has transformed its workflow process. Planners need to be well acquainted with these technological and analytical tools at hand if they are to utilise them effectively.

Both chapters two and three lay the theoretical foundation for the study, expanding on concepts presented in chapter one. The following chapter will unpack the research methods adopted in this research report. The findings of this research will be cross-analysed with the aforementioned framework. The framework will assist in the analyses and discussion of the findings detailed in chapter five.

Chapter 4

Research Methods

4.1. Introduction

The preceding chapter has provided a theoretical platform on which this chapter is based. This chapter will magnify the research methods utilised to assemble the information required to address the research question. Throughout this report, the researcher makes reference to the research as that which, "is essentially a thought process on accumulating facts and data in order to determine what the facts 'say' and what the data means. Put differently, research is a method of action by means of which people solve problems in an endeavour to extend the boundaries of knowledge" (Leedy 1989: 4, cited in Brynard and Hanekom, 1997: 2). Therefore, research involves the interpretation of information in order to reach a valid conclusion.

Terms, paradigms shifts and epochs such as the mechanisation through ICT's, e-Government, and LIS are attracting the scrupulous attention of academics and scholars, due to the technologically driven information society we reside in (Corey and Wilson, 2011). In an attempt to unravel valuable knowledge in this field, the research design and method was kept simple and systematic (Brynard and Hanekom, 1997: 3).

The type of research conducted will determine the potential outcomes and findings, therefore adopting the right approach is crucial in answering the research question. The research methods required for this study are predominantly qualitative in nature and adopts an interpretative, qualitative approach. The interpretative qualitative approach facilitates in understanding the manner in which people interpret and take cognisance of their daily experiences, through inductive, interpretative and interactive analysis (Savenye and Robinson, 1996).

The use of multiple methods assists in capturing information in great detail that can be used to cross-reference the conceptual framework. The approach adopted to obtain and gather the data from key informants is semi-structured interviews. The researcher utilised Forester's (2006: 1) article titled, "Exploring Urban Practice in a Democratising Society: Opportunities, Techniques and Challenges" as a point of reference for conducting interviews with key informants, more specifically city officials, and planning consultants. This approach aligns well with what is advocated in interpretive qualitative research. How the secondary data was obtain from the CoJ GMS trends report, and is briefly outlined. The manner in which this data will be analysed is then presented. The chapter concludes by addressing the various ethical considerations that needed to be adhered to whilst conducting the research. The underlying aim of this chapter is to elucidate 'how' the information and data was collated.

Figure 4.1, below provides the reader with a graphical representation of the chapter. The systematic diagram illustrates the nature of the research conducted, the methods employed and the type of analysis that was carried out. Each facet of the diagram will be elaborated on in greater detail in this chapter. The varying colours utilised in the diagram represent the systematic flow of research and analysis conducted. The facets that are coloured the same have been made into sections, so as to more systematically present this chapter.

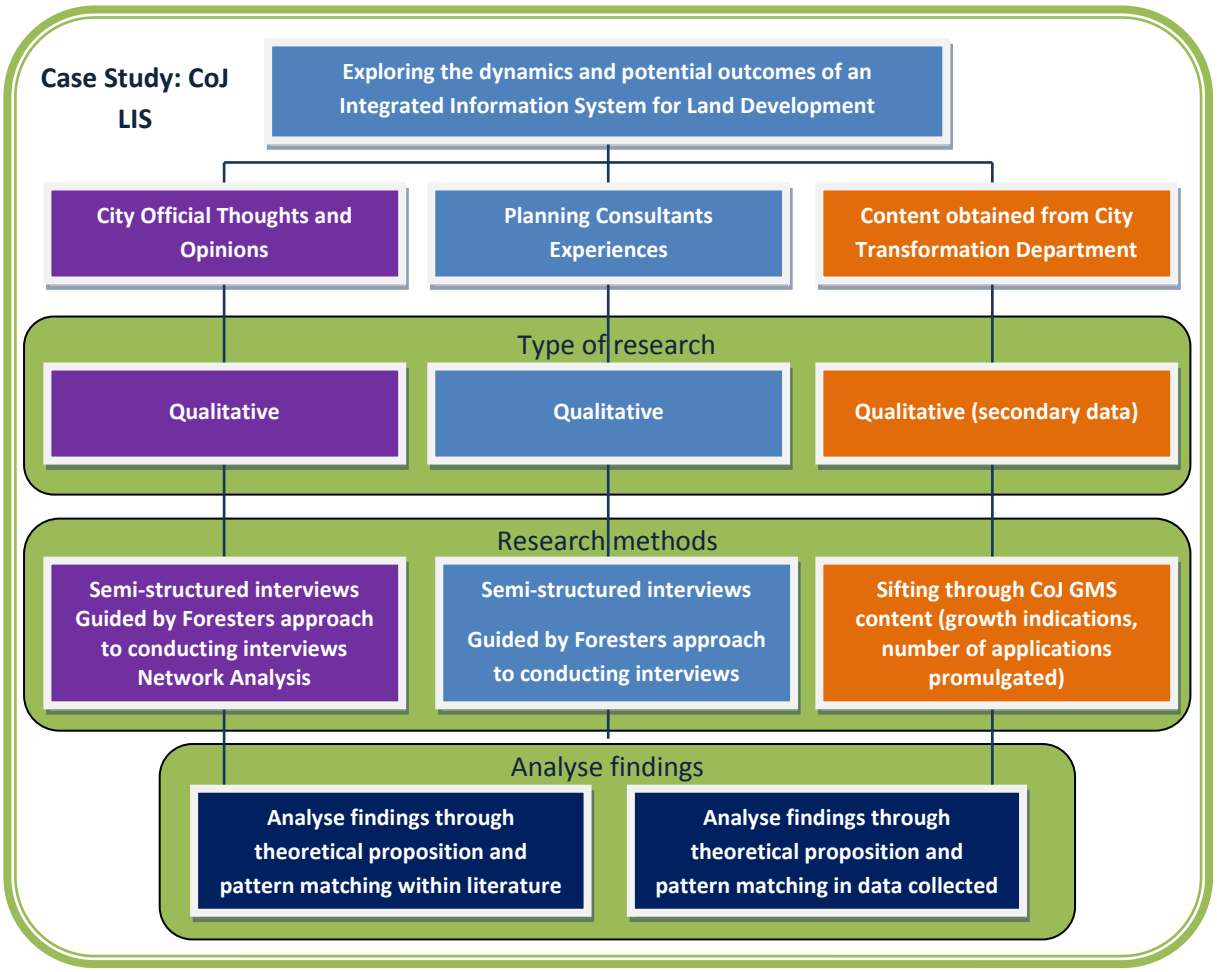


Figure 4.1: (above) Graphical representation outlining the research methods utilised in this report, **Source**: (Momberg, 2014)

4.2. Case study research

As a method, the inherent qualities of a case study are seen as appropriate to this research. Approaching research through the means of a case study utilises an array of methods to acquire the required information and data (Bromely, 1986, cited in Sarantachos, 2005). Tellis (1997: 12) classifies it as "one that uses multi-perspective analyses that elicit details from the viewpoints of the participants by using multiple sources of information". Yin (2003: 4) goes further to state that "case study is the method of choice when the phenomenon under study is not distinguishable from its context". Furthermore, Tellis (1997) explains that the use of a case study is closely aligned to an

interpretive qualitative approach to conducting research. These opinions on research are important, as this report is constructed around a case study approach to research.

According to Yin (1994: 8) utilising a case study as a research method has the "ability to deal with a full range of evidence – documents, artefacts, interviews and observations". In addition to this, Yin (1996: 8) explains that a case study "is an empirical inquiry that focuses on [a] contemporary phenomena within its real-life context" and answers research questions such as 'how' and 'why'. In utilising a case study as a research method, the researcher will be able to retain a holistic and meaningful understanding of the subject in question (Sarantachos, 2005). As Tellis (1997) has pointed out, the method relies on an array of data sources, at some point these sources of data will align providing a clear picture of the phenomena in question. Yin (1994) further points out that the development of a theoretical proposition facilitates as a guide for the collection and analysis of data. Research based on two or more methods and data sources is valuable in constructing a detailed contextual account of one case study. According to Guion et al, (2011) such research allows for mythological triangulation[3] which enhances the validity of the case study research.

Research conducted through the means of a case study is particularly valuable for the researcher who aspires to address the contextual situation as the topic may be of great relevance (Yin, 1994). In Watson's (2002: 184) view, the use of a case study can be beneficial to planning related research as it enables the interrelation of "actors, circumstances, contextual settings and sequences of events". A component of this research is aimed at addressing this, as it sought to crystallise how the system has enhance land development. This includes the actors who engage with it on a daily basis.

It is worth mentioning that this research utilised one case study. Conducting research through the use of a single case study has attracted criticism and raised concerns regarding the reliability of the findings or outcomes. However, Flyvberg (2001) counters this argument by noting the importance of 'subjectivity' of the case and the manner in which it is chosen. The case study identified largely depends on the field of research. A case can be randomly selected or it can be based on a preconceived experience or knowledge-base of the given topic. In his works, Flyvberg (2001) points out that if the underlying purpose of research is to accumulate as much information as possible about the case or given topic, then this approach should be adopted based on ones preconceived experience or knowledge.

The case study selected in this regard was pre-empted on a set knowledge-base about the adoption of ICT's in local government. Working in a local land use planning directorate, the researcher

[3] The use of multiple methods to study a particular topic

identified the lack of enthusiasm in ICT analytical tools. Although there was a GIS system present, planner's seldom made use of this information resource based on accessibility and technical skill limitations.

The researcher is well acquainted with the CoJ's e-services portal, also referred to as the "self-service portal" (Hattingh, 2014). The self-service portal allows a user access to land related information through a Web GIS viewer. Information such as zoning, demographic data, typography, public-transportation routes, up-to-date aerial imagery to name a few, are available to the public by means of the self-service portal. This sophisticated Web GIS viewer allows a user to render spatial information to a specific scale and dataset. The researcher utilised this platform throughout his academic journey for numerous urban design and land management related projects. These past experiences sparked the researchers' interest in this realm of knowledge. The various layers of information facilitates as a vital platform and portal to land information for a range of activities.

Over time academics and scholars alike, have altered their perceptions about case studies. Campbell and Eysenck (*undated*, cited in Flyvberg, 2001) previously condemned the use of a case study method as nothing more than insignificant narratives. However, Eysenck (*ibid*: 73) has altered this perception coming to the realisation that, "sometimes we simply have to keep our eyes open and look carefully at individual cases...not in the hope of proving anything, but rather in the hope of learning something". Flyvbjerg (2001: 87) provides evidence that "a discipline without a large number of thoroughly executed case studies is a discipline without systematic production of exemplars, and that a discipline without exemplars is an ineffective one". This accentuates the importance of this approach to conducting research on this particular topic.

As previously mentioned, the research is based on the CoJ's LIS. The research is constructed around this case study because it was the only operational information system, at the time of the research, that utilised an ICT mechanism to facilitate land related activities.

4.2.1. Case study – the City of Johannesburg's Land Information System

The case study utilised in this research report is the Land Information System currently in operation in the CoJ. This information system is headed by the Corporate Geo-Informatics Directorate. The LIS is responsible for collecting data from various sources responsible for land information. This includes maps, aerial imagery, land related information and billing information which is funnelled into the integrated LIS. The LIS has developed into the single point of reference regarding spatially-enabled sources of land information in the City. This is the focal point of the research – the use of a information system for decision making and integration of land related information.

Through the use of this case study, the researcher conducted semi-structured interviews with CoJ officials involved with the operations of the LIS. Planning consultants were also approached to obtain their external opinions and accounts of their experiences with any land related activity. The above mention methods of information collection utilised by the researcher will be discussed in further detail below.

4.2.1.1. Network analysis

Within this case study, the network analysis method was utilised to augment the research findings. The approach as an empirical tool is used to describe and analyse the organisational structures based on information synergies and relationships between people, groups and departments (Kenis and Schneider, 1991). The method utilises a combination of graphical and mathematical tools of analysis in analysing and describing the relationships between agents within the organisational structure (Keast and Brown, 2007). The network analysis was constructed through the aid of key respondents interviews, more specifically city officials (key respondent interviews will be discussed in the following section).

The results of the network analysis assisted the researcher conceptualise the overall functioning's of the LIS. In constructing a graphical representation of the LIS, it will help uncover the various typologies and synergies of land information sharing amongst departments. It also enabled the researcher to construct the overall workflow synergies between departments and agencies.

4.3. Obtaining information from city officials, and external agents

4.3.1. Type of research required

The research places emphasis on 'how' the LIS has enhanced land development in CoJ. The researcher wishes to utilise an 'evaluation lens' as the overarching approach to the research. Evaluation research can be defined as an "inquiry employed to assess the merit of programmes, policies, services or interventions. Its main purpose is to provide information about various aspects of programmes, such as whether these programmes, policies, services or interventions are worth pursuing, supporting or continuing" (Clarke, 1993:3, Greene, 1994 and Sanders, 1999 as cited in Sarantakos, 2005).

Within this approach, a case study of the CoJ's LIS will be the basis of evaluation. City officials and planning consultants engaging with this system were asked to provide their perception, perspectives and opinions. In so doing, the researcher deems a qualitative approach is best suited as a research method. In the opinion of Philip (1997: 267), "qualitative studies are typically small-scale intensive pieces of research in which everyday life experiences by all sorts of people and communities are

explored". Creswell (2009) further categorises specific research methods that underpin a qualitative approach, namely: group interviews, unstructured interviews, discourse analysis, case studies, face-to-face interaction, narrative inquiry, phenomenology, grounded theory and ethnography.

The research method which aligns with this report is semi-structured interviews and narrative inquiry with key informants. The rationale behind this approach is that the researcher had questions which need to be put into perspective. It should be noted that the researcher is open to the respondents opinions and themes which may have not been adequately acknowledged or disregarded.

4.3.2. Key respondent interviews

Information and data regarding the operability and general workings of the LIS within the CoJ cannot be found within literature. In order to obtain a meaningful understanding of the LIS, it was essential to approach key respondents and informants for interviews. This was done in an attempt to familiarise and acquaint the researcher with the LIS. The LIS is responsible for recording information on land. Planning, development and the management of land is inextricably linked to virtually every aspect of planning theory. Land, by its very nature is changing from the means of management to development on it, bringing in its wake a plethora of challenges for planners. Forester (2006) recognises these challenges and provides the researcher with meaningful insight on how to approach research within the realm of planning practice.

In his article "Exploring Urban Practice in a Democratising Society: Opportunities, Techniques and Challenges", Forester (2006) supplies researchers with a framework to conduct research, as seen in the table below.

1. "Choose actors, not spectators, engaged with a problem that you find crucial, fascinating, and compelling.
2. Ask those actors to tell the story of instructive cases revealing both challenges and opportunities.
3. Do not ask the actors ‘what did you think about X?’ ask ‘how did you handle X?’
4. Get the actors stories with a trajectory.
5. Help the actors help us: ask for relevant details, not good intentions, ask for examples, not abstractions.
6. Ask for practical implications.
7. Allow time for reflection and lessons learned.
8. Give ‘reflection’ content by mining the riches of surprise” (Forester, 2006: 576).

City officials and external agents directly and indirectly involved in the LIS were selected as key respondents for the research. As Forester (2006) notes, a researcher should identify "actors and not spectators, engaging with a problem" with the LIS as a departure point for conducting the research. According to Kumar (1989: 1) a key respondent "is an individual who has a substantial amount of knowledge and information into the subject which the researcher is investigating". City officials, developers and planning consultants may be able to provide the researcher with information that ordinary citizens are oblivious to. Therefore, it is vital to interview such respondents, who are actively involved with the LIS since its inception and throughout its general operations. They ultimately attain first-hand experience and insight to the genealogical overview of the LIS. This process of prodding and conducting research will adopt a form of narrative inquiry.

Narrative inquiry is firmly embedded in the understanding that humans develop an understanding and give meaning through personal story telling (Andrews et al, 2008). Kramp (2004: 106) states that "a narrative is a way of knowing". This is part of our cognitive inventory. It is a process of engaging in dialogue that enables the story teller to give meaning to the experience, and as a result, the researcher can formulate an understanding. A story does not exist before it is told. Only when it is shared, meaning becomes assigned to the experience and the intentionality becomes unambiguous (*ibid*, 2004: 110). In the context of this research, key respondents, will be reflecting on their experiences of a specific topic, that is, the LIS and its related themes.

It is inevitable that each respondent will adopt their own thought trajectory and opinion of the LIS. For example, a planning consultant will have a preconceived notion of the workings of the local authority. According to Forester (2006) the project, plan or process that is being examined or researched should have happened already. A process that has yet to take place, or that is in the embryonic phase of taking place, offers limited use, as researchers are unable to reflect on any potential outcomes.

The LIS in the CoJ has been operational for 7 years now, addressing Forester's (2006) concern regarding the validility of the project, plan or process. Forester (2006) indirectly poses the suggestion that the researcher must delve into, 'what the outcomes of the project, plan or process were?'. Boyce and Neale (2006: 3) suggest some insightful trajectories a researcher may pose to a respondent during an interview, by noting the following: "for example, we might ask participants, staff, and others associated with a program about their experiences and expectations related to the program, the thoughts they have concerning program operations, processes, and outcomes, and about any changes they perceive in themselves as a result of their involvement in the programme".

This aligns closely to what is advocated in innovation literature. The researcher constructed and posed similar questions to respondents during their interviews.

Whilst conducting any form of interview, the researcher must guide the respondent with relevant, clear, concise and well-articulated questions. The respondent needs to understand and comprehend the trajectory of the question posed to them; if they are to reveal rich information about the tasks they have been conducting (Forester, 2006). Furthermore, the researcher should avoid monotonous one-way dialogue, subjugating the respondent to passiveness. The interview ought to be conducted in a manner the respondent feels comfortable in addressing questions that may be politically ambiguous, and socially nuanced. It is for this reason that the researcher prepared questions guided by literature to the interview. This will guide the type of data the researcher will scrutinise in the following chapter (*ibid*).

4.3.2.1. Limitations of this approach to research

The most significant setback to key respondent interviews is that city officials may not be entirely honest. Engaging with city officials involved in the workings of the city may skew information as respondents who are directly involved with the LIS may withhold information, so as to not jeopardise their positions. Boyce and Neale (2006) believe that respondents directly involved may be willing to shed light on the successful workings of the system. However, they can be hesitant if not reluctant to elucidate the faults and challenges of it. The research overcomes this limitation by conducting multiple interviews with city officials and external agents, so as to eliminate the aspect of biased feedback.

Although the use of a case study as a research method is conducive for assimilated multiple sources of data and viewpoints. It is inevitably time consuming and costly when compared to attaining data from a single source (Yin, 1994). This time duration will depend on the level of detail the interviewee provides the researcher with. If the respondent grants permission to be audio recorded, the process of transcribing the audio information will be time consuming and tiresome. Furthermore, the researcher has to synthesise and identify patterns and or address contradictions in the data (Boyce and Neale, 2006).

4.3.2.2. Brief overview of the key respondents

The following section provides the reader with a brief overview of the key respondents the researcher approached during the formulation of this research report. Interviews were conducted with internal respondents (city officials) and external respondents (planning consultants). Planning consultant often represent developers based on their levels of expertise and skill sets. Thus, the

researcher asserts that planning consultants provide an adequate amount of information and insight for the purposes of this report.

City officials

Adopting an interpretive qualitative approach to the research, the researcher aspired to gain a overall understanding and insight into the operations of the LIS in the CoJ. Therefore, respondents from three sections of the CoJ were earmarked in this regard namely: the Corporate Geo-Informatics Directorate; City Transformation and finally, the Development Management Department. These three sections fall under the Department of Development Planning and Urban Management. Due to the nature of land development, departments work alongside each other, to carry out set functions. The table below provides a brief summary of the city officials interviewed.

Name of Department	Name of key respondent, position and brief description of their role
Corporate Geo-Informatics Directorate	Mrs Marcelle Hattingh, Director, initiated and has overseen the development of the LIS within the Directorate.
Corporate Geo-Informatics Directorate	Mr Etienne Erasmus, Deputy Director, designated section: System Administration and Development, worked alongside Marcelle Hattingh since the LIS's inception to present day.
City Transformation Department	Miss Margo Weimers, Senior Specialist, key roles include spatial policy formulation, reviewing of SDFs, provide input on development plans and strategies such as the GDS 2040, She has worked alongside former deputy director Peter Ahmad who initiated the GMS trend analysis report.
Development Management Department	Ms Marietjie Reinecke, Deputy Director, coordinate and manage numerous local land use planners, She is a key proponent in the development of the TAS since its inception under the name Development Application System (DAS).

Planning consultants

Planning consultants provided the researcher with a rich narrative and external opinion of the implementation of the LIS in the CoJ. These external agents assisted the researcher to uncover how the system has improved their experiences and dealings with the city. The table below provides a brief outline of the planning consultants interviewed.

Name of planning consulting company	Name of key respondent and brief description
Sandy de Beer Consulting Town Planner	Mrs Sandy de Beer, owner of Sandy de Beer Consultants, she has over 30 years working experience within the realm of land use management and has been engaging with the CoJ for over 25 years.
Raven Town Planners	Mr Rick Raven, owner of Raven Town Planners, he has over 20 years working experience in the field of land use management and development planning. He has represented many respectable and prominent property developers.
Di Cicco & Buitendag Town Planning Property Consultants	Mr Mario Di Cicco, co-owner of Dicco & Buitendag Town Planning Property, he also has over 20 years working experience in the field of land use management, as is a former employee of the CoJ, land management division at the time.
Brownlee CC	Mr Noel Brownlee, operates his own 'one man' practice and has been engaging with the CoJ's Department of Development Management for over 6 years.

4.4. GMS trends and development indicators

4.4.1. Type of research required

This part of the research utilised secondary data obtained from the City Transformation Department. Secondary data analysis research involves the analysis of existing datasets that have been collated by another researcher for another purpose (Heaton, 1998; Smith, 2011). In this regard, the data has been compiled by the CoJ, and the GMS trends analysis will provide an additional spatial component to the research.

4.4.2. Spatial and numerical analysis of development trends

Utilising the available GMS data, the researcher sought to investigate how the City was utilising the LIS database in spatial policy making. The GMS trend data has been made available for public perusal via the CoJ website. It should be noted that the latest, fourth annual review of the GMS report published in June 2012, has been revoked from the CoJ's website (the reason behind this will be explained later in chapter). The initial GMS report drafted in 2008, up to the third review in 2010, is available to the public. The CoJ has yet to publish a revised GMS trends analysis report since June 2012.

According to Mouton (2001: 108) the term "analysis" involves 'breaking up' the data into manageable themes, patterns, trends and relationships. The aim of analysis is to understand the various constitutive elements of one's data through inspection of the relationships between various concepts, constructs or variables and to see whether there are any patterns or trends that can be identified or isolated, or to establish themes in data". The analysis technique outlined by Mouton (2001) was selected because of the simplicity and ability to conduct pattern matching. According to Yin (1994) pattern matching is an analytical technique, that compares a factual outcome with a hypothesised one (this will be discussed in further detail in the following section). The GMS trends analysis data graphically illustrates via the means of maps, where development is taking place within the jurisdiction of the CoJ. The spatial component will supplement the research findings in the following chapter.

4.6. The approach taken to conceptualise the information and data

As alluded to above, the main method utilised is based on a single case study. The analytical strategy utilised in this research is what Yin (1994: 130) refers to as "relying on theoretical propositions". This approach requires the researcher to take cognisance of the theoretical propositions that emanate out of literature and the preliminary objectives of the research. Yin (1994: 130) notes, "the proposition is an example of a theoretical orientation guiding the case study analysis". It should be noted that these theoretical propositions informed the process of data collection and provided the researcher with a guide of the data and information required.

The information extracted from the various respondent interviews was initially categorised into specified themes and concepts that emerged out of the literature surveyed. Some of the categories did not emerge out of the literature and were utilised in the conceptualisation of the broader scheme of the LIS. The approach illustrates the notion of deductive and inductive information analysis. Questions posed to city officials were primarily derived from literature, however, the nature of the research required an interpretive qualitative approach. This enabled the researcher to

interpret and make sense of respondents experiences through inductive and interpretative analysis (Savenye and Robinson, 1996).

As a research method, qualitative analysis enables the researcher to piece together and identify patterns of themes. During this process the researcher generally adopts a bottom up approach to the research. Furthermore, it required the researcher to work backwards and forwards between themes and concepts, until the researcher is able to establish a coherent research (Creswell, 2009). It is important to note, that not all the themes and concepts were present in the initial literature review, only through engaging with key respondents allowed the researcher to conceptualise and understand the broader workings of the research topic. Pratt (2009: 1) classifies this process of research as "iterative analysis – a methodically plodding process". Put differently, when a researcher inductively identifies a specific theme or concept (from the literature surveyed or information obtained), they attempt to validate or confirm their findings based on existing academic literature. This ongoing process is deductive hence it initiates an "inductive loop" (*ibid*).

The available information and data made available by the CoJ City Transformation Department was culled from the available GMS trends reports and analysed accordingly. For instance, the spatial location of development applications and number of applications processed since 2007 to 2011. Development patterns and trends were analysed, which also informed the questions that would be posed to both city officials and planning consultants.

The information obtained from the various methods were then cross-analysed with the key concepts, themes and ideas revealed in both literature and key respondent interviews. As mention in the previous section, Yin (1994) classifies this analytical technique as "pattern matching". This technique requires the researcher to compare and contrast findings from literature. If the findings are conclusive, a researcher can formulate a strong conclusion and validate their hypothesis. However, if the findings are inconclusive and fail to align with what was proposed the preliminary prediction or hypothesis has to be revised. This concept is closely aligned to the "iterative analysis" strategy highlighted by Pratt (2009).

4.7. Sequential steps taken to obtain the information and data

Once the research topic had been identified and chosen, it required getting to grips with this multifaceted system. The researcher made multiple trips to the CoJ's premises to collaborate and develop the hypothesis with city officials in the Development Planning section (Development Management, CGIS Directorate, and Legal administration Department). In addition to this, the researcher also made contact with a planning consultant (Mr Mario Di Cicco), so as to gain an overall

understand of his experiences engaging with the CoJ. The method utilised in the initial step was narrative inquiry through 'off the record', unstructured interviews. All the respondents at this stage freely expressed their thoughts and experiences on the research topic. These early connections proved helpful when the scheduling follow up 'semi-structured interviews' with respondents.

The interpretative qualitative approach allowed the researcher to collaborate and interact with research respondents, in ways that aim to understand how the subject experiences and interact with their reality, by examining thoughts and opinions. In this case, understanding the presence of ICT's within local government sought to uncover the operations of the LIS. Collaborating with the aforementioned agents allowed the researcher to narrow down the scope of the research.

The researcher decided to approach planning consultants prior to conducting any interview with city officials. The rationale behind this decision was based on the preconceived notion that planning consultants may provide the researcher with additional insight or questions that could be posed to city officials. Thus, the researcher set up formal interviews with four respectable planning consultants. The interviews were semi-structured guided by the researcher and sought to uncover their thoughts and experiences of the topic. Following on from the planning consultants interviews, four city officials were formally interviewed. Again this was semi-structured and sought to gain a greater understanding of the operations, rational, challenges and experiences of the system in place. With the consent of the respondent each interview was audio recorded for analysis purposes.

The researcher initially attempted to tabulate and graphically represent the CoJ's Department of Development Management's performance, in accordance to the number of development applications received in comparison to the number of promulgations. A full audit report was difficult to get hold of, although requests for these reports did not yield substantial numerical facts, as many data fields in the 'Excel spreadsheet' were incomplete (Reinecke, 2014). The researcher then sought the GMS trends analysis data, however, the latest June 2012 review cannot be obtained via the CoJ website. This was besides the fact it had its own dedicated webpage and links to access the report. As a result, the researcher requested this information from the City Transformation Department. This secondary data and statistics regarding the development trends was then sifted through and analysed.

Only once the relevant information and data was collated, could the researcher undertake the analysis phase of the research. This included listening, transcribing and making additional notes from the key respondent interview audio recordings. Findings were designated into specific categories such as the rationale behind the LIS's adoption / challenges and difficulties; and future potentials / recommendations. The information obtained from each respondent was cross-analysed with themes and concepts around literature regarding the topic. The flow chart diagram illustrated in Figure 4.2, depicts the research process and steps traversed to obtain the results.

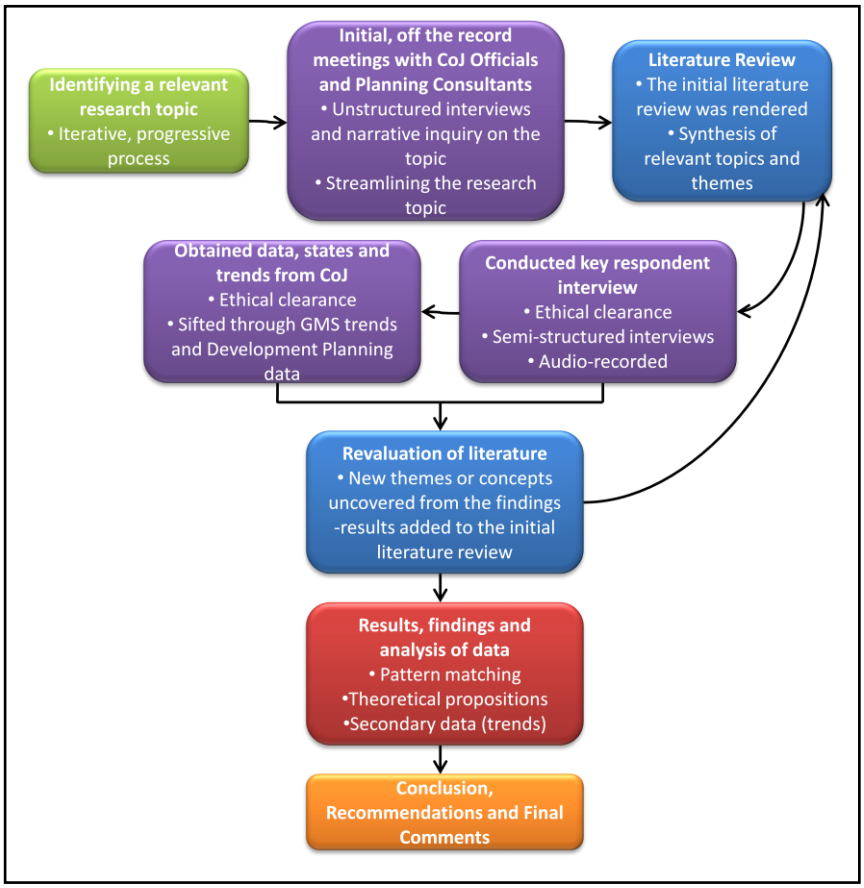


Figure 4.2: (above) Research flow chart diagram, **Source**: (Momberg, 2014)

4.8. Ethical considerations

The following section identifies the ethical considerations involved when conducting qualitative research, through key respondent interviews. As key responded interviews formed a core component of this research report, it was integral that the researcher obtained authorisation and permission from them to conduct the interview and utilise their insights in the research findings. Authorisation and permission from higher levels of management (such as Directors in the Department of Development Planning in the CoJ) to carry out interviews with city officials were also required.

All respondents were provided with a letter (addressed to the specific respondent) which briefly described the research topic, rationale and aim. The letter also informed the respondents that their confidentiality would be maintained, if necessary. However, all respondents approached for the purposes of this report granted the researcher permission to utilise their names alongside their contributions to the report. The letter and consent forms are attached herewith in the reports Annexure D.

4.9. Conclusion

This chapter has presented the methods and means through which the researcher obtained information and data relevant for the report. The underlying research conducted in this report is predominantly qualitative. The information gathered by the key respondents was through qualitative research, which was done by means of semi-structured interviews, in which interviewees were encouraged to transpire their thoughts, opinions and trajectories of the topic. The researcher utilised Forester's (2006: 1) article, titled "Exploring Urban Practice in a Democratising Society: Opportunities, Techniques and Challenges" as a frame of reference and guiding tool in the interview process. Through interviewing internal and external informants, the researcher was able to utilise Yin's (1994) analytical technique, referred to as pattern matching. A brief synopsis of how the information and data was obtained and analysed was then provided. The following chapter reveals the research findings and begins to analyse the information obtained through the research methods outlined above.

Chapter 5

Findings and Discussion

5.1. Introduction

This chapter aims to unpack the outcomes of an integrated information system for land development. The bulk of the research findings emanated from key respondent interviews and secondary data, as outlined in the preceding chapter. The discussion presented in the following chapter is based on the CoJ's LIS, and typifies the relevant themes outlined in the theoretical framework, such as access, enablement, optimisation and leadership. The thematic review of literature contained in this report assisted in the synthesis and analysis of the LIS. The research sought to discover how the implementation of the LIS has enhanced land development. This chapter begins by exploring the rationale behind the systems adoption in the CoJ. A graphical network diagram on how the LIS has streamlined workflow processes in the City is constructed. It then addresses how this unified database has assisted both internal and external agents in the land development process. In order to move forward the shortcomings of the LIS need to be addressed. These challenges and concerns were raised by city officials and planning consultants, who were interviewed, as will be detailed. Finally, the manner in which this development data and information has been translated spatially is provided.

5.2. The rationale behind the implementation of the Land Information System

The genealogical narrative behind the CoJ administrative realignments and progression into a democratically led government had a significant influence behind the systems adoption (Hattingh, 2014). The CoJ has experienced various administrative transitions, from racially divided regions during the Apartheid era to a democratically-elected municipal jurisdiction in the mid-1990s (Todes, 2012a). As part of the municipal restructuring in 2002, the majority of the City's planning departments were centralised in Braamfontein, through the amalgamation of the previous Joburg Metro, four local town councils (North, South, East and West) and Midrand administrations (*ibid*). Although this was a remarkable achievement for the City, it brought with it countless challenges such as: reconfigurations in internal workflow processes; data assimilation of property information; as local councils at the time handled information datasets according to their own methodology and functionality (Erasmus, 2014).

The LIS was initially conceptualised as a support subsystem for a Systems Application Project (SAP), called "*Programme Phakama*" (Hattingh, 2014). SAP deals exclusively with the billing and revenue collection of the city. Conceived in early 2006, *Programme Phakama* sought to address "the operational environment for revenue and customer interface management" (*ibid*). Planning consultants believed the city sought to reconcile concerns and challenges facing billing and revenue

collection. This SAP programme utilises a "comprehensive software program" which facilitates in the "streamlining" of workflow processes (CoJ, 2009a).

Although the on-going 'billing crisis' surrounding the CoJ's finances is not of the main concern in this report it does have reciprocal implications for the underlying rationale behind the LIS and land development. Not only does efficient revenue maximisation promote public-led investment in service delivery and infrastructure provision, it allows property owners efficient access to property data. Property owners can request and obtain crucial information such as 'Section 38 clearance certificates' from the valuation department with relative ease. The manner and efficiency with which property owners, developers or planning consultants obtain this information determines when the development processes or transfers of property ownership can take place.

Hattingh (2014) points out that shortly after the conceptualisation of *Programme Phakama*, "the city quickly realised it required a reliable property database". This vital component was not recognised in the initial development phase of the programme. As a result, the city identified the need for a unified, single source of property related information. Without the development of the LIS database the entire *Programme Phakama* would not feasible. This is because "reliable property information is a prerequisite for a credible billing process" (*ibid*). Property information is the "building block of space", and the Department of "Development Planning [CGIS, Development Management and City Transformation] are the custodians of space in the City" (*ibid*).

Erasmus (2014) notes the importance of the GIS database, as he makes the claim that it is a "crucial component – that was built prior to the implementation of the LIS". It is estimated that approximately 80 per cent of all the data utilised by local government involves spatial and non-spatial information of land (Masser and Ottens, 1999: 26). The above mentioned figure accentuates the importance of capturing, storing and sharing of information through associated management systems. Both these mechanisms play an integral part in planning and implementing the vision of the City.

Development planning manages the lifecycle of each parcel of land within the jurisdiction of CoJ (Hattingh, 2014). Each parcel of land has its own unique spatial and non-spatial related attributes ascribed to it (Erasmus, 2014). Within the Department of Development Planning, more specifically Corporate Geo-informatics (CGIS), is the directorate responsible for core property related information of the city. Therefore, the directorate was subsequently approached to create a unified database, based on the abovementioned situation.

Discussions of the LIS arose in mid-2006, shortly after the City recognised the importance of a "complete and unified property database", however the system officially commenced in early 2007 (Erasmus, 2014; CoJ, 2009a). At this time, the vision of the CoJ was under the banner of "a world class African city". Therefore, the city sought out incentives and innovative strategies to "meet world best practice in terms of processes, systems, people and to transform the service levels and service delivery model of property services" (Hattingh 2014).

According to Hattingh (2014) the implementation of the LIS brought great responsibility and expectations on everyone in the CGIS department. Although the presence of ICT as an analytical tool is synonymous to a multi-purpose, multi-user GIS system, the implementation of the LIS called for institutional realignments as a new division in the directorate needed to be created (this will be discussed in further detail later in the chapter). This, to a certain extent, set the platform for individuals to cultivate innovation in the organisation, which can be difficult to achieve within the bureaucratic functioning of local government (Howard, 2012). It is clear that the decision to embark on this 'revolutionary' LIS permeated from political, financial, institutional and performance related pressures. The lack of trust and confidence in government ability to perform and deliver has been address throughout literature (e.g. de Guchteneire and Mlikota, 2008; Gaventa, 2002; Heeks, 2001, 2003).

During this time, the former Executive Mayor of the CoJ, Amos Masondo was under media scrutiny regarding the City's 'billing crisis'. With the Municipal Elections fast approaching in 2009, the city recognised the political importance of the LIS and SAP system. The City saw this as an opportunity to rekindle and reconcile the level of satisfaction of its citizens, by proactively initiating such innovative mechanisms. It took the CoJ just over 3 years to develop a strong foundation to initiate the SAP system, as it was initiated throughout the City's departments and parastatals in phases, early in 2010 (Erasmus, 2014). During this time, the LIS was already operational, capturing land development applications and building plans submitted to the City.

Although the migration to both the LIS and SAP systems was embedded in a political motive, it created a new platform for departments to integrate and collaborate in ways that never occurred before. Hattingh (2014) provides evidence of this, as she notes that the CGIS department is now well acquainted with the entire land development process and PVC. Therefore, there has been a fundamental shift from a silo mentality to across organisational boundaries. As Hattingh (2014) notes, "before we [CGIS] were operating in silos, only concerned with tasks relevant to our department. The implementation of the LIS has allowed our department to recognise the entire development process which spans across a multitude of departments".

It would seem that the wide range of political, financial and institutional pressures pre-empted the LIS's adoption. This demonstrates that within the context of the CoJ, the decision to embark on this innovative mechanism stemmed from higher levels of management in the city's organisational structure. This suggests it was 'top-down, collaborative-led initiatives', which aligns with what is advocated within innovation literature. Innovative process, as noted by Fimm (2011), calls for individuals in prominent positions in the institutional hierarchy to initiate and drive it (Fimm, 2011; Howard, 2012).

This is emphasised in an exemplary manner here, as innovation was a central component in the CoJ. In the context of the LIS, the process was initiated by individuals in prominent positions, such as Executives, Directors and Deputy Directors. The implementation of the LIS required buy-in from various departments and parastatals, and also resulted in major institutional realignment throughout the City's day-to-day operations. The presence of leadership within the process of innovation is crucial (Howard, 2012). Hence, the importance of individuals in prominent positions driving the transitions to ICT driven mechanisms is salient.

During the inception of the LIS, every department was assigned "scorecards" (Erasmus, 2014). This was the city's attempt to benchmark, monitor and evaluate a department's performance. Both Erasmus and Hattingh (2014) cite the presence of limited amount of human and capital resources as inhibiting the performance of the City. Often, these city officials are under a tremendous amount of pressure and there is an expectation to meet and accomplish goals on a restrictive budget. These pressures and challenges are often at the helm of successful innovation implementation.

The City has undoubtedly witnessed the successes of the LIS. Under the leadership of Hattingh, the CGIS Directorate has achieved numerous awards and accolades, such as the 'Innovations Award' from the Joburg Innovation and Knowledge Exchange, in 2009 (CoJ, 2009a). According to Hattingh (2014), ongoing motivation and encouragement contributed towards the success of the LIS. She felt that the City, more specifically the CGIS department had an obligation to serve its customers by providing them with reliable, credible and rateable property information.

Innovation spans across various departments in the CoJ and is not confined to the CGIS Directorate. Erasmus (2014) cites former assistant Director in the Development Planning and Facilitation Directorate, Peter Ahmad, as being a "pro-active individual" and exemplifies his prominence as a former asset to the CoJ. He explains that Ahmad was particularly interested in the GIS software the CGIS Directorate utilised, as he "learnt how to utilise the software in conjunction with urban planning, by himself." (Erasmus, 2014).

Weimer (2014) cites Ahmad as being the initiator of the GMS trend analysis and development indicators. Utilising the information obtained from the LIS in combination with the Development Management Department TAS and BAS data, Ahmad wanted the department to track development, investment and economic trends and the growth of the City. In this sense, Ahmad can be classified as a "champion" in that he effectively collaborated with multiple departments which is a crucial factor in initiating innovation (Lam, 2005). In addition to this, the Deputy Director of Development Management department, Reinecke has been a prominent figure in the continuous development of the TAS system (Erasmus, 2014). The above mentioned individuals in the CoJ have all played a proactive role in the overall migration to ICT driven mechanisms.

It should be noted that the LIS was developed 'in-house', in collaboration with an external technical service provider, the International Business Machines Corporation (IBM). According to Hattingh (2014) the City needed to take the initiative and developed a system that address a specific tasks. This together with its progressive adoption throughout departments aligns with what is advocated in e-Government literature (Layne and Lee, 2001). Although there have been examples of information systems cited throughout literature, the CGIS Directorate did not seek help from international insights and past-experiences (Hattingh, 2014). This is somewhat concerning, as it has been well documented in literature the notion of e-Government failures by scholars such as Ciborra (2005), Baldwin et al (2011), and Heeks (2001, 2003).

The development of the LIS aligns to what is advocated in information system literature, taking into consideration a countries development context and requirements (Dale and McLaughlin, 1988; McLaren and Stanley, 2012). However, it is crucial that when any government implements ICT's into their workflow processes, they are well-acquainted with past experiences and common challenges.

With the LIS and relevant subsystems such as the TAS and BAS in place, the city is in the process of standardising the development process, ensuring greater accountability and transparency in every department. If the CoJ can make processes more efficient and convenient for the property development industry, it will facilitate in 'red tape' reduction, and establish a conducive environment for economic growth and further coordinated development.

5.2.1. Conceptualising the overall operations of the Land Information System

The following section elucidates the flow of property data in the CoJ. Given the opaque nature of the overall operations of the LIS, the researcher sought to conceptualise the workings of various systems and subsystems. It uncovers the manner in which property data is obtained, screened, and replicated into the LIS database. The LIS effectively cuts across numerous departments and

facilitates as an interface for the billing system (SAP). It also supplies property data to relevant subsystems currently in operation in the City, such as the TAS and BAS.

Although the City has rendered diagrams of the PVC and LIS, the researcher felt it was necessary to develop a network diagram, illustrated in Figure 5.1, through the assistance of city official interviews. Constructing this diagram assisted the researcher in understanding the overall workings of the LIS within the context of the CoJ. This diagram illustrates relationships and information synergies between departments. The workflow process of property data in the City is iterative in nature. Although the diagram illustrates a one-directional flow of information (from left to right), the development of land is ongoing. The LIS supports the entire life-cycle of property data, as it begins and ends at the Deeds Office and Surveyor-General. However, the billing of a property occurs on a monthly a basis. An information system that captures land related data is an indispensable asset for local government in terms of revenue administration and management.

Before the LIS, the CGIS Directorate had three sections, all of which sought to develop, validate and maintain property data. These sections were: spatial information; street addresses; and zoning. With the inauguration of the LIS in 2007, the directorate initiated an additional section called the "land information system" (Erasmus, 2014). This exemplifies one of the many institutional realignments that have subsequently taken place in the Department of Development Planning.

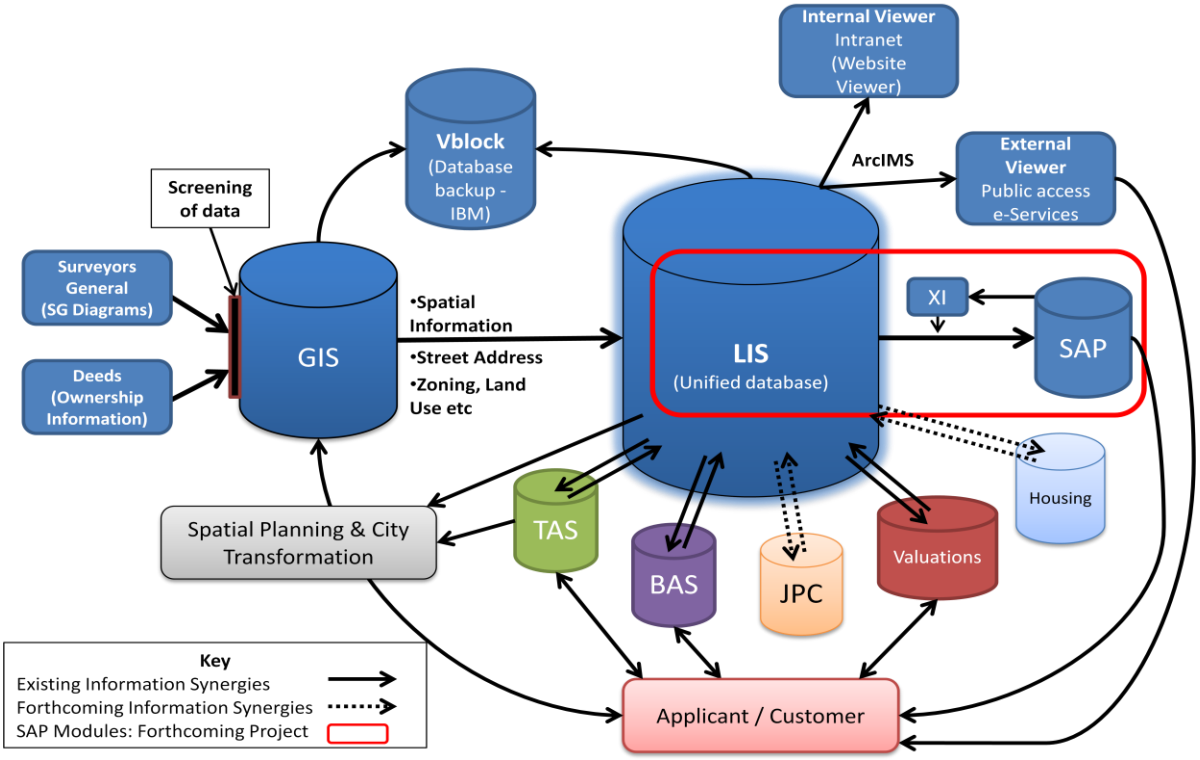


Figure 5.1: (above) Graphical network analysis of information exchange, typologies and synergies between departments, parastatals and the public **Source**: (Erasmus, 2014; Hattingh, 2014; Momberg, 2014; Weimer, 2014)

There are two predominant sources of property data that the CGIS Directorate utilises (Erasmus, 2014). The directorate receives an extract from the Deeds Office and Surveyor-General on a weekly basis. If there is a transfer of ownership the relevant property data is captured and undergoes a tougher screening process (*ibid*). If any discrepancies are found, it is referred back to the relevant property source mentioned above. The directorate is dependent on this legal form of land tenure, however it does acknowledge the presence of informal settlements. It is in the process of capturing aerial imagery, demarcating the location of these settlements and monitoring the volatility of these organic developments. This visual layer adds an additional spatial component to the database, which simplifies data validation processes and assists in the planning of any upgrades. According to Erasmus (2014) the City is in a process of regularisation and formalisation these settlements, only once they are formally captured in the Surveyors General and Deeds Office, the correct information can be populated into the LIS[4].

The process of capturing property data takes place daily in the CGIS Directorate. However, twice a week, on Tuesdays and Thursdays, "the master dataset compiled by each section in the week" is replicated into the LIS (*ibid*). The mechanisation of this workflow process has effectively "locked it down" to any form of property data tampering by assigning users different access rights (Erasmus, 2014). This ensures transparency and accountability at every step and thereby discourages any surreptitious activities (McLaren and Stanley, 2012). Furthermore, property data captured into the GIS and LIS databases gets transferred into a secure backup database referred to as "Vblock" (Hattingh, 2014; Erasmus, 2014).

The sharing of spatial and non-spatial information through ICT's has enormous implications for integration and coordination in planning processes. A crucial mechanism in this regard is the presence of a shared online database, and an internal 'intranet' network to facilitate in information exchange (Goldfinch et al, 2011; Masser and Johnson, 2006). However, subsystems (such as the TAS and BAS) that bring more to the table, increase the complexity and difficulty of integration. The more complex and crowded the overall system becomes, the harder it is to regularise, formalise and process the data captured. This also inherits the risk of placing a greater dependency on the existing infrastructure network (Trusler, 2003).

There are various subsystems in operation in the CoJ, including the TAS and BAS. These subsystems not only manage the administration functions relating to the development applications submitted to the City, they also supply data for various other planning functions such as policy making and

[4] This can be seen in the provision of RDP housing in Protea Glen Extension 16, refer to the Annexure B, for the graphic mapping, demarcation and growth of this development since 2006-2009.

forward planning. According to Erasmus (2014) the Directorate has been collaborating with the JPC and Housing Department. These departments will soon have access to this unified database, which also source property information on a daily basis.

The City Transformation Department is yet to develop its own spatial trend analysis tool. Presently, the directorate depends on other datasets such as the TAS, but the LIS has furnished this section with property data, when requested (Weimer, 2014). The CoJ has been able to translate this data into a spatial context, by graphically mapping development trends, since the LIS's inception, as seen in the City's GMS. The GMS trends analysis data presently available reflects the City's growth from 2007 to 2011. This data is yet to undergo its annual review (this will be discussed further later in the chapter).

Members of the public also have 'restrictive' access to this database due to information sensitivity clauses. Information capture into the LIS is made available via the City's online e-services portal (this portal will be discussed in detail later in the chapter). According to Erasmus (2014) data sensitivity clauses and allowing members of the public access to certain information needs to be adhered to. However, only once the CGIS Directorate is granted permission by the relevant departments in the City, is the information made available to the public. This is the reason for the two internal (intranet) and external (e-services) information viewing platforms.

The LIS facilitates as a property information interface for the SAP system. Information that has been captured into the LIS is automatically updated into the SAP system via the 'XI platform'. This interface program ensures information sourced from the LIS for billing purposes, is correct (Erasmus, 2014). The program insinuates another screening interface of property information. The forthcoming SAP module aims to further integrate the two datasets and alleviate the potential for information discrepancies, thus replacing the 'XI platform'. Importantly, this entire process facilitates in efficient revenue maximisation and optimisation (Hattingh, 2014). This has been identified in both the City's IDP and SDF (IDP, 2012; SDF, 2010).

5.3. Utilising the Land Information System as a unified information platform

As is well documented in literature, access to reliable and efficient information can greatly influence the decision making process (Dale and McLaughlin, 1988; Lewis, 2008; van Helden, 1994). How readily available this information is to government departments, paratastals and the public determines the effectiveness of the system. The integration of information in this regard is an integral component of planning. The following section uncovers how the CoJ has utilised this information dataset in aspects such as decision-making, policy making and overall collaboration

amongst departments. It also addresses the future potentials, objectives and goals of the system that officials deem important.

5.3.1. How the City of Johannesburg utilises the information dataset

The LIS has significantly improved government to government (G2G) departmental collaboration and coordination, through the mechanisation of internal workflow processes. This can be seen in the LIS itself, and both the TAS and BAS systems, found in the Department of Development Planning. Furthermore, the external viewer, given access through the use of the CoJ's e-services portal enhances government to citizen (G2C) and government to Business (G2B) relations (Fang, 2002; Ndou, 2004). Layne and Lee (2001) concur with this, noting that information sharing via ICT mechanisms promotes better organisational coordination and strengthens integration between departments.

Although the LIS's initial purpose was primarily to supply the SAP system with property related information, and enhance revenue collection, it has also allowed the City to archive development activities and monitor its spatial growth. Through monitoring these development trends, the City can evaluate where it is performing and what development looks like on the ground. Furthermore, by understanding the development trends, these figures can be utilised to check whether the growth of the City is aligned to the SDF, and can also anticipate infrastructure investments.

According to Hattingh (2014) the LIS has provided city officials instantaneous access to property information allowing them to make informed decision. This can be seen in the Development Management Department, where land use management planners have access to this database. Having access to property information, they can advise property owners, developers and planning consultants in a efficient manner. Furthermore, with the TAS in operation, any local land use planner can advise an applicant on the status of an application, even if the designated planner handling the application is not present. The transition to a shared database coincides with literature, as the development of a planning support mechanism allows "the contemporary planner unparallel access to land use information and analytical tools" (Berke et al, 2006: 197).

The LIS has also reduced the persistence of information duplication and misuse of resources, in the sense that property information was being captured on multiple databases. The central unified property database provides subsystems such as the TAS and BAS, as well as access to a single source of property information. The capturing and validating of street addresses onto this system has also created many benefits. According to Hattingh (2014) when a new street address or road name is proclaimed it is captured into the LIS and National Address Database. This information will allow a

property owner access to a postal address, rapid response time to emergency services and the delivery of municipal services to the correct location.

The LIS captures information for Auditor-General queries and annual audits of the City. According to the *Municipal Planning and Performance Management Regulation*, 2001, section 14, all municipalities are required to submit a performance results report to an external auditor for review. This also coincides with the *Municipal Systems Act*, 2000, sections 45 to 48, which legally mandates a municipality to draft an annual performance report (which comprises of performance throughout the year, targets, development and service delivery priorities and financial statement of a municipality). Such activities align with the Batho Pele principles, providing the public with an annual report on municipal performances and totalities. These audits need to be taken into consideration in collaboration with the drafting or reviewing of government policy such as IDPs.

Utilising Kaufmann's (2000, cited in Steudler and Williamson, 2002: 7) analogy, the LIS can be regarded as the City's "accounting system" for land related activities. Executives, Directors and mayoral committees have access to an annual land development report. This report discloses the number of land development applications the City has received, as well as those which are pending review. The number of approvals of both development and building plans allows the City to quantify the market rand value (in terms of number of units and built square meters). It also provides the City with a greater understanding of the land markets, as it uncovers what is being requested and what the land market is asking for, but more importantly, what is being approved and where the development is taking place. This informs whether or not development is in line with policy, and questions the impact on the City's rate base and valuation roll.

The system provides the City with an additional source of information that can be utilised in the process of policy formulation and reviewing of SDFs and IDPs. According to Weimer (2014) the Development Planning and Facilitation Directorate is in the process of reviewing the City's current SDF. The department, aims to utilise this data source to inform the reviewing process. Such processes of drafting and reviewing SDFs are by nature information intensive. Various categories of spatial and non-spatial information from an array of sources is required in formulation of such policies. Furthermore, these plans need to be informed by the where, how and to what effect development has had on the City. Weimer (2014) further refers to this as a process of "benchmarking development". Communication of this information has taken place, through annual GMS reports, inter-departmental committees, commissions, clusters, and steering committee meetings. The GMS details where the city is prepared to invest capital in infrastructure, in both the medium and long term (CoJ, 2012).

The organisational structure of the CoJ reflects a multi-actor and multilevel organisation, as seen in Figure 5.3. The operational level forms the basis of the organisational pyramid, and includes the tasks such as assembling property information into the LIS. The management level builds on this, as it monitors where, when and how development is occurring. The policy level draws on the lower tiers, in that information is utilised in the rendering of new spatial policy and reviewing of SDFs. Each level needs to carry out the required task in the most efficient manner. Therefore, if the operational level is not performing, this will inhibit the subsequent levels, and the reviewing of policy will be made more difficult. These operational levels in the City have been strengthened since the implementation of the LIS, as it has facilitated in horizontal and vertical information sharing amongst departments and parastatals. It is important to note that the ambit of planning in the City is not the responsibility of a specific sphere of government and department, but rather, it spans across neighbouring municipal boundaries and is all encompassing. It therefore involves strategic decision-making and aligning to a common objective as outlined in spatial policy, such as the GDS 2040.

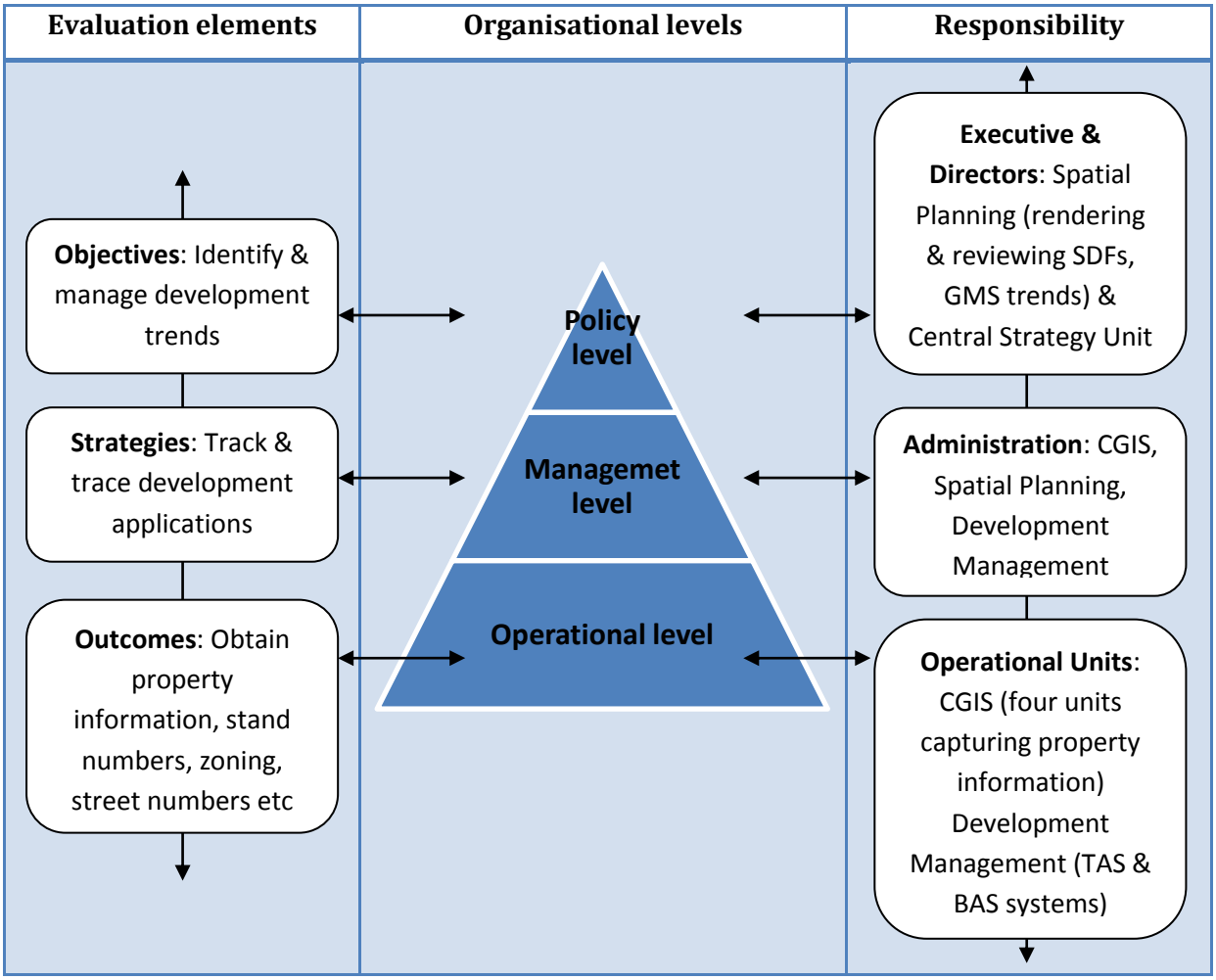


Figure 5.3: (above) Organisational pyramid, highlighting the horizontal and vertical information synergies between departments in terms of their evaluation elements to responsibilities, **Source**: (adapted from Steudler, 2004: 375, Momberg, 2014).

5.4.2. Future potential of the Land Information System

With the implementation of the LIS it is evident that the CoJ is becoming increasingly management conscious. However, good management extends beyond the realm of flow charts and elaborate diagrams. Good management is often regarded as the 'skilful handling' of information. Therefore, it requires long term buy-in and commitment to the success of the plan, confidence in the validity of the policies and the trust of the city officials involved.

The LIS is in operation but needs to be further developed and additional resources are required for its continuous maintenance. Although ongoing skills development is resource intensive, it has been earmarked as a crucial component to the operations of the LIS (Erasmus, 2014). Reciprocal relationships and institutional realignment amongst departments need to be strengthened further. Both Reinecke and Erasmus (2014) assert that they would like to see great integration between the LIS and TAS. The TAS, previously known as the Development Application System was created before the implementation of the LIS. As a result the TAS is operating on a different operating system as compared to the LIS. According to Erasmus (2014) not all of the information captured by TAS is replicated into the LIS. Furthermore, the persistence of working in silos and departmentalism is still imminent due to the nature of data and information sensitivity. City Power and Johannesburg Water, for example, will continue maintaining their own databases, as their information and supply networks cannot be disclosed to the general public. The CGIS Directorate does, however, allow these entities access to the LIS database (*ibid*).

Erasmus (2014) notes the importance of collaboration between the CGIS Directorate and external agencies. AfriGIS for instance has provided the department with physical street addresses information datasets. This project included the verification and identification of new street address which is the perquisite for billing process according to the Property Rates Act. The Directorate also provides the GCRO with access to their LIS database. The GCRO, in collaboration with the Gauteng Planning Commission is working towards a collective GIS platform for the entire Gauteng City Region (GCR) "referred to as GeoGCR" (Wray et al, 2013: 51).

The sharing of land information, being spatial and non-spatial, holds the potential to facilitate successful planning, not only in a local government context, but provincially and nationally as well. The Department of Development Planning has also partnered with Eris South Africa to develop a 3D visualisation of the entire jurisdiction of the City (GCRO, 2013). This 3D rendering will be utilised in conjunction with the City's Sustainable Human Settlements Urbanisation Plan along transit-orientated development corridors, referred to as *The Corridors of Freedom* spatial policy. With the development of urban modelling platforms and sophisticated 3D rendering tools such as UrbanSim,

cities are able to run a range of development scenarios, such as natural and human induced disaster modelling or transport system simulations. This highly advanced, data intensive and multifaceted UrbanSim platform represents the high end of urban simulation modelling (Wray et al, 2013).

The City has begun to collate a host of datasets such as demographic data (Census data and Quality of Life Survey data), economic indicators (Gross Domestic Product and Growth Value Add) and development trends (GMS – derived from the LIS database). Utilising the available 3D modelling software, the city can run a host of development simulations, and projecting growth throughout various decades. The City aims to utilise this 3D model in conjunction with its densification projections along the various Developmental Corridors spanning the City (GCRO, 2013; Wray et al, 2013). Essentially, the use of such modelling incentives can be utilised for testing various spatial policies, providing policy makers with options and further guidance whilst drafting long term planning strategies.

5.4. Challenges facing the Land Information System

The presence of ICT within the CoJ cannot be denied, however, concerns and challenges have been raised by city officials and planning consultants alike. These range from budget constraints to a lack of human resources, dataset operability to redundant hardware and software infrastructure, and even accessibility and transparency of information. Literature surveyed typifies these aforementioned challenges. Such literature includes work by scholars such as Allen et al (2001), Ciborra (2005), Baldwin et al (2011), Heeks (2001, 2003), McLaren and Stanley (2012), and Trapscott (1996) to name a few. These pivotal challenges need to be addressed if the LIS is to progress and develop into an exemplary testament to an ICT driven mechanism in government. Addressing these challenges will not be a quick fix process as "planning is a long-term investment" (Zetter 2006: 299, cited in Lewis, 2008: 138). The section below elaborates on some of these concerns from both an internal and external perspective.

5.4.1. Insights and concerns raised by city officials

The progressive diffusion of the LIS amongst departments in the City, through the integration of databases, requires departmental buy-in and a long term commitment. Literature suggests that this process can take in excess of 10 years (McLaren and Stanley, 2012). This accentuates the importance of political support and backing throughout the implementation of such a long-term mechanisms, as municipal budgets can be restrictive. The LIS in the CoJ has been operational in excess of 7 years. As the development of ICT's is exponential in nature, it is vital that software and hardware infrastructure is updated. It was discovered that the LIS has yet to undergo hardware upgrades since its inception in 2007. This has been earmarked as a major concern by both Erasmus and Hattingh

(2014). According to Erasmus (2014), "updates should take place every 3 years, at the very least". He notes that these systems need to be updated, regularly.

Hattingh (2014) provides evidence that the City did not classify the LIS as an "Enterprise System", as it saw the SAP system. Therefore, it did not receive the recognition and funds required to perform the relevant technical upgrades. The sheer age of infrastructure and size of the database of the LIS has resulted in performance related losses and system downtime[5]. As more departments and users access this database, it places tremendous strain on the existing server. In addition to this, the CGIS directorate is in the process of migrating technical service providers from "IBM to Dimension Data", based on tender arrangements. The hand over phase is crucial to the operations of the LIS (Erasmus, 2014). The City has since recognised these constraints and has procured the funds to perform the relevant upgrades. However, this is yet to take place. The transition to "state of the art technology" seeks to alleviate performance related losses, improve the overall operability and longevity of the LIS (*ibid*).

As mentioned in the previous chapter, prior to the LIS, various departments captured and retained property information in their own databases. These databases were designed and developed to serve a specific purpose relevant to the departments' needs and functionality (Erasmus, 2014). These early challenges needed to be ironed out to address the LIS viability, in terms of accuracy and completeness of the "master dataset" (*ibid*). To add to the frustrations, each department utilised different software and database operating systems, based on tender agreements. The collation of data, administration and cleansing of the data was inevitably difficult to achieve (Hattingh, 2014). As is well documented in literature, the integration of information within the planning profession has been elusive for much of its existence (Kunzmann, 1998). Information is usually difficult to obtain and problematic to synthesise, which challenges the production of detailed reports.

Challenges facing the adoption of ICT mechanisms extend beyond the realm of technological realignments (Allen et al, 2001; Basu, 2004; Trapscott, 1996). The adoption of the LIS also calls for institutional realignments and restructuring factors (e.g. organisational, technical and political). Academics cite this as a potential obstacle as it influences political and internal arrangements (Allen et al, 2001; McLaren and Stanley, 2012). Hattingh (2014) notes the presence of recalcitrance in certain departments; however this was swiftly dealt with due to political backing. She believes that the presence of new ICT's in department exposes a sense of "vulnerability" in city officials' positions (*ibid*). The LIS spans across various departments, and therefore, certain processes that were once carried out by hand have become computerised. "Everyone working in management knows that

[5] A screenshot of the e-service portal experiencing technical difficulties is included in the Annexure C

managing change is one of the most challenging and difficult aspects of their job. People are naturally inclined to resist change" (*Ibid*). In Lewis' (2008: 134) view, "People have an inherited reluctance to change". This stems from uncertainty as to what the new will imply. He believes that this is something that will always be with us, as people will always be scared of change and the unknown (*ibid*).

Additionally, realignments in policy pose an additional challenge towards the CGIS department. Erasmus (2014) cites the impending status of the *Consolidated Johannesburg Town Planning Scheme*, 2011, as being a future challenge to the department. The GIS system has been configured in such a manner that it captures information in accordance to a specific town planning scheme. The shift towards a single town planning scheme requires property data fields to be changed in accordance to the scheme. Such realignments will influence the operations of the GIS the Directorate utilises.

Erasmus (2014) believes that the use of GIS in combination with planning has eluded the profession for many years. With Ahmad's resignation from the CoJ in 2013, Erasmus (2014) infers that the City Transformation currently does not have "a planner, GIS champion somebody that has a good overview of what GIS is and how to use it together with planning". The lack of human resources and financial infrastructure capacities has been highlighted in the Department of Development Planning. Vacancies in prominent positions have been cited by the City Transformation Department (Weimer, 2014, Erasmus, 2014). The lack of institutional capacities have prevented the department from undertaking a review of the GMS trends analysis, since 2011. According to Magni (2011, cited in Todes, 2012b: 9) the 2008 "recession and previous years overspendings" has led to budget cuts in CoJ, which as a result, affected the appointing of additional staff.

Weimer (2014) believes that certain departments in CoJ, such as the Department of Environmental Planning and Management, are yet to experience the true potential of ICT's. Difficulty remains in translating information, such as a legal framework from an 'Excel spread sheet' into a spatial context, where it can be of greater use for the Development Management department (*ibid*). Additionally, the persistence of incomplete data fields in the TAS remains a major hindrance in the compilation of a report, such as the annual GMS trends analysis (Reinecke, 2014).

5.4.2. Insights and concerns raised by planning consultants

Planning consultants often wish to collaborate with local authority planners at a very early stage in the development lifecycle, which is usually referred to as the scoping process. This is to ensure the relevant department will 'support' and 'motivate' the proposed development. Planning consultants are often required to make the trip to the CoJ, such as the CGIS, to obtain a zoning certificate, permissible information contained in a land use scheme (whether it is zoning, coverage, or floor area ratio) or the Development Management Department, to collaborate with the relevant planner designated to an area or region. However, if the system is offline or down, and the information is not available through hardcopy, city officials are forced to turn away members of the public (Brownlee, 2014). This takes valuable time away from the planning consultant and causes further frustration for the public.

Brownlee (2014) believes that the integration of ICT's within the workings of the CoJ, more specifically the TAS, has yet to reach its full potential. He notes that the system is not a "reactive" as it would seem and that it is more "proactive" for internal workflow management, and auditing information (*Ibid*). Although the TAS enables one the ability to track and trace an application, it is yet to migrate to an electronic application submission platform. This requires planning consultants to carry out follow-ups on a regular basis to ensure the application does not get stuck at a particular department (based on the nature of the application). Planning consultants would like access to the tracking of their applications via the e-services portal. At present, the BAS allows one to monitor its progress and status. This would alleviate the monotonous task of engaging with city officials, and thus save time. According to Reinecke (2014) the migration process has been earmarked as a crucial component developing the system further, noting "it is just a matter of time".

Although planning consultants have noticed the success in the presence of ICT within the City and engage with the e-services portal on a frequent basis, they feel that have not seen any drastic improvements in the processing of development applications. They all cite an average duration of over a year, up to three years from submission to promulgation status (however, de Beer (2014) does cite an exception to this figure, of six to eight months, noting "it depends on the planner handling the application"). The TAS has made the circulation of scoping reports to relevant departments and parastatals more transparent, as applicants are now able to track the progress of the submitted document. It also allows them to identify any delays in the process. In the opinion of Di Cicco (2014) the system does not allow the consultant the ability to resolve the issues raised during the process. It still requires them to collaborate with the designated planner or relevant department. Brownlee, Di Cicco and Raven (2014) all cite the human component, inhibiting the true

potential of both the LIS and TAS. As Brownlee (2014) notes, "the system the city has put in place is as good as the people who operate and maintain it".

According to Reinecke (2014) a local land use planner in the Development Management Department has approximately 60 to 120 land use applications in a 'pending status'. Each application is different in nature and requires the planner to draft a preliminary report that gets sent to a designated deputy director within the department. Being a Deputy Director, Reinecke handles over 400 development applications a month, before they are submitted to mayoral committee meeting. Being inundated with such a tremendous backlog and development pressure, de Beer (2014) expresses some form of apathy for land use planners in CoJ, noting "we need to understand the situation from their point of view". These planners are often at the helm of disgruntled applicants and are required to carry out laborious tasks such as: attending development tribunal meetings, designate time to see the public and carryout site inspections, whilst having to draft reports for development applications that are in line with spatial policy and land use schemes.

All planning consultants cite the lack of planners in the Development Management Department. As the CoJ is divided into seven regions, a certain number of planners are designated to particular region. Raven (2014) believes the lack of capacity in the department is hindering development significantly, and is often under pressure from his clients to obtain the required approval. de Beer (2014) cites a developer's willingness to provide infrastructure (that should be provided by government) in exchange for the development application to be processed and approved on time.

5.4.2.1. Planning consultants working relationship with city officials

Overall, consultants maintain a positive working relationship with the CoJ, more specifically, Development Management, CGIS and City Transformation directorate. They unanimously profess a professional and ethical relationship with City Officials. As noted in chapter three, land management systems are extremely tedious and require a skilled seasoned professional to navigate the city administrative system (Rubin, 2007). Planning consultants and local land use planners are in contact with each other on a regular basis. As Lewis (2008: 144) suggests, "It is important for professionals to work together to overcome the challenges facing land use management". Therefore it is crucial that strong partnerships are formed between the local land use planner and planning consultant. Lewis (2006: 879) goes further and states "land use planners need to be approachable – and open to negotiation".

Although planning consultants maintain a respectful working relationship with city officials, they would appreciate being kept more informed of the development process. Di Cicco, Brownlee and Raven (2014) recognise the capacity constraints in the department, however they were particularly

concerned with the poor attitudes of city officials. They felt that many of the land use planners handling their applications did not appear to care about their work or the outcomes of the developments they were involved in. Planners did not return their calls or emails timeously and frequently lost crucial documents. Di Cicco (2014) cites a recent example where a planner requested he resubmit a 'power of attorney' for an application, however he insists the document was submitted to the Registration Department (without such crucial documents attached to land use development applications, it would not have been circulated and have reached the planners desk, hence it was lost during the circulation process). Brownlee (2014) feels the City's Development Management Department is a, "Bureaucratic minefield". This is somewhat concerning, as land use planners need to be "approachable" and more flexible to open dialogue with planning consultants and developers alike (Lewis, 2006: 879).

5.4.2.2. Utilising the e-services portal

This section briefly covers how the CoJ has made information available to the customer. The City has been able to implement a number of facilities that enables the public to interact by means of an online platform. The CoJ e-service portal is one such example. This online portal largely reflects a stage two level Layne and Lee's (2001) model of e-Government development.

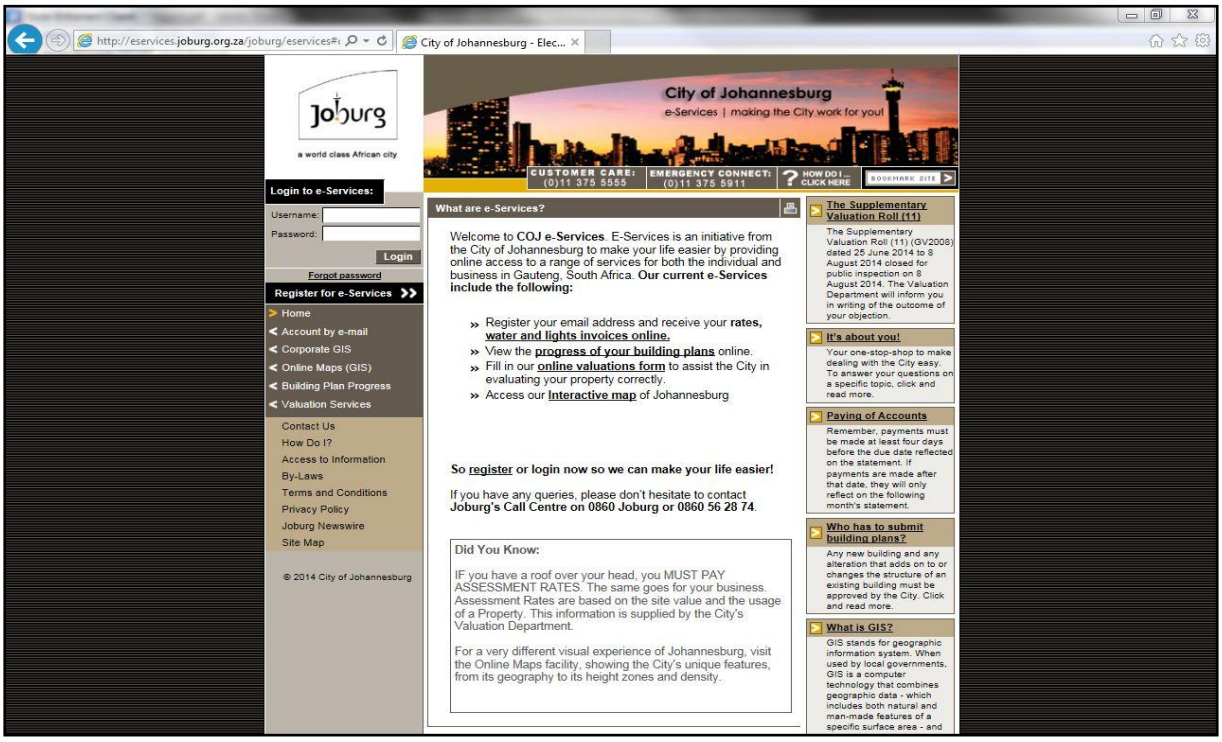


Figure 5.3: (Left and below): Accessing the CoJ website, a user can find the e-services link on a tab located on the homepage. Once a user clicks this link it redirects them to the e-services webpage, seen below, **Source**: (http://eservices.joburg.org.za/joburg/eservices)

Previously, the use of this portal was limited to the public in terms of a subscription service. According to Di Cicco (2014) limiting this service was at the cost of the public. The annual subscription fee of this service was in excess of R1000 (*ibid*). At the time, the portal offered users two forms of mapping services, a free service that included basic information, such as: City administration and ward boundaries, transport routes, stand numbers, street addresses and basic zoning information; and a 'paid subscription service' which provided the user extensive access to land information all the way to each parcel in the CoJ; and a paid service, which features included, detailed zoning information, full resolution aerial imagery, dating back in three year intervals (from 2006, 2009 and 2012), proposed townships, and an imagery editing tool.

Hattingh (2014) explains that the cost of updating the aerial imagery had to fit into the Directorates budget, thus at the time, the additional resources required justified the users expense. This has subsequently changed, according to Erasmus (2014) when the City decided in 2012 to make this service fee of charge to the public. The City needs to understand the customers they are targeting, and from there on enable them to commit to developing these relationships.

The volatility of the information provided through this web portal has been cited by planning consultants interviewed. Prior to accessing the Web GIS viewer through the e-service portal, the user is presented with a "disclaimer notice". Only by accepting the terms and conditions may the user proceed in accessing the relevant information[6]. Raven (2014) argues that one often needs to double check the information with the Deeds Office and Surveyors General[7] before concluding that it is correct. He believes that if a consultant draws information for a single source they run the risk of making crucial errors. However, on the contrary Erasmus (2014) believes that this stems from, "an expectation that the information provided by the deeds registry is correct. This is not the case". There have been several cases of property data discrepancies. However, the CGIS prides itself in the screening processes of all property data captured into the LIS. Building trust around the information and ICT driven services the CoJ provides is an important component in this regard (Trulser, 2003).

As is well-documented in literature, critics claim that the use of ICT's for service delivery precludes a large segment of society (Cloete, 2004; Trulser, 2003). It is important to recognise this as an omnipotent barrier to the CoJ e-services portal. The lack of internet penetration in the CoJ's households further exemplifies this challenge. According to Stats SA (2011) only 14.4 per cent of households in the CoJ have access to internet, and only one in nine people have access to a personal

[6] This *declaimer notice* has been included in the Annexure C.

[7] Both the Deeds Office and Surveyors General have their own dedicated online web portal. Members of the public can access these platforms and request property information, such as an S.G Diagram. A screenshot of these portals are included in the Annexure C.

computer. This is largely relevant to the study, because the online Web GIS viewer can only be viewed through a computer with a reliable internet connection. It cannot be accessed through means of a mobile tablet or smart phone. This minimises the potential user base, as the majority of the population do not have direct access to this commodity. Hattingh (2014) acknowledges these challenges and alludes to the presence of information help desks in the CGIS Directorate. However, this still means that a citizen with limited or no access to the online service is still required to make a trip to the relevant department.

The overall user friendliness of the Web GIS viewer needs to be identified as a further limitation. The operability of this service is only available through a specific up-to-date web browser, namely 'Internet Explorer'. This can further compromise the extent to which this service is utilised, as users utilise an array of web browsers and different operating systems. The actual online Web GIS platform requires the user to be technologically inclined. Although all planning consultants were aware of this online service, de Beer (2014) noted that in her personal capacity, she was not utilising the Web GIS service to its potential. However, according to the e-services website, "CGIS gives free training to internal and external clients on how to use the Online Maps Website at its premises" (CoJ, 2009b). Jaeger and Thompson (2003) concur with this as they believe government needs to take a proactive role in educating citizens about the value and benefits of such systems. This indicates that the CGIS Directorate has taken the initiative to actively engage and educate members of the public about its developing technologies, such as GIS.

5.5. Monitoring land development in City of Johannesburg

The section below utilises the secondary data obtained from the CoJ Department of Development Planning and draws from planning consultant insights. The CoJ is undergoing rapid urban change, this can be seen in the GMS trends analysis report. As noted in literature, both development and alterations of land uses expand and contract in response to such factors (Berke et al, 2006). Since 2007, every development application submitted to the City has been captured on the LIS database, and "this has had a profound impact on the spatial information in the city" (Hattingh, 2014).

The Department of Development Planning in the CoJ is on a mission to develop "a spatial form and functionality that embrace the principles of integration, efficiency and sustainability, and realises tangible increases in accessibility, amenity, opportunities and quality of life for all communities, especially the poor" (CoJ, *undated*). For the City to meet this development vision, it needs to monitor, anticipate and forecast growth. Without the development of the LIS, this information would not be available. This further emphasizes the importance of the LIS within local government. It is within this sphere of government that the majority of planning takes place (Platt, 2004).

5.5.1 Growth trends and development indicators

As mentioned in Chapter one, the CoJ's economy is the largest in the country, contributing towards approximately 17 per cent of the National Gross Domestic Product (GDP) and around 47 per cent of Gauteng's economy (IDP, 2013). These statistics indicate the continual growth and development of the City's economy.

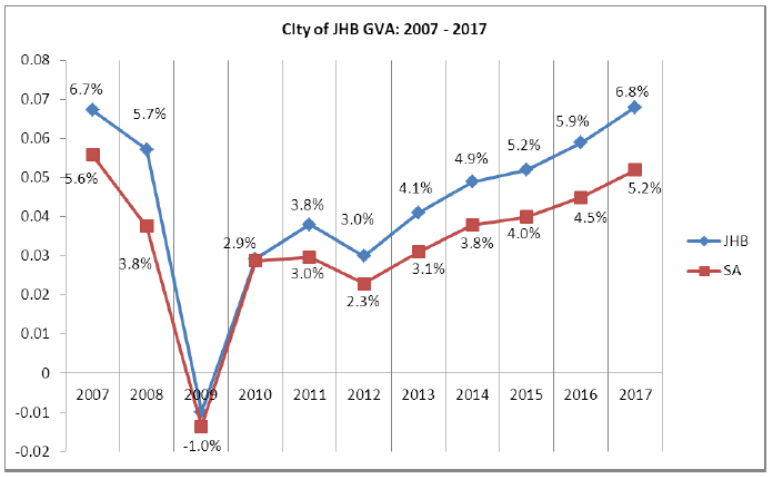


Figure 5.4: (above) GVA indices of CoJ in relation to the rest of South Africa, from 2007 to (a projected) 2017, **Source**: (IDP, 2013: 26)

Although the City experienced an external financial decline during the recession during 2008 and 2009, the CoJ remains the cornerstone of the financial and business sector, which has since seen progressive growth and development as a whole. Figure 5.4 illustrates the existing and expected Growth Value Add (GVA) of the CoJ in comparison to the rest of South Africa (*ibid*: 26). It is clear that the CoJ is comparatively higher when compared to South Africa. The researcher deems it necessary to take the above mentioned indicators into account when scrutinising the empirical evidence rendered in the latest GMS trend analysis report. Due to the economic recession and lack of available archived development applications prior the LIS, this inhibited the numerical viability of this research. Thus, the researcher analysed the spatial maps that planners and policy makers had access to. These are valuable spatial representations informing where development is taking place in the City.

Acknowledging the above mentioned figures, coupled with the inward migration, it is clear the CoJ will experience further urbanisation. With this in mind, it is crucial that planners and policy makers understand the changing land use patterns and driving forces behind the land market. "Urban development is rapid, and its impacts are long lasting" (Farmer et al, 2006: 1). In chapter one, the skewed development disparities and high level of inequality of the City was highlighted. The legacy of the property boom from 2003 to 2008 has further exacerbated the disjuncture between spatial growth of the city and infrastructure development. The property development industry is a

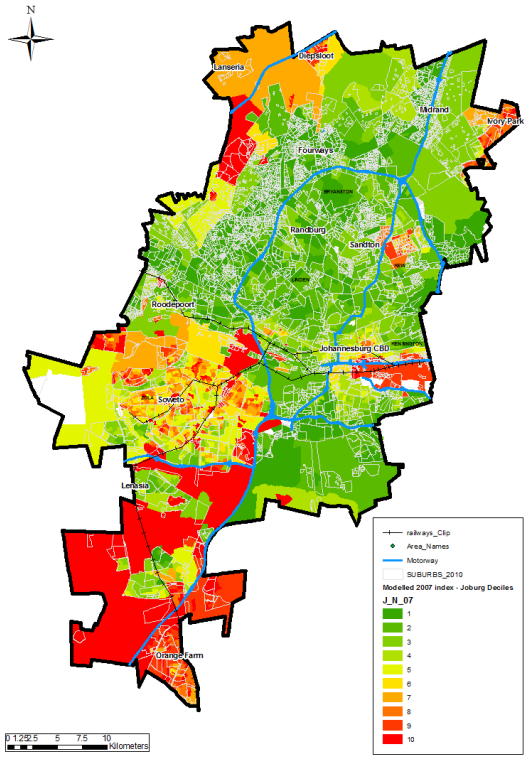
significant financial asset to the City, however the patterns of development are "unsustainable and unjust" (Todes, 2012a: 164). Thus, spatial policies such as the City's SDF needs to guide development in accordance to the developmental vision set out in the GDS 2040, outlined in chapter 3 of the report.

Through the implementation of the LIS, city officials, planners and policy makers have access to an invaluable analytical tool that can inform policy making choices and inform investment in infrastructure. It can also assist the City in determining whether "it is getting value for its infrastructure investments" (Wray et al, 2013). Drawing from the data captured from the LIS and layering it through the aid of GIS mapping, the City can produce spatial renderings of land use change and growth of the urban fabric, as seen in Map 5.2 and 5.3 (on the following page). When these maps (illustrating the geographical location of land use development applications) are cross-analysed with Map 5.1 it is evident that development is still prevalent in the northern portion of the City, and not in areas of previously marginalised regions. This aligns closely to McLaren and Stanley's (2012: 351) concerns stating that "land administration services have been notoriously difficult for some segments of society to reach". This would seem to be the case here, as the lack of applications in the south, in combination to Map 5.1, bares testament to the above mentioned statement.

It would seem that development has been hesitant to extend to the south of the City. This is further highlighted by the fact that planning consultants (that were interviewed) carried out the bulk of their practice in the northern portion of the City, however, Di Cicco (2014) did cite "a few applications in a pending status in the south" of the City. de Beer (2014) believes that there is a lot of development and redevelopment taking place in the northern suburbs of the City, particularly along major arterial arteries, and that the financial returns in these areas are attracting the attention of developers.

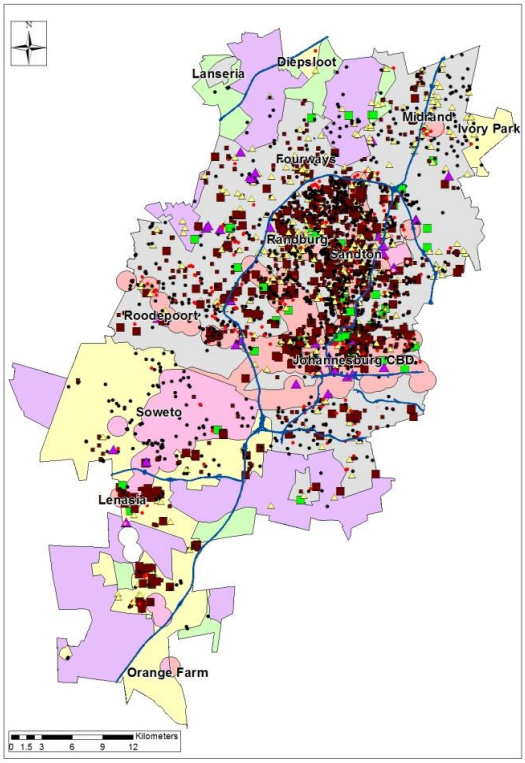
This does not go without mentioning that previously marginalised areas are not experiencing rapid growth. As of 2012, the City has identified over 320 000 backyard shacks within the jurisdiction of the CoJ (Pienaar, 2014: 13). These are areas with a greater size of population and higher levels of densities, when compared to the northern portion of the City. Therefore, they require additional resources for infrastructure development. The proliferation of backyard shacks has been earmarked as a significant challenge for the CGIS Directorate to monitor and manage (Erasmus, 2014). Monitoring the organic growth of these settlements provides planners with an analytical tool to determine feasible locations of public led investment. Therefore, the implementation of the LIS and the data captured by the database has influenced spatial policy and decision making processes in the Department of Development Planning.

Map of Deprivation across the CoJ (2012)



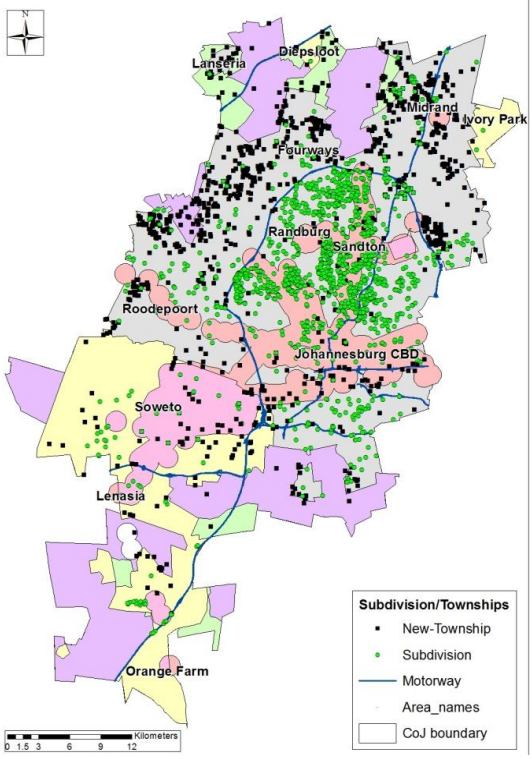
Map 5.1: (above) Level of deprivation based on five indicators: income, employment, health, education and employment **Source**: (IDP, 2013: 20)

Rezoning Applications (2007 - 2011)



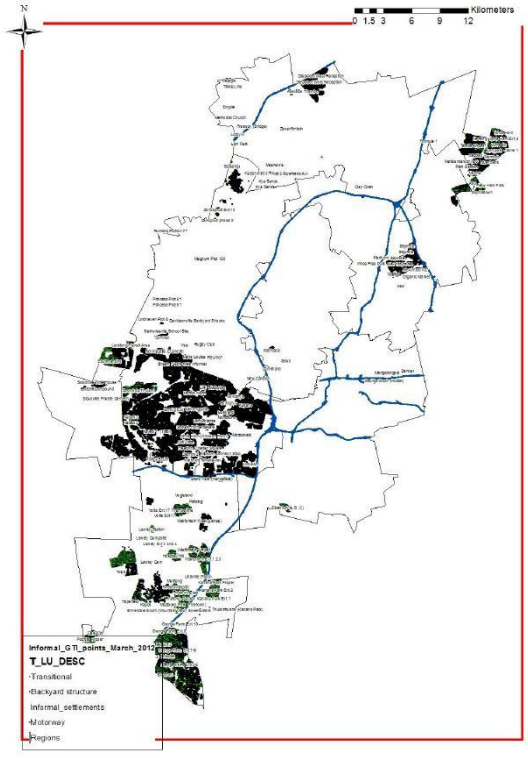
Map 5.2: (above) Geographical location of rezoning applications submitted to the CoJ. Applications in the map include residential, business, commercial, industrial and special zonings **Source**: (Ahmad, 2012: 40)

Subdivisions and Township Establishments



Map 5.3: (above) Geographical location of subdivisions and township establishments submitted to the CoJ (between 2007 to 2011) **Source**: (Ahmad, 2012: 43)

Backyard Shacks (2012)



Map 5.4: (above) The proliferation of backyard shacks illustrates a correlation with areas of high levels of deprivation, **Source**: (Pienaar, 2014: 13)

5.6. Moving forward

Utilising the research methods outlined in the preceding chapter, this chapter provided the reader with an analysis of the research findings. The findings presented in this chapter were cross-examined with the relevant literature and theoretical framework constructed in chapter three. As mentioned in chapter one of the report, the CoJ was "the first municipality in South Africa to have a single integrated property database system in place" (CoJ, 2009a: 1). The implementation of such a revolutionary mechanism bares testament of CoJ's commitment to serving its citizens, as outlined by the concept of Batho Pele. It is evident that the LIS has circumnavigated a plethora of developmental challenges and is still faced with an enormous responsibility, which is providing the SAP system with up-to-date property data for billing purposes. Thus, the LIS plays a fundamental role in enhancing, generating and maximising revenue collection for the CoJ.

It does not go without mentioning that the LIS is still faced with many complex challenges, such as an out of date ICT related infrastructure, which has impeded the overall performance of the system. Furthermore, the LIS can be deemed as reductionist in nature, in the sense that the poor and previously marginalised do not necessarily benefit from the e-services portal. These challenges and others addressed in this chapter begin to inform the recommendations that will be brought forward in the following chapter.

This chapter began by acquainting the reader with the rationale and underlying motive behind the LIS's adoption within the CoJ. It then provided a network analysis of the sharing of information between departments and agents in the City. The conceptualisation of the network analysis assisted the researcher tremendously in understanding the complex workings of the LIS, as it spans across a multitude of departments. It then uncovered how the City was utilising this additional information resources in daily activities such as allowing city officials instantaneous access to property related information to enhance and inform spatial policy in the City. The following chapter utilises these research findings and postulates recommendations as a way forward for the City.

Chapter 6

Conclusion, Recommendations and Final Remarks

6.1. Introduction

In moving forward, the researcher deems it necessary to look back on the overall research process. At the beginning of this report, the research set out to discover how the implementation of an integrated information system has enhanced land development within the CoJ. The following chapter aims to conclude the research and provides some suggestions on the way forward in terms of the CoJ's LIS. Drawing from the research findings and outcomes, four recommendations are presented. The recommendations disclosed in this chapter are embedded in the results and findings of this research case study – the CoJ's LIS. This means that the recommendations put forward are unique to the CoJ, however in some instance may be relevant to any municipality in South Africa, in the future. The chapter finally culminates with the researcher reflecting on some of the overarching limitations of the report, how this field of research can be taken further and lastly some final comments are provided regarding the researchers journey.

6.2. The dynamics and potential outcomes of a Land Information System - conclusion

The research has exemplified the importance of information in the realm of planning, as the basic resource in any decision making process. It was discovered that the majority of local government functions and operations are dependent on the same source of property data. Thus, implementing an integrated information system, such as an LIS, can enhance the effectiveness and efficiency of the decision making process in land development. In the preceding chapter, the internal workflow process and sharing of property data in the City was divulged. The researcher deems it necessary to indicate the broader parameters within which the LIS operates, this can be seen in Figure 6.1.

Emphasis needs to be placed on the importance of a country's policy and legislative framework guiding the implementation of an e-Government initiative. As was outlined in chapter two, South Africa is fortunate to have numerous pieces of legislation and policy advocating its implementation. This is evident in national policy such as, *South Africa's Ten-Year Innovation Plan*, 2008-2018, which seeks to transform South Africa into a 'knowledge-based economy' that supports government's long term developmental agenda. Provincial strategies guiding such incentives also include the *Gauteng ICT Development Strategy*, 2011. This is further exemplified by the City strategies that call for the CoJ to become more 'smart' in its operations, functioning and long term vision as outlined in the *Joburg Growth and Development Strategy* (GDS) 2040. Referring back to Figure 6.1, the concept of e-Government can be seen as a overarching and all encompassing, influencing the overall operations of a LIS.

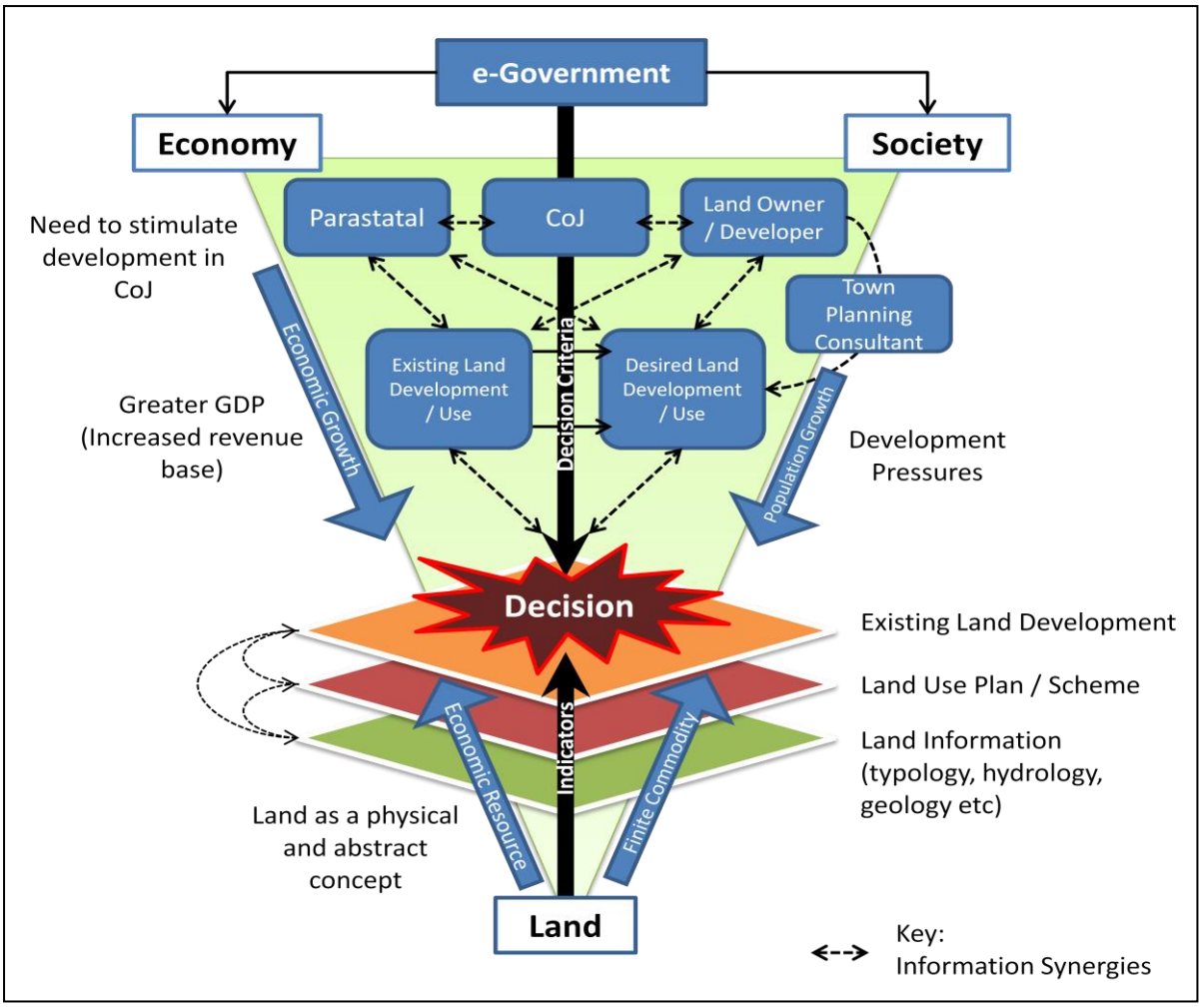


Figure 6.1: (above) Graphical representation of the Land Information System in relation to Land, the Economy and Society, **Source**: (Momberg, 2014)

The green triangle, as seen in Figure 6.1, conceptually represents the broader workings of the LIS. The system connects three variables comprising of the following: land, economy and society. Each of these anchors influence development of land, and facilitates in the flow of information (illustrated as information synergies) amongst various agents, plans and layers of information, such as the existing land development; land use scheme; existing servitudes registered over land; geology; hydrology, contours and so forth. The arrow pointing downwards are the existing land use management policies, local development frameworks, strategies guiding development currently in effect that are informing the decision criteria.

The arrow pointing upwards are the existing land related information. This forms the foundation of the LIS. It is a point of reference for policy makers, land administrators, developers, planning consultants and society to acquaint themselves with. As Hurtubise (1984: 28, cited in, van Helden, 1994), argues "The mission is decision". Thus both arrows converge to a final decision. This decision is based on various attributes, such as polices, legislation and strategies. But access to information

related to land ultimately determines whether or not it is feasible, safe for society and economically viable.

This research accentuates the importance of land as a public good that needs to be managed efficiently. It is a finite commodity which makes it an economic resource to society. Therefore, any changes or alterations made to it influences the rest of society. This introduces the presence of trade-offs as planners may need to decide where to invest in infrastructure. The layering of information in this regard is beneficial to the decision making process.

It is important that local government recognises that such mechanisms are resource intensive, both capital and financial related. However, if implemented correctly these information systems possess the opportunity to reduce administrative, functional and operation costs in the long term. It also provides planners and policy makers with an additional analytical tool that can inform the decision making process, whether it is short, medium or long term related.

The implementation of an LIS is innovatively progressive in nature. Information systems should be designed and constructed to serve the purpose for which they are needed. They cannot be bought, as the development of such mechanisms must adhere to the developmental needs of a country context, as it needs to follow the correct developmental procedures and ensure that the LIS recognises the development pressures and challenges of the context (van Helden, 2014).

The layering of information can provide planners with a rich understanding of the city. By monitoring land cover change analysis, planners can evaluate the rate at which these changes take place. Where the City is developing and where it needs to invest in infrastructure provision. With the development of a LIS, cities can capture valuable information, such as land use cover changes over a time period. A city that has access to this can further strengthen their overall planning and policy decision making. Such analytical tools will revolutionise the planning profession, as decisions will be based on up-to-date, relevant and accurate data and information.

The introduction of new and improved ICT's, in particular the e-Government, has dramatically increased the capabilities and capacity of local government to gather, process and share information. However, it is important to note "the link between better technology and better governance is not automatic. The opportunities are tremendous, but the challenges are formidable, and the conditions for success or failure need to be clearly identified" (UNDP, 2004: 1).

6.3. Recommendations

Drawing from the aforementioned section and preceding chapters of the report, the following section constructs four overall recommendations the researcher deduced whilst carrying out this study. These recommendations are unique to the CoJ's LIS.

6.3.1. Recommendation pertaining to greater collaboration and partnership building

As mentioned at the beginning of this report, the CoJ is "the first municipality in South Africa to have a single integrated property database system in place" (CoJ, 2009). It can be argued that the CoJ is at the forefront with implementing such an innovative mechanism into its daily operations. Therefore, the CoJ should look into drafting a report outlining the lessons learned and recommendations for other municipalities to take into consideration. Implementing a LIS is an elaborate undertaking in its own right and any past experiences of any municipality "provides a learning process for future users" (van Helden, 1994: 484). This report could facilitate as a roadmap for other municipalities to acquaint themselves with and can be read in conjunction with SALGA's *Roadmap to successful ICT Governance* strategy. The limited amount of human resources and budget in any municipality in question is significantly restrictive. As a result, they cannot afford to lapse into the same problems and challenges the CoJ has faced. If these challenges are not addressed effectively, local government stands the risk of further misuse of financial resources, as was seen in the Nelson Mandela Bay Municipality. Although the right intent was present in the municipality, the lack of skills development and coordination amongst departments led the information system into a state of disrepute.

Additional knowledge sharing platforms need to be encouraged amongst municipalities across South Africa. As alluded to in chapter one, numerous municipalities have initiated technologically driven incentives in their developmental, city strategies, such as the GDS 2040. The City of Cape Town, City of Tshwane, and Ekurhuleni Metropolitan Municipality have all recognised the need to migrate to ICT driven mechanisms within their daily functioning's. Collaborating and developing strong relationships between these metropolitan municipalities will facilitate in the sharing of experiences, knowledge, insights and ideas can take be placed in a formal setting. These platforms could take place during the biannual South African Planning Institute conference which is held every two years. Municipalities can present their projects and get reciprocal insight and additional support from prominent members attending these conferences.

These partnerships need to be extended further than the annual conference. It is suggested that additional interdepartmental committees, clusters, commissions, intersectoral programmes and workshop groups become ubiquitous within this realm of planning. As mentioned in chapter five, the

ambit of planning is not confined to a specific department in local government, but rather, it traverses a multitude of departments, parastatals, and agents.

Communication and co-ordination is a critical obstacle facing the successful planning in any municipality, such as the CoJ. Therefore, communication needs to be improved within the municipality, as well as between the city officials and planning consultants. As was highlighted in chapter five, planning consultants collaborate with local land use planners in the Development Management Department on a regular basis. Although planning consultants did cite the presence of nepotism in some instances, they felt that some land use planners were notoriously difficult to get hold of. This is where higher levels of management, such as deputy directors, need to intercede and ensure these situations are addressed accordingly. Local land use planners need to be approachable, whilst the applicant must maintain an ethical working relationship during the development process. As Lewis (2006: 868) notes there needs to be "a move away from the 'them' and 'us' between officials and developers / [planning] consultants".

The CoJ needs to address the capacity constraints problems it is faced with. This has resulted in a growing development backlog and is stifling the potential development of the City. Therefore, the CoJ needs to re-evaluate the number of planners assigned to the development process in the City. Serious consideration should be given to expanding the number of planners dealing with the processing of land development applications, and also increase the number of highly skilled planners in the vacant positions, as seen in the City Transformation Department.

6.3.2. Recommendation pertaining to harmonizing databases to allow for greater integration, ongoing software and hardware upgrading

The following recommendation align closely with the above mentioned section, however, it delves deeper into the technical aspects of the LIS. Although the LIS is in place in the CoJ, it is yet to truly develop into a single reciprocal database. The persistence of information fragmentation, siloism and departmentalism poses a serious challenge, as the TAS and BAS are yet to fully integrate into the LIS. As mentioned in chapter five, not all of the information captured by the TAS gets replicated into the LIS. These systems and subsystems are running different programs and are dependent on different external service providers, such as IBM, Oracle and Data Dimension. These external service providers tend to promote their own software and operating platforms, making the integration of systems (such as the LIS) and subsystems (such as the TAS and BAS) datasets increasingly illusive. Therefore, generating an annual report on the amount of development applications received and processed are still reliant on a isolated 'Excel spreadsheet' (Reinecke, 2014).

This makes the assimilation of information into a spatial context extremely tedious and overburdens city officials such as the Deputy Director of Development Management Department, Marietjie Reinecke, with an additional workload. The integration of the databases was not previously anticipated, and translating this data in a spatial context is a cumbersome process itself. This has inhibited the review of the annual GMS trends analysis report, as data in relevant fields of the 'Excel spreadsheet' are missing. This in turn influences the accuracy of the information the Development Management Department can provide City Transformation, to undertake a comprehensive annual review of the GMS trends analysis.

Furthermore, financial and capacity limitations and lack of interdepartmental realignments in certain departments, such as Development Management, has placed additional strain on the existing staff and personal. In moving forward, the Department of Development Planning needs to address these constraints accordingly. If they are not rectified, the problems highlighted above will continue to plague the planners' ability to perform and compromise the accuracy of figures utilised in the formulation of spatial policies in the City.

The City needs to recognise these limitations going forward when allocating tender agreements to external service providers, highlighting the difficulties departments are faced with when they need to combine datasets. The development of the LIS has been deeply flawed by the lack of financial budget since its inception in 2006, as raised by Hattingh (2014). The LIS is effectively a linchpin in the Property Value Chain (PVC), more specifically the SAP billing system. Therefore it is vital that the relevant upgrades and updates are carried out. The LIS ensures that the SAP has access to reliable, creditable and rateable property information. If this system is not operating at an efficient level, there will be adverse effects on the revenue generation for the City. Furthermore, if this system is compromised, the City stands the risk of falling into a state of disrepute, as it is constantly under media scrutiny, regarding the 'billing crisis'.

However, as alluded to in chapter two, critics cite more pressing demands in the public service tend to take precedent over any ICT driven mechanism, rendering it a lower priority in terms of budget allocation (Bwalya, 2009; Trusler, 2003), in addition to this overspending in previous years and the 2008 recession lead to budget cuts in many departments in the City (Magni, 2011, cited in Todes, 2012:b). The City has invested a tremendous amount of human and capital resources into the development of this system. It needs to procure the relevant finances ensure that this system is "up-to-dated, accurate, complete, and accessibility" (Dale and McLaughlin, 1988: 8).

It is also concerning to note that the City did not acquaint themselves with past examples or experiences, as cited in literature, by academics such as Dale and McLaughlin (1988), and McLaren and Stanley (2012). The City has experienced many of the challenges and obstacles raised by academics, however, it is somewhat perplexing the time duration in which this took place. The City conceived the idea and implemented the LIS within a matter of a year. These sophisticated systems require time to plan prior the implementation, however, being under a tremendous amount of political pressure, the roll out of the LIS within such a short time period was inevitable. Local governments looking to implement such ICT driven mechanisms need to acquaint themselves sufficiently on the past experiences and potential challenges before embarking on such initiatives.

6.3.3. Recommendation pertaining to accessibility and skills development

To an extent, the LIS is reductionist in nature, as its primary source of property data stems from formal land administrative systems. As mentioned in chapter five, the CGIS Directorate is dependent on property data from the Deeds Offices and Chief Surveyor-General databases. According to Erasmus (2014) these are the two prominent sources of property data the directorate extracts and replicates into the LIS database. Although the directorate is capturing and monitoring the ongoing spatial growth of informal settlements, the LIS is yet to acknowledge customary tenure or land ownership. Thus, the implementation of the LIS does not necessary benefit the urban poor in this regard. As McLaren and Stanley (2012: 352) note "the computerisation of land administration without the outreach to otherwise disconnected segments of the population can further disadvantage the poor". It would seem that the development of the LIS thus far has benefit the CoJ, developers, planning consultants and members of the public with access to commodities such as a computer and stable internet connection.

As highlighted in chapters two and five, the presence of government services offered through online portals, the potential user base is significantly minimised. As society becomes increasingly connected and spatially enabled, it is imperative that government address the omnipresent challenge of the digital divide. The latest Census (2011) results, exemplifies the lack of access to commodities such as a computer and internet access. In addition to this, the user friendliness of the Web GIS viewer platform offered on the e-services portal is a challenge to digitally illiterate members of society (Cloete, 2004). If this phenomenon is not adequately addressed in the 21st century it stands the risk of enforcing further inequality.

As was discussed in chapter five, this web based platform allows a property owner access to information related to their property. The City, more specifically the CGIS Directorate, needs to look into updating these service. This services needs to extend to a whole host of web browsers such as

Google chrome, Mozilla Firefox and so forth. Limiting services, such as the Web GIS viewer to computers compatibility, needs to be addressed. In order to enable the broader spectrum of society with limited access to such commodities to truly benefit from such information mechanisms they need to be accessible from tablet computers and mobile smart phones.

Critics claim that small, unpredicted uses of spatial and non-spatial information of land is where the biggest opportunities lie (Ford, 2009). Enabling the public access to government held information opens the opportunity for innovation, for instance a small business wishes to develop an application that utilises the mapping information held by government to enhance their services, they need access to such services. This also extends into the realm of parastatals operating alongside the CoJ. With access to the up-to-date spatial database of the city, the Johannesburg Road Agency (JRA) has been able to implement a state of the art "Find and Fix mobile application" that allows members of the public to report "potholes, faulty traffic signals, storm water drains, manhole covers, and other infrastructure issues related to the JRA" (CoJ, 2013c). This exemplifies how the development of an LIS in conjunction with a GIS platform can enhance efficiency and increase productivity throughout departments in the City.

Both the CoJ and the CGIS Directorate have recognised the presence of the digital divide. The CoJ for instance, in collaboration with the Council for Scientific and Industrial Research (CSIR) has initiated an innovative project called the *Digital Doorway Project*, in mid-2009 (CoJ, 2011b). This project saw the roll out of computer centres in previously marginalised and lower income communities such as Diepsloot and Orange Farm. The computers are located in community centres and are accessible to the general public 24 hours a day. These innovative projects provide the members of the community access to computers and basic computer literacy training. This is vital moving forward into the 21st century, as more government services and information is made available online, members of the public, need access to such technological advancements to prevent the further proliferation of inequality (Odendaal, 2006). The CGIS Directorate, has stated on its online e-services website that it offers onsite training to all members of the public including city officials looking to utilise the Web GIS viewer. As was mentioned in chapter five, this portal is improving public access to land related information. Such mechanisms need to be promoted and further diffused into all members of the public and planners alike.

With more government services being place online, it is becoming increasingly apparent that access to the internet is a necessity. Although this research did not deduce the user base accessing this service, the stark disparities in development applications across the City (as highlighted in the preceding chapter) does question, 'who stands to benefit from such services?' Literature typifies

both the potentials and risks such innovative mechanism inhibit accessibility to a large segment of society.

6.3.4. Recommendation pertaining to the introduction of new topics in the planning curricula

The presence of technological advancements is pervasive and the changing nature of the profession makes it increasingly challenging to harmonise the two. Additionally, if planners do not choose to acquaint themselves with these technological advancements they stand the risk of lapsing into a state of technological limbo. As highlighted in chapter one, society is undergoing rapid change into a information / knowledge-based society and there is no chance of turning back. This means that literature planning students are exposed to needs adapt and evolve with the times. The presence of technology and innovation within the realm of planning will become ubiquitous with professionals. Thus, a 'new generation' of literature needs to be recognised and incorporated, as a substantial amount of literature has emerged relating to the planning profession, technology and smart cities for instance.

The planning profession is not static, challenges facing society change with time, so do the methods to overcome these obstacles. It is necessary for planners to re-evaluate themselves to enable them to plan within a changing context of society and the global economy. This is where tertiary education can facilitate as an important role by providing mid-career skills enhancement, development programmes and courses (Lewis, 2008). Such capacity building initiatives and continuous development courses are imperative for the profession. This includes short courses and learning seminars such as GIS training and project management, such course are offered by the South African Planning Institute.

The scope and nature of planning as a profession is constantly undergoing change. As was highlighted in chapter one, planning is a "public good", thus it is subject to many external forces and development pressures. As Lewis (2006: 868) notes "we [planners] should constantly think our roles in such new systems". The presence of ICT is inescapable in the 21st century, furthermore it is also becoming a perquisite for planners entering the working field to have a basic skill set of GIS and CAD programmes. These topics need to be introduced to planning students early in their tertiary curricula.

As alluded to in the preceding chapter, Eris has already partnered with the CoJ Department of Development Planning. These connections need to be strengthened in the sense that they offer the City the potential skills training platform. Planners need to recognise the potency of analytical tools such as GIS. Imparting this knowledge has the potential to revolutionise the planning profession.

6.4. The limitations of this research

The research acknowledges that there were a lot of challenges and limitations that need to be raised. This field of research is still relatively new within a South African context, which made the topic particularly tedious and interesting at the same time. Due to the opaque nature of the LIS, the researcher spent a lot of time conceptualising the overall working of the system. This meant collaborating with numerous city officials in the CoJ. The researcher constructed a network analysis of the flow of property data through various departments and agencies, through the assistance of four city officials. This was conceptualised to the best of the researcher's ability and may be subject to scrutiny. As the LIS spans across a multitude of departments, parastatals and agencies, the research was only focused on three particular Development Planning Departments and planning consultants. This research did not uncover how the LIS has influenced the Corporate and Legal Directorate, Valuations Department or parastatals such as City Power or Joburg Water for instance.

This research was primarily based on insights and experience of prominent city officials in the city engaging with the LIS on a daily basis. As the LIS spans across a multitude of departments in the City it has influenced virtually every city official dealing with property related information. Conducting a survey analysis of city officials utilising this ICT driven mechanism could also yield interesting findings.

Furthermore, the lack of numerical data present in this report can be regarded as a major limitation to the research findings. This would have enriched the findings further, as it sought to uncover whether or not it has enhance local governments performance in relation to development turnaround times Gaining access to this data and information was particularly difficult for the researcher. Although such figures and states should be made available for public inspection, it seems as if it was a sensitive area, as it deals with the Department of Development Planning's performance track record. It can be assumed that due to the serious lack of capacity has resulted in a growing backlog of development applications. As a result, some of the findings and discussion in this report are still open for debate. This does expose the research findings to further scrutiny, however it does allude to further research potentials.

The secondary data utilised from the GMS trend analysis only reveals development within a time period from 2007 to 2011. At this stage there were a numerous external factors influencing these numerical figures, such as the peak of the property boom in 2008 and the latter global recession that influenced cities across the globe. Such unequivocal series of events have skewed the numerical figures, to the degree it provide a true indication whether or not the number of land development applications have increase post the adoption of the LIS.

It should also be noted that the researcher conducted multiple interviews with an array of prominent city officials. These directors and deputy directors were under a tremendous amount of pressure, thus the researcher only had a limited amount of time to extract the necessary information required for this research report. The information they did share assisted the researcher tremendously in the drafting of this research report.

6.5. Potential research

The CoJ is still in the process of collating its land development archives. Once the City has established an accurate archival record of all development applications prior to, and post the implementation of the LIS, a detailed analysis based on the numerical figures can effectively take place. Although this data was not readily available to the researcher, it does probe an interesting realm of further research, when the relevant data is complied.

As mentioned in chapter one, the City of Cape Town has also recently implemented a system similar to the CoJ. Although the Integrated Spatial Information System (ISIS) is still in embryonic stage, a comparative analysis between the CoJ's LIS and City of Cape Town's ISIS could take place in the future. According to Hattingh (2014) the City of Cape Town did collaborate with the CoJ CGIS Directorate prior to its inauguration in 2012. It would be interesting to see what the City of Cape Town learnt from CoJ's LIS and uncover the variances and discrepancies between the two systems. Further collaboration between these two municipalities needs to take place to facilitate additional knowledge-sharing. Although the ISIS is still in embryonic status, a comparison between the two would have been interesting to analyse. However, a comparative analysis would not have been financially viable for the purposes of this research report.

With the development of a LIS, cities can capture and store a vast amount of information into a unified database. This information database forms the basis in monitoring the growth of the city. If a city has access to up-to-date database it can be utilised in conjunction with sophisticated urban modelling software such as UrbanSim. There is a growing interest amongst academics, planners and policy makers to develop analytical tools that will assist decision making for the developmental

future. Planning by its very nature inherits responsibilities such as monitoring, controlling, anticipating and guiding spatial growth of the city. Further research within this body of knowledge would be invaluable to planners in the future. The ability to simulate, render and run scenarios on sophisticated computer programs may influence the planning profession tremendously. These programmes will allow planner to run sunlight simulations to determine the effect of a high-rise development on the surroundings, and provide a topographical analysis of the proposed site, earmarked for development.

The presence of technology is inescapable in the information society we reside in (Belissent, 2011). Therefore, the concept of the digital divide needs to be investigated further in relation to planning. Although there are recurring leitmotifs outlined in literature, it would seem that this topic within a South African, context has yet to receive a substantial amount of empirical research. This has been alluded to by academics such as Baldwin et al (2011) and Odendaal (2006; 2010). It would be interesting to investigate the number of views the e-services portal receives and replicate the information spatially. Thus, divulging where and whom the user base for this online service is located. This could be cross-analysed with a map such as the level of deprivation within the CoJ. In addition to this, it would be interesting to see how many members of the public and internal city officials, more specifically planners that have requested training from the CGIS Directorate.

6.6. Final comments

As cities continue to grow and land uses continue to change, the LIS is developing into a sophisticated planning analytical tool that can greatly influence the decision making process in the CoJ. Since the implementation of the LIS, it has informed spatial policy in ways that have not been achieved in South African planning as of yet, as seen in the GMS trend analysis reports the city has been able to produce. However, due to the numerous obstacles still prevalent in the operations of the LIS, it would seem that we are still in the early stages of fully conceptualising an era of information rich planning.

With the implementation of the LIS, the CoJ is at the forefront with the development of such an innovative mechanism. However, there is much room for improvement as additional resources are required for its development, as highlighted in chapter five. It is hoped that should the necessary resources be spent on the development of the LIS, it can develop into a truly exemplary example of an ICT driven mechanism in local government.

The researcher found this study extremely insightful progressing forward into an aspiring planning practitioner. Engaging with both city officials and planning consultants, the researcher uncovered

some of the complexities and challenges in the cumbersome land development process. This has been invaluable asset moving forward in the planning profession.

The researcher would like to refer to a statement made by Burnham in 1902, "Make no little plans. They have no magic to stir men's blood and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing, asserting itself with ever-growing insistency. Remember that our sons and grandsons are going to do things that would stagger us. Let your watchword be order and your beacon beauty. Think big!"

Planners need to step back once in a while and see the greater picture of the situation. They need to be visionary in nature and be willing to take risks in order to succeed in making a change in society. The implementation of an LIS accentuates Burnham's statement, in that it was revolutionary in its approach adopting ICT’s into the workflow process of a municipality such as the CoJ.

The progressive diffusion of technology into the planning profession cannot be denied. Leveraging these mechanisms to their full potential to expedite the development of the urban and regional planning realm. The researcher fully agrees with van Helden's (1994: 495) statement that "information technology makes urban planning sense".

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Glossary

Broadband: This refers to high-speed data transmission in which a single cable can carry a large amount of data at once. The most common types of Internet broadband connections are cable modems (which use the same connection as cable TV) and DSL modems (which use your existing phone line)[8].

Computer Tablet: is a portable computer that is a hybrid between a personal digital assistant and notebook computer. Equipped with a touch screen interface, a computer tablet usually has a software application used to run a virtual keyboard[9].

Enterprise System: Enterprise software is an over-arching term for any software used in large organizations (whether business or government). It is considered to be an essential part of a computer-based information system, and it provides business-oriented tools such as online payment processing and automated billing systems[9].

ICT: Information and communications technology (ICT) refers to all the technology used to handle telecommunications, broadcast media, intelligent building management systems, audiovisual processing and transmission systems, and network-based control and monitoring functions[8].

Intranet: Contrary to popular belief, this is not simply a misspelling of "Internet." "Intra" means "internal" or "within," so an Intranet is an internal or private network that can only be accessed within the confines of a company, university, or organization. "Inter" means "between or among," hence the difference between the Internet and an Intranet[8].

Smartphone: is a mobile phone with highly advanced features. A typical smartphone has a high-resolution touch screen display, WiFi connectivity, Web browsing capabilities, and the ability to run sophisticated applications[9].

Web GIS: Web GIS is a type of distributed information system, comprising at least a server and a client, where the server is a GIS server and the client is a web browser, desktop application, or mobile application. In its simplest form,

[8] TechTerms (2014) http://www.techterms.com/definition/intranet (accessed: 12/10/2014).
[9] Techopedia (2014) http://www.techopedia.com/definition/7045/enterprise-software (accessed:12/10/2014).

web GIS can be defined as any GIS that uses web technology to communicate between a server and a client[10].

Web Portal: Web portals are organized gateways that help to structure the access to information found on the Internet. Much more than a simple search engine, they usually include customizable access to data such as stock reports, local, regional, and national news, and email services[11].

[10] ERIS ArcGIS Resource (2014) http://resources.arcgis.com/en/help/main/10.1/index.html (accessed: 12/10/2014).

[11] WiseGeek (2014) http://www.wisegeek.org/what-is-a-web-portal.htm (accessed: 12/10/2014).

Annexure A

What is an information system?

According to Narain (1997: 38, cited in Cruz, 2004: 17), an information system is defined as a "group of different data bases and documentation merged together in a systematic manner for transfer of knowledge and communication of data on any subject. Such a system is generally created to identify and analyse problems, set priorities and formulate policies and programmes, and monitor and evaluate policies and programme performance".

Information systems are developed in order to mechanise and "translate data into information that would have importance to public or private sector, in terms of accomplishing a certain task or objectives. A common objective in this regard is the support of decision making. Thus, information systems are commonly linked to policy makers, land administrators and other planning support mechanisms, such as forward planning mechanisms and growth management incentives. In such examples, the information gathered takes the form of an answer to a decision making question. The information system therefore facilitates as a mechanism to determine "what information is required for what decision as part of what function (van Helden, 1994: 486).

Information systems of late, have been transforming from an inward into more of an outward-looking perspective (Cruz, 2004). The objective of the system is not so much to support decision making but more to meet the demands and satisfactions of the users and citizens. The organisation of information is not seen as a decision-making system but more of a mechanism to satisfy citizen's needs, being the customer (Ho, 2002). Consequently, the information system is haled out from the "boardroom to customer interface (Bacon and Fitzgerald, 2001: 56).

This has led to the growing interest in knowledge management, which investigates how people in departments use and process information. People within departments are not at the helm of creating databases but are at the forefront of generating knowledge. This aligns well with the varying concerns of information technology, shifting the focus from, data to information, to knowledge and intelligence (Klosterman, 2001: 11). The term knowledge management has been defined as the "process of creating value from an organisation's intangible assets (Liebowitz, 2001: 2).

Annexure B

Residential Growth in Protea Glen Extension 16 (2006-2009)

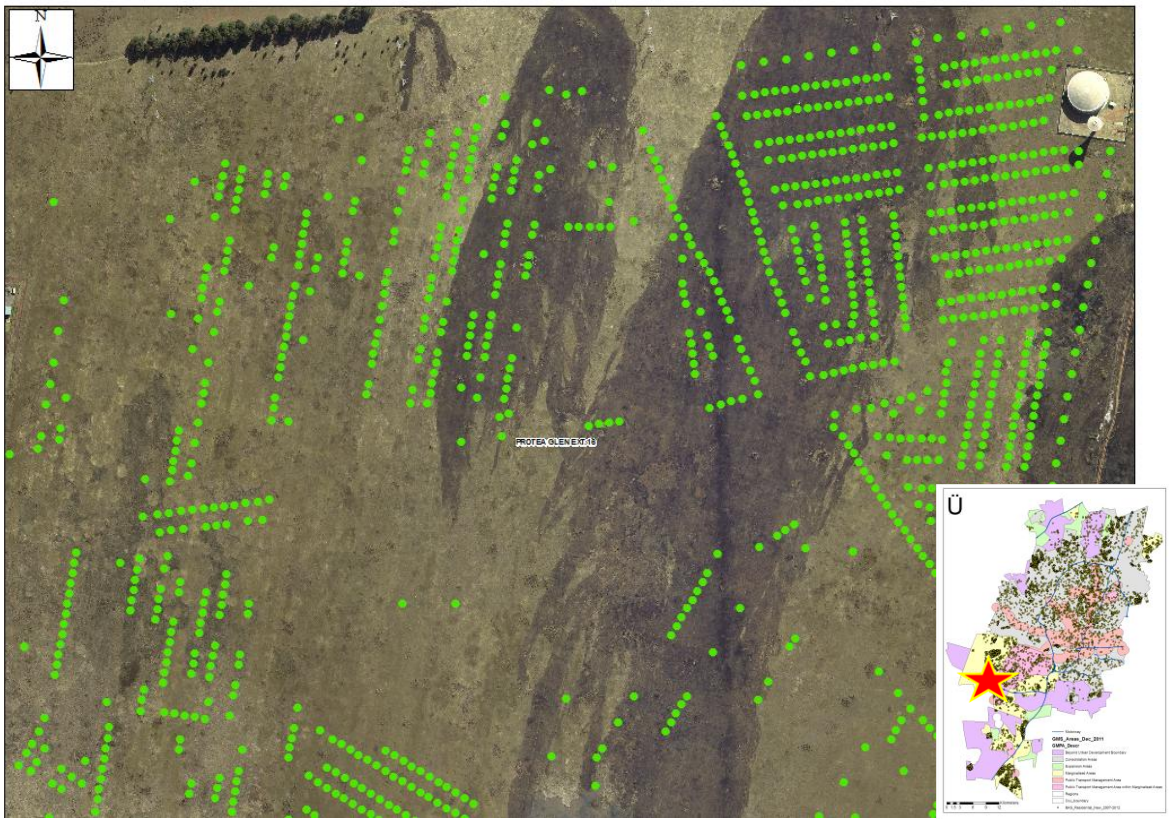

Figure 2: (above) Greenfield development, translating data into a spatial representation, anticipated growth, Source: (CoJ, 2012: 58)

Figure 3: (above) Subsequent residential growth experienced in the community, Source: (CoJ, 2012: 59)

Annexure C

Disclaimer notice

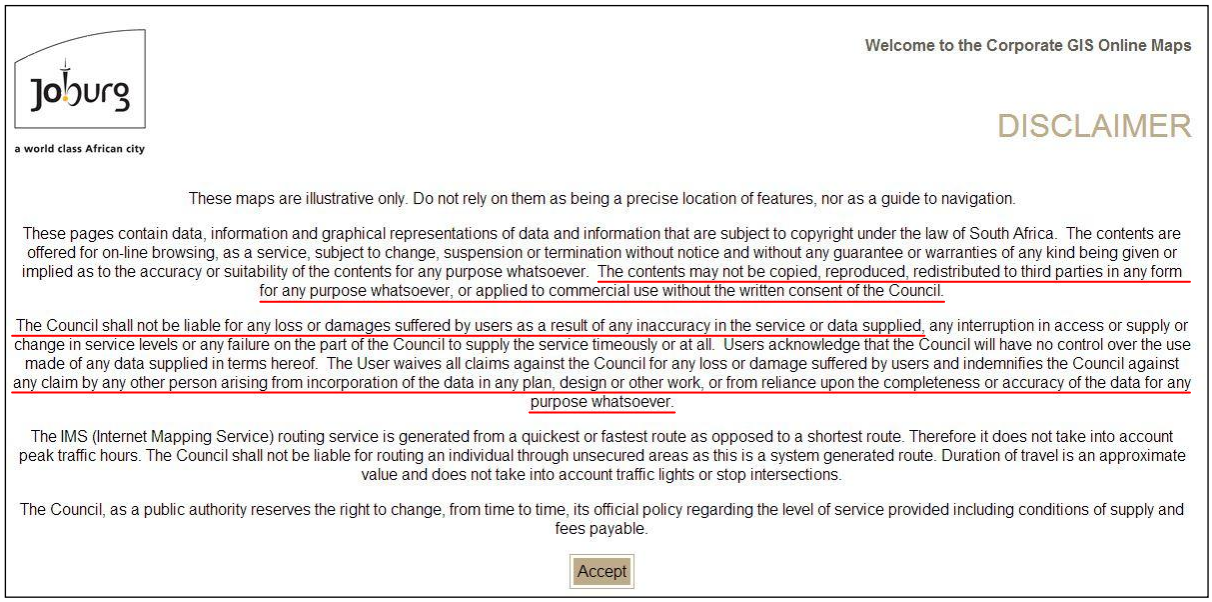

Figure C.1: (above) the Disclaimer notice, **Source**: (http://web.joburg.org.za/IMS.nsf/user?OpenForm)

When accessing the online Web GIS viewer, a user is presented with the a disclaimer notice illustrated in Figure. Within this legal agreement, the City stipulates to the user to the viewer may not redistribute the content to third parties, an example being, one cannot publish the maps available on the website without the permission of the CGIS department. However, even with the necessary permission the commercial licence agreements state that companies can only use the map as a backdrop, that they must agree to share their improvements with the City, furthermore they cannot resell the data (Ford, 2009: 1).

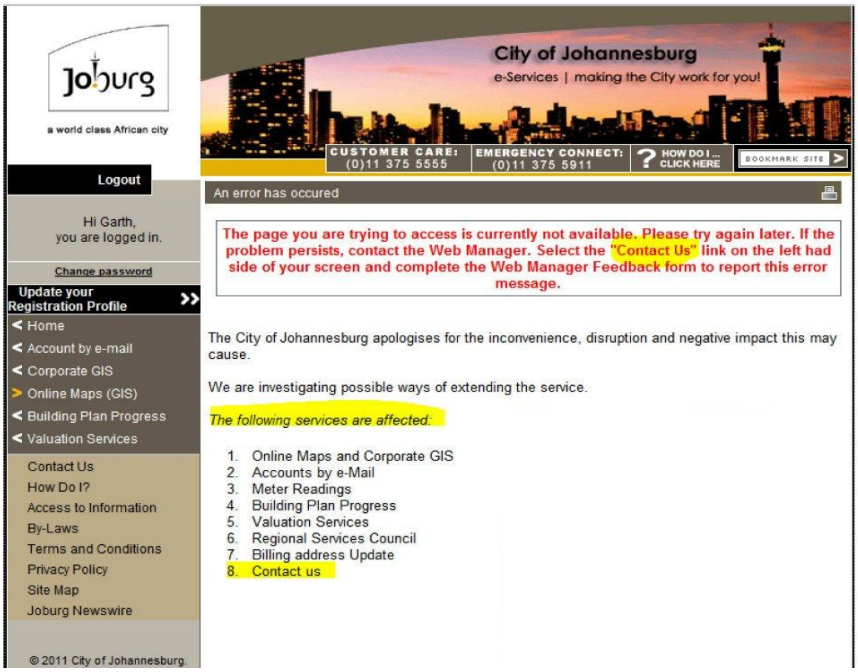

Figure C.2: (left) Screenshot of the 'e-services' portal experiencing technical difficulties. A user would have to revert back to the CoJ offices, or relevant department to complete a task that could have been carried out over this online portal.

Deeds Office web portal

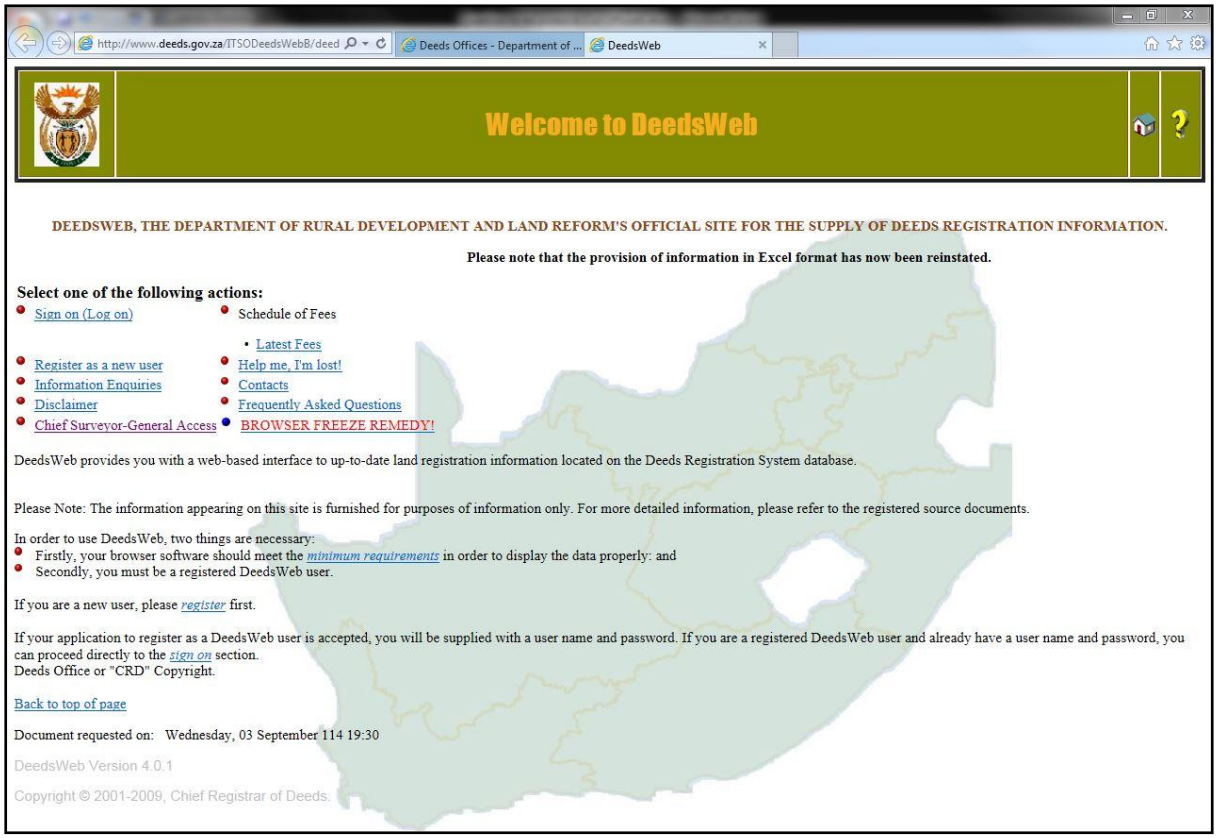

Figure C.3: (above) Screenshot of Deeds Office web portal, **Source**: (http://www.deeds.gov.za/ITSODeedsWebB//welcome.jsp)

Chief Surveyors-General web portal

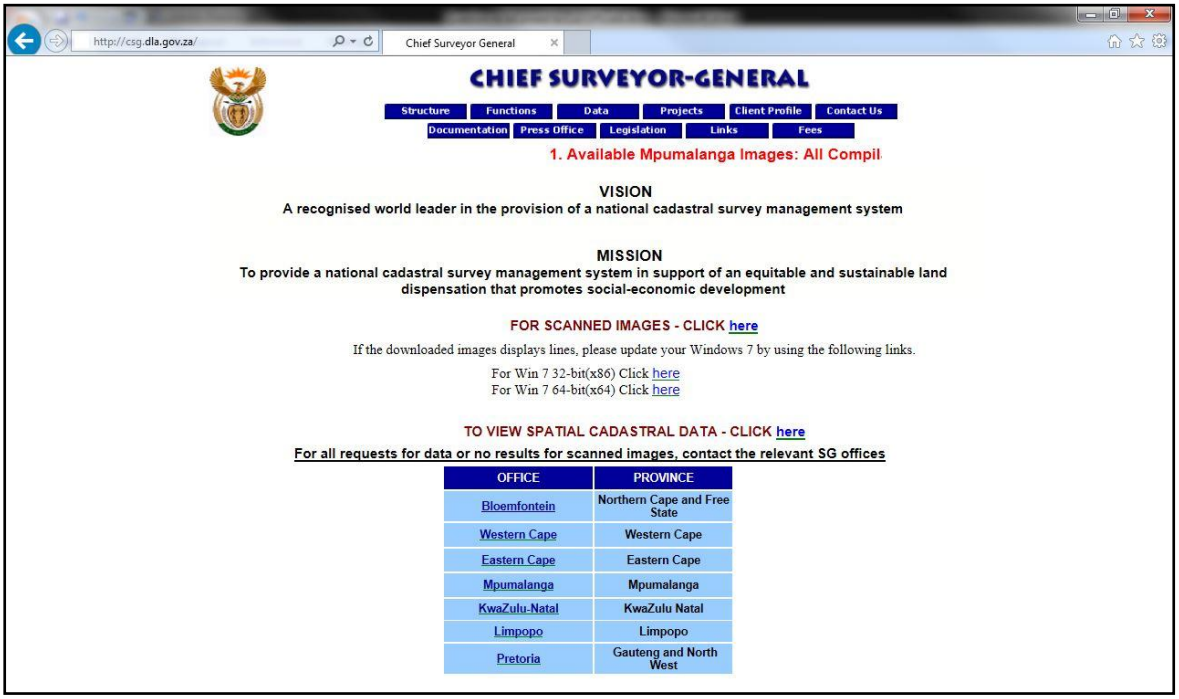

Figure C.4: (above) Screenshot of the Chief Surveyors-General Web Portal, **Source**: (http://csg.dla.gov.za/)

Annexure D

Interview Questions and Clearance Letters

City officials (four respondents in total)

Corporate Geo-Informatics Directorate (two respondents)

1. What was the rationale behind the development of the Land Information System?
2. How important were the policies and legislation surrounding the implementation of the Land Information System?
3. What city policies does the directorate align themselves with when they operate the LIS?
4. Who do you collaborate with in the LIS operations of the city?
5. How reliable is the information captured into the database? Is there any form of screening or cross-referencing process that ensures the information is correct?
6. What are the challenges and most pressing obstacles facing the general operation of the systems?
7. What are the advantages of Land Information System?
8. Does the public have access to certain information captured in the database? How accessible is this information?
9. How stable is the system? Has there been any glitches or snags during daily operations?
10. Do you believe the system is being utilised to its full potential? What improvements do you foresee taking place?
11. Going forward what would you like to see happen in the operations of the LIS

City Transformation Department (one respondent)

1. Does the City Transformation Department have access to the Land Information System?
2. How often do you refer to this database to extract property related information (whether its aerial photography or cadastral information).
3. Do you find this information easily and readably available?
4. Does the department have it own spatial development analysis system or are you reliant on the LIS itself?
5. Do you feel the implementation of the LIS has influence the planning in the Development Planning Department, more specifically City Transformation?
6. Has the Land Information System made the formulation of Spatial Policy for the CoJ easier?
7. What are some of the general challenges the department faces when extracting information from this unified source of information?

8. Going forward what would you like to see happen in the operations of a LIS

Development Management Department (one respondent)

1. Do planners in the Development Management Department have access to the Land Information System?
2. How often do you refer to this database to extract property related information (whether its aerial photography or cadastral information)
3. Do you find this information easily and readably available?
4. What are the general challenges facing the operations of the TAS and LIS?
5. Going forward what would you like to see happen in the operations of the TAS and LIS?

(Each respondent aided the researcher in the network analysis diagram of the LIS. Mr Etienne Erasmus, being the first key respondent, assisted the researcher tremendously in the initial phase of drafting the diagram. Subsequent to this, each respondent was presented the 'draft' version of the network analysis where they provided their opinions, thoughts and perspectives from three different departments. This was invaluable to the research, as it assisted the researcher in conceptualising the overall workings of the LIS and how it has influenced planning as a whole in the Development Planning Department).

Planning Consultants (four respondents in total)

1. How long have you been engaging with the Corporate Geo-Informatics and Development Planning Department in CoJ?
2. Where do you find development predominantly taking place in CoJ?
    - Why / Why not?
3. How do you usually retrieve / access information related to land (also referred to as scoping development).
    - Does it require you going into CoJ CGIS department?
4. Do you find information related to land with relative ease?
    - What makes it ease / not easy?
5. CoJ offers an "e-services" portal, are you aware of this?
    - When were you made of it?
6. Have you ever used this service to retrieve property information?
7. How often have you utilised and engaged with this "e-service" portal?

8. Does the "e-services" portal provide you with sufficient information? how do you think it could be improved?
9. Do you find this platform user-friendly, and information readily available?
10. CoJ has implemented a Land Information System, have you noticed any significant changes in the workings of the municipality?
11. Do you have any particular concerns with this system?
12. Approximately how long does a straight forward application take if it is in line with the spatial development plan and no objections are received?
13. Has there been any noticeable improvement in approval turnaround times?
14. When you have submitted a development application, does CoJ keep you adequately informed?
    - How do they usually keep you informed, is e-mail correspondents sufficient?
15. Now that CoJ has implemented a LIS, do you have more confidence / trust in the CoJ handling development applications?
16. How would you describe your relationship with CoJ?
17. What are the common frustrations one usually faces?
18. Throughout your experiences, which municipality do you prefer to engage with? Why?
19. Private consultants are often called on by clients to advise them development incentives, If you had to advise a client where to invest, do you see foresee CoJ as a competitive jurisdiction to invest in?

It should be noted that the researcher asked more questions based on the answers each respondent provided. These questions were utilised as a guide during the interview process, as respondents provided their own experiences and insights on the research topic. Furthermore, the researcher did not follow the precise order of the questions as provided above. Respondents either indirectly answered questions, thus leading the researcher to build on their answers provided at the time.