Dilemmas for decentralization of geo-information technology at local level towards a local SDI in Peru

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by

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Abstract

Peru is considered a centralist country and one of the last Latin-American countries that has initiated decentralization reforms within the government. Peru has received a democratic government for the second term. It is also in the second stage of most important national decentralisation reform which was initiated in 2001. After almost seven years the second stage reforms have led to many achievements. Local and regional governments are considered the base of the decentralization process, they have received new powers and autonomy to make decisions; however centralization is still embedded in the national government that for instance comprises 75% of the national budget, whereas regional governments and local governments comprise 17% and 8% respectively. The development of information technology and geo information technology is concentrated in the national government in spite of decentralization policies which promote the propagation of geo information technology to regional and local governments; this concentration seems to prevent the local initiatives for the implementation of spatial data infrastructures.

This study explores the decentralization process in Peru and the influence of geo information technology diffusion at local level within this process, with the objective of determining the possible critical conditions in decentralization of geo-information technology at local level towards a further implementation of Local SDI in Peru. To accomplish this main objective, the state of the decentralization process in Peru at local level is analysed and the influence of decentralization process in geo-information technology at local level is studied, through interpretative methods by reviewing theoretical concepts of decentralization and geo information technology.

In order to explore the context of these two variables a fieldwork for data collection was conducted in a relevant provincial local government of the country. Data collection covered organizations at the three governmental levels set within the provincial jurisdiction. Broad data collection methods allowed getting deep views and perceptions of actors pertaining to decentralization and geo information technology at local level, which were contrasted and analysed with the formal arrangements. The interpretation of the findings built a picture of the state of decentralization at local level and the conditions of geo information technology at local level

From this study it emerges that in spite of the progress in administrative and political decentralization till now, the process has failed to implement effective financial decentralization, which at local level is promoting:
- Autonomous but centralized local organizations,
- Dependent regional governments and;
- Decentralized but controlled or dependent national offices at local level

GIT is sustaining these tendencies because it is only concentrated in national organizations and controlled by them; it also supports the centralization in local organizations. So, the diffusion of geo information technology to local level is a complex process which will not happen automatically, but it has to undergo along with the decentralization process, therefore, government should be aware that it's policies are preventing the adjustment of GIT to the organizational conditions:

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List of abbreviations

COFOPRI   : Commission for Formalization of Informal Property
FONCOMUN   : Funding of Municipal Compensation
GIT   : Geo Information Technology
GIS   : Geo Information Systems
GRLL   : Regional Government – La Libertad
IDEP   : National Spatial Data Infrastructure of Peru
ICT   : Information, Communication and Technology
IGN   : National Geographic Institute
INAAC   : National Institute of Mining Leasing and Cadastre
INEI   : National Institute of Statistics and Informatics
INRENA   : National Institute of Natural Resources
IS   : Information System
IT   : Information Technology
MEF   : Ministry of Economies and Finance
MOF   : Organization and Functions Manual
MPT   : Provincial Municipality of Trujillo
PCM   : Cabinet Presidency
PIA   : Institutional Annual Budgeting
PETT   : Special Project for Rural Land Titling and Cadastre
PLANDET   : Planning and Development Office
PNFP   : National Property Formalization Program
SATT   : Taxation Management Service of Trujillo
ROF   : Organization and Functions Regulation
SDI   : Spatial Data Infrastructure
SIMTRU   : Metropolitan Information System of Trujillo
SUNARP   : Superintendence of Public Registry
TUPA   : Administrative Proceeding Document

1. Introduction

1.1. Background

After eleven years of a centralist government (1990-2001) that annulled the decentralization advances made up till then, in 2001 a new decentralist reform was initiated in Peru which is the second most important reform throughout its democratic political life.

Several legislative modifications were made. In 2001 the decentralization chapter in the National Constitution was modified. In July of the same year the Decentralization Law was issued and also regional and municipal authorities were elected and the Regional Government Law was enacted. The promotion of political, economical and administrative autonomy of regional and local governments was also initiated.

Conceptually, the new reform supposes that the conditions and development requirements will create the de-concentration and decentralization of the national government's attributes and competencies that progressively will get over the centralistic approach and promote a new vision of the Peruvian territorial development.

This "territorial democracy" also supposes that the citizen's rights will be strengthened and its potentialities will be enhanced if there is also an institutional reform. This would enable a functional counterbalance and territorial governmental power, so in addition to the classic division of the State powers (Executive, legislative and judicial), there will be a power redistribution at the territorial government levels (national, regional and local) as an expression and guarantee of the citizen's participation in the public subjects (Dammert, 2003).

However, the proposed decentralization reform seems to be a distant future for the Peruvian society. Decentralization at present is supported by two main pillars: first, the regional governments which are newly elected as an independent government (2002-2007); second, the municipal governments or municipalities with more than twenty-five years of continuous local administration and accumulated experience. However, the limited capacity of the sub-national governments is not a nig problem but the confused legislative framework that generates superposition of competencies and additional complications is big problem (Ugarte, 2006). This is due to an unnecessarily complex normative system in public administration, which delays the transfer of competencies and resources that are concentrated in the sectorial subsidiaries of the national government to regional and local levels. In addition, the public resources are highly centralized in the national government. The total public sector budget is divided between the national government (appr. 75%), the regional governments (appr. 17%) and the local governments (appr. 8%).

This can be subdivided further which means that the national government may allot approximately 45% for ordinary expenses, 7% for capital expenses and 22% for services of the national debt. The regional governments may allot 15% for ordinary expenses, 2% for capital expenses and an

insignificant 0.02% for debt services. However, for the local governments, the budget is essentially for capital expenses with an allotment of 6%, a mere 2.95% for ordinary expenses and 0.49% for debt services.(Toledo, 2005)

Along with the decentralization process, the modernization of the state is another aim of the national government. According to the Law 27658[1], its fundamental purpose is to create an efficient state in order to provide better services to the citizens and to prioritize and optimize the use of public resources (Toledo, 2002(1)). Modernization of the state also includes citizen's participation, management's transparency and the use of Information and Communication Technologies (ICTs) in public organizations; thus, the government has enacted several policies which encourage public organizations to develop a culture of planning and simplification of administrative procedures in order to enhance the quality, adequacy and prompt public services, it also aims at evaluating the services and standards provided to the citizens (Castro, 2007)

1.1.1. Informatics resources over different administrative levels

In 2002, the National Institute of Statistics and Informatics – INEI conducted a study analyzing the informatics resources in the public administration. The results reveal that there is a technological gap between organizations in the ministries (Executive Power) and the regional and local governments(INEI, 2002)

Table 1.1: Informatics Resources in Public Organizations

Resources	Local governments (%)	Regional governments (%)	Executive Power (%)
Workstations	7,9	8	64,9%
Data network	18	17	55,4%
Internet access	20,9	70	80
GIS software	Auto CAD	Arc Info, Arc Info	Arc View

This gap is shown in Table 1.1. The differences in informatics resources between local, regional and national public organization are evident, not only about IT but also in the use of GIS software in the public administration. Only about 8% of local and regional organizations avail informatics resources to support their activities whereas around the 65% of ministries offices in the Executive Power have informatics resources. 80% of national organizations avail access to internet, one of the reasons for this is that the ministries are mostly located in capital of provinces where the provision of public services is better than in small Districtal municipalities. In addition the, national organizations have access to Arcview, while local governments mainly use AutoCAD software, it could be the reason because, since the 1980's national organizations have implemented GIS units especially in the ministries related to Natural Resources Management and Defence (Geographic National Institute – IGN).

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[1] Law 27658: Law of State modernization

1.1.2. Policies on spatial data in Peru

In 2001, Ministry of Natural Resources Management and Geographic National Institute – IGN being governmental organizations and producers of spatial data, declared the necessity for accessibility and updated spatial information exchange to avoid financial and technical duplication of efforts (De la Fuente Solari, 2001) . Hence, in 2003 the National Spatial Data Infrastructure – IDEP was established with the participation of 28 national agencies and ministries in the Permanent Implementation Commission (De la Fuente S, 2003). The objectives of the National Spatial Data Infrastructure (IDEP) are as follows

- To propose guidelines and strategies for the production and diffusion of spatial data.
- To establish a cooperative framework between producers and users.
- To standardize the spatial information ensuring data interoperability, and enhancing the technological capacity of the participant organizations.

In 2005, the Permanent Commission of IDEP studied the situation of the spatial data in Peruvian public organizations, 67 public organizations of the national, regional and local governments were part of the study. The results show that the distribution of spatial data between organizations is about 20.7% for local governments, 34.5% for regional governments and 40.2% is concentrated in organizations at national level. In addition the study found several constraints for information exchange between the public organizations, these factors among others are as follows: lack of policies for information exchange (19,6 %), the information producers (national organizations) do not want to lose the control of their data (16,1%), restricted resources to produce or to maintain spatial data (16,1%), insufficient skilled personnel (12,1%) and administrative expenses for the information exchange (11,8 %) (PCM, 2006)

The studies described in the previous paragraphs (INEI and IDEP reports) have shown the concentration of Information Technology (IT) in the central government also has lead to the concentration of Geo-information Technology (GIT) in this governmental level.

Ugarte (2006) argues that the reason could be because the government is trying to design the decentralization process without having a clear model of a decentralised state with a governmental system structured from the three levels of government, differentiated and with complementary competencies and functions to each other without unnecessary dependencies which promote the concentration of development in the national government in detriment to the local and regional government which are supposed to be the base of the decentralization process in Peru.

He also suggested that it is essential, to design a structured, agile and effective State for the service of the society, observant to its signals in order to support its competitive development, watching at the globalized world from the communities perspectives, reinforcing the local governments and redefining the government's scope for "thinking globally but acting locally".(Ugarte, 2006)

1.2. Research Problem

The ongoing decentralization process has restored the autonomy of the local governments, which was reduced during the 1990's. According to the law, local governments have financial and administrative autonomy. Nowadays, local governments not only provide services but also they have the duty of

planning and managing their jurisdictional territories. Local planning is an integral, permanent and participatory process that joins the municipality with its neighbours in establishing policies where decisions are made based on stakeholders' participation and consensus as base of local development (Toledo, 2003)

The local planning relies on local governments for the implementation of several plans covering aspects, such as zoning, urban cadastre, land use, etc. Hence, municipalities have started the use GIS in the planning activities (Table 1.1). The INEI (2002) study also underlines the updating of integrated cadastral and ownership databases as the most important informatics applications in municipalities. In addition, the previous studies show that more than 20% of the spatial data is produced at local level (PCM, 2006)

The previous discussion, suggest that in spite of the technological gap between local and national governmental organizations, there is an urge for the use of geo-information technology at local level. Notwithstanding the technological differences, local governments have realised that GIT is essential to develop the main instruments for local planning such as Urban Cadastre and Land use planning because urban cadastre and land use planning requires or can benefit from spatial analysis and visualization of diverse fields of information. In addition, they recognize the necessity of spatial data provision from other governmental levels because urban planning covers different scales and diverse spatial information is produced at regional and national level.

Current trends regarding the development of GIT, suggest that Spatial Data Infrastructure (SDI) may be beneficial in local urban planning providing means for networking and referencing various data sources and for ensuring consistency and compatibility of data development across administrative and organizational boundaries. There are several other benefits which are as follows (Nedovic-Budic et al., 2004)
- Enhancing vertical and horizontal communication and presentation of planning issues and ideas
- Reducing cost and duplication in data production.
- Saving data development effort by using standardized data, guidelines, and tools.
- Developing applications more quickly and easily by using existing data.
- Helping with analysis, plan and policy development, and administration of urban development within and between jurisdictions.
- Providing for more informed decision-making.

Nevertheless, information systems like SDIs are an integral part of the wider culture and society in which they found. This means that ideas, practices, organizational arrangements, roles and statuses in the information system reflect the wider socio-cultural and political economic context in which they occur and are influenced by that context. (Mukama et al., 2005)

In the context of Peruvian local governments, inter-organizational relationships needed for a local SDI approach may raise conflicts in the context of a decentralization process; where functional and financial resources and thus; technological development, is still embedded in the centralised national government whereas autonomous local governments are still restricted in their responsibilities.

This tension is clearly shown in the case of Trujillo's provincial municipality that took the initiative to implement a Spatial Information System to support local planning process. It requested the

collaboration of spatial information producing national and regional organizations located within its jurisdiction. But, the local government was not able to sustain the project due to several issues such as:

- Organizational bottleneck;
- People, organizations, politics, economics, and technology were adapting to the transitional circumstances at that time
- Unsustainable and unrealistic high standards of data precision. At local level data quality is relative and it is based on the local need and economic prospects (Murgia et al., 2002)

In 2002 the Peruvian administration was in a transitional political stage, from the centralistic governmental rule (1990 -2000) to the initiation of a new democratic government. The state and all public organizations were also at an unstable stage and under an intensive process of re-organization. Thus, there is a possible relation between the unsuccessful example of Local SDI in Trujillo's city with the political situation at that moment in the country. Presently, the country is having a second term of a democratically elected government therefore the political situation is much more stable and the decentralization process is undergoing for almost seven years.

1.2.1.   Formulation of the research problem

The previous discussion has shown that centralism is still embedded in national organizations. Hence, the focus of the research problem is whether decentralization process in Peru would make it possible for the geo information technology to diffuse to local level (particularly for local land administration and local land use planning) or whether the geo information technology will be used to support the remnant centralism within the national government.

The implementation of local SDI requires streamlined information exchange between different governmental levels which can be achieved by local control of resources, autonomy to make decisions by local organizations and also local cooperation in short decentralization.

1.3.   Research Objectives

The main objective of this research is to determine the possible critical conditions in decentralization of geo-information technology at local level towards a further implementation of Local SDI in Peru. In order to accomplish the main research objectives the following sub objectives arise:

1.   *To analyse the state of decentralization process in Peru*
2.   *To determine the influence of decentralization process in geo-information technology at local level*

1.4.   Research Questions

The first objective which is *to analyse the state of decentralization process in Peru in the local Level*, will be answered by the following research questions

1.   *What policies determine the roles of GI actors at local level?*
2.   *Are the actors able to execute their GI roles at local level?*

3. *How much are the local organizations able to collaborate/co-operate with national organizations at local level?*
4. *What differences of GI practices between local and national organizations can be related with decentralization/centralization?*

The second objective which is *to determine the relation of decentralization process and geo-information technology at local level,* will be answered by the following research questions

1. *How much centralized/decentralized are the organizations at local level*
2. *Is the state of decentralization having any influence on geo information technology at local level?*

1.5.   Methodology

1.5.1.   Literature Review

The review of literature was performed in two phases. The first phase was prior to the collection of data, and in this stage the literature review consisted of SDI concepts and applications to local level, information technology and its relationships with governance and Information Systems development in developing countries in order to contextualize the research. The second phase was after data collection to assist the interpretation of findings from the fieldwork. The literature reviewed at this stage was about the impact of Information technology in public organizations and organizational centralization/decentralization.

1.5.2.   Case Study

Case study allows the use of multiple approaches using qualitative methods to gather and analyse data. Case studies are especially helpful when the boundary between the concrete case – here, the concrete GIT application – and its context is not clear (Yin, 1994). The case study selected was the Local Government of Trujillo's province which is introduced in chapter 3. The research is interpretative because it intends to understand the data gathered, and also to show how the specific situation emerged, so that the data sources were a) interviews b) analysis of documents c) observations.

1.6.   Thesis Structure

Chapter 1 dealt with the background of the research problem, the objectives and questions and finally the methodology used for data collection to fulfil the objectives and answer the questions.

Chapter 2 deals with the development of basic concepts based on existing literature related to concepts of centralization and decentralization, strategies for local governance and GIT for local governance. An evaluation of strategies for the development of SDI in the developing countries was made. This chapter helps to define the basic concepts used in the research.

Chapter 3 focuses on the fieldwork plan and the methodology used for data collection during the fieldwork. The location and relevance of the case study for the selection of organizations and respondents is briefly discussed. This chapter also discusses the methods used to operationalize the

concepts. Finally, the relevance of indicators derived from the literature review to the data collection methodology is discussed.

Chapter 4 describes the roles of GI institutions and agents at local level which are derived from secondary resources. This chapter also explains the role of Local institutions related to land use planning, land titling and cadastre and finally the role of National institutions related to Land Administration.

Chapter 5 describes the findings from interviews and secondary resources regarding the views and perception of the actors. It initially presents the limitations and potentials observed in organizations followed by the inter-organizational tensions between organizations, the issues regarding access and standards and finally differences of IT architecture and resources.

Chapter 6 analyzes the interpretations of the findings from chapter 4 and 5 and the literature review from chapter 2 in order to understand the implications of geo-information technology and decentralization for the diffusion of GIT at local level. This chapter also discusses the possible critical conditions or dilemmas related to GIT and decentralization.

Chapter 7 presents the conclusions and recommendation of the research. It ends with the recommendations for future research.

2. Literature Review

2.1. Introduction

The aim of this literature review is to define the basic concepts and their relationships in order to understand the research context. Consequently, this chapter discusses the theoretical concepts of geo-information technology, centralization and decentralization strategies for local governance.

Thus, in section 2.2 relevant concepts of decentralization and local governance are described. In section 2.3, geo -information technologies in favor of local governance, centralization and implications of IT in organizations are studied and the issues faced for the implementation of SDI in the context of developing countries are addressed. Finally in section 2.4, conclusions regarding the previous discussion are presented.

2.2. Decentralization for Local Governance

Governance involves multiple stakeholders, interdependent resources and actions, shared purposes and indistinct boundaries between the public and private, formal and informal, state and civil society sectors, and greater need for co-ordination, negotiation and building of consensus (Rakodi, 2003). It refers to the formation and location of the formal and informal rules that regulate the public realm in the position in which the state as well as economic and societal actors interact to make decisions (Batterbury et al., 2006) (Odendaal, 2003)

Shan (2006) describes *local governance* as the formulation and execution of collective action at the local level; it includes its direct and indirect roles, formal institutions and governmental hierarchies, as well as the roles of informal norms, networks, community organizations, and neighbourhood associations in pursuing collective action (Shah, 2006). According to Odendaal (2003) *Local governance* refers to the means by which local government manages its environment to achieve ongoing growth, delivery and effectively administers its affairs. It relates to the relationship between individuals, interest groups, institutions and service providers in the ongoing business of government. (Odendaal, 2003)

Urban governance which is a part of the local governance is responsible for what happens within the city, which is determined by the relationships and interactions between local actors and institutions where city or municipal government is the largest and most obvious actor (Devas, 2004) The actors and institutions involved include: private sector businesses, both corporate and informal; civil society, including community based – organizations, NGOs, political parties, religious groups, trade unions and trade associations and the whole range of governmental agencies of national, regional and local government, including traditional authorities. (See Figure 2.1)

Thus, as de Man (2002) suggests, *local governance* deals with two dimensions: '*horizontal*' interactions within local society and '*vertical*' interaction with higher and lower levels of authority.

Also, it comprises many aspects because it is multi-level, multi-actor, multifaceted, multi-instrumental, and multi-resource- based and it is essentially polycentric in its decision-making. Subsequently local governance needs mutual coordination and adaptation which are embedded on institutional arrangements. (de Man, 2002)

Figure 2.1: Actors and Institutions of Urban Governance
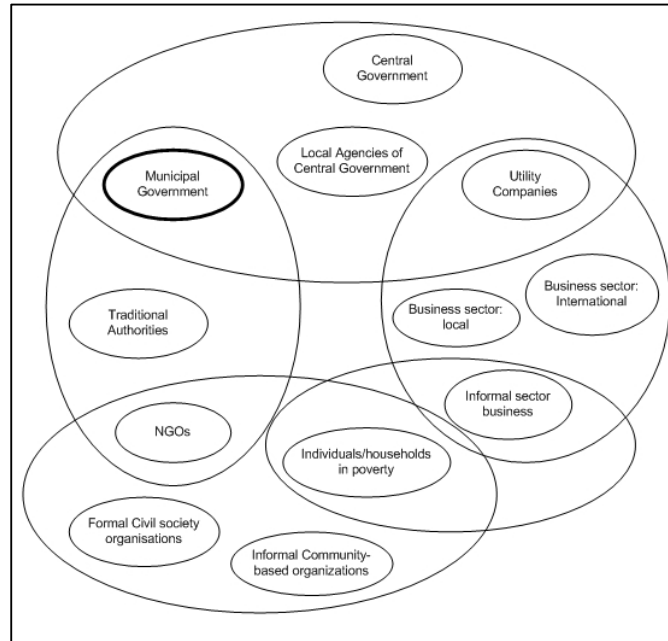
The relationship between decentralization and good governance is also considered in the literature. It has been argued that **good governance** covers any initiative of public sector reform, designed to create "lasting and positive changes" (Batterbury et al., 2006) in accordance with the following principles:

-   Openness; improving institutional public confidence and carrying on accessible and comprehensible practices for all actors.
-   Participation; because when developing, implementing and evaluating policies, institutions should adapt an inclusive approach.
-   Accountability; because institutions must provide clarity about their policies to the society and take responsibility of the impacts.
-   Effectiveness; because policies must be clear and timely, corresponding to clear objectives.
-   Coherence; because policies and practices should be coherent and easily understood, given the increasing diversity and complexity of demographic and institutional scales at which the institutions are expected to function.
-   Civic peace; concerning mutual respect, human dignity, and rights among groups in society

Decentralization is defined as any political act in which a central government formally cedes powers to actors and institutions at lower levels in a political-administrative and territorial hierarchy, therefore it relates good governance to political decentralization by conferring decision-making powers to local institutions (Ribot et al., 2006), since it improves both accountability and voice for local people and their representatives (Batterbury et al, 2006).

Devas (2004) assumes three main issues as to why decentralization of decision making is essential in good governance (Devas, 2004):

- *Administrative considerations*, because it is just not possible for governments to make decisions at the centre about the detailed management of services development at the local level.
- *Economic considerations*, because decisions about local services and development are made locally, reflecting local needs and preferences, this should result in a better allocation of resources and hence greater economic efficiency.
- *Political considerations*, because in a democratic state, local people demand the right to make decisions about those things that locality affect them.

The author makes a distinction between *administrative deconcentration*, which transfers tasks to field offices of central government without local autonomy and *political decentralization* or devolution of powers and resources to elected local governments with a degree of local autonomy. The author supposes that *fiscal decentralization* is in fact an element of the other two aspects because it relates to the transfer of resources and decisions, promoting prospects for more efficient management of expenses, rights, and democratic values.

Accountability along with autonomy or discretionary authority is essential in any decentralization reform which aims at devolving power to lower levels. If local authorities always need the approval for any action from superiors then their "downward accountability" is attenuated. Moreover, if central governments grant local governments the rights to make and implement decisions but withhold resources or otherwise limits local ability to do so then its discretionary power will not been effectively transferred (Ribot et al., 2006)

In practice, decentralization is threatened from two sides. From the central governments side, devolution of responsibilities of management without corresponding funds intensifies the scarcity of resources. This will restrict the ability of the local levels to undertake the routine tasks of the local governments. Central governments also limit the scope of powers that they transfer by instituting new patterns and systems of oversight, creating ambiguity in the reforms or by exploiting ambiguities inherent in all policy measures.

Ultimately, the lack of legal clarity prevents local authorities from co-ordinating its decisions with higher level officials and makes it easy for central departments and ministries to maintain control and ignore input from local government. But on other side, decentralization policies may also lead to with negative effects if there are deficiencies in the intergovernmental relations (Devas, 2004). For instance:

- Decentralization could results in the fragmentation of the national state
- Local decision making could undermine the achievement of broader, national goals and common objectives.
- Decentralization could result in economic inefficiency, through the loss of economies of scale and creating inter-jurisdictional rivalries.
- Decentralization could result in increasing inequalities, e.g. those in rich regions could be free to prosper while those in poor regions remain disadvantaged.
- Excessive fiscal decentralization could undermine the fiscal position of the central state.

From the review of literature regarding decentralization and governance, it can be concluded that the effects of good governance and strategies for decentralization will particularly be felt in local

government but also it is here that the potential for its failure are met. Normative models often fail in practice because central government do not hand over enough control to local people. (Batterbury et al., 2006)

2.3.   Geo information technology in organizations

2.3.1.   Information Technology and Local Governance

The relationship between local governance and technology is supported by the modern trends of local government (Odendaal, 2003), which are as follows:
- Increasing role that extends beyond the traditional role of service provision.
- Promotional identity of the city, mostly the economic development in order to attract investment and tourism
- Emphasis to build networks and collaboration channels between
    - Various local governments.
    - Local governments and other levels of government.
    - Local governments and other institutions.
    - Local governments, public/private partnerships and stakeholder groups.
- Emphasis on consultation and participation with communities, allowing for continuous two-way communication between local governments and their constituents.
- Strategic focus of local government that manages change and fluctuation more effectively.

From the literature of the previous section it is affirmed that local governance has several components such as participation, legitimacy, transparency, accountability, competence, equity and vision. Along with these, access to information, including spatial information is another important component because, local decision making has an explicit spatial context (Sliuzas, 2002) It is also assumed that the inclusion of local institutions in managing spatial information will support local governance (de Man, 2002)

Odendaal suggests that the extent of the relationship between ICT/GIT[2] and local governance has a substantive dimension in how digital networks and infrastructure are adapted as outcomes (Odendaal, 2003). However there is also a technical/ practical dimension which depends on how well ICTs adapt the processes necessary to achieve local governance. Nevertheless, these relationships should be supported by technical, cultural, economic and institutional context hence, priority for economic development, policy and technological development will most indeed determine the capacity of municipalities to incorporate ICTs into governance processes.(Odendaal, 2003)

GIT can contribute for urban planning and management as a tool for informed and participative decision making, especially in developing countries. But its implementation must be financially, institutionally and politically realistic. Moreover, urban governance in developing countries is

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[2]Geo-Information Technology (GIT) refers to the technologies designed to perform practices related to spatial data handling or processing. It encompasses both highly specialised and more generic spatial information tools such aerial photography, satellite imaging and processing systems, GIS, GPS and several others

characterised by deep rooted procedures in institutional cultures, a prevalent resistance to change, and conflicting aims and priorities that may prevent its development (Rakodi, 2003).

2.3.2. Centralization and IT in Organizations

Several characteristics distinguish centralization versus decentralization (Brooke, 1994 cited by (Young et al., 2004). Decisions delegated to lower levels; higher participation in decision making; high choice at lower levels; high autonomy at lower levels; coordination with high levels, advice downward and democracy are characteristics of decentralization while as control from higher levels down, orders downward are termed as centralization characteristics. (Brooke, 1994)

Andrews et al (2008), argues that centralization can be measured as both the hierarchy of authority and the degree of participation in decision making:
-   Centralized organizations have a high degree of hierarchical authority and low levels of participation in decisions; (Andrews et al., 2008)
-   Decentralized organizations have a low hierarchical authority and high participation in decision making where all organizational members are involved in decision making.

To this study the effect of centralization or decentralization of information technology particularly Information Systems within organizations, scholars have studied connotation as a form of control or power exercise, they also found that it can be an efficient approach to enhance the organizational performance. (Dedrick, 1997),

Dedrick (1997), suggests that the real concern for both centralized and decentralized computing is the power and control within the organization, the quality of computing services is not a concern because if information is power, then centralized computing concentrates power at higher levels in the organization while decentralized computing devolves more power to subunits within the organization Contrary to this view, Haque (2001), states that centralization give to managers the ability to guide computing towards the organization goals, centralization may support to increase economies of scale in procurement, it may also enhance coordination in the use of data between agencies. (Haque, 2001)

Andrews et al (2008) who studied UK public organizations found out that centralization has no independent effect on service performance or service expenditure. However, the impact of centralization is dependent on the strategic orientation of organizations. In addition, Information technology could characterize existing forms of knowledge, legitimacy and authority, and hence its tendency is to support the organizational ***situation*** as institutionalized mechanism of internal and external control, (Orlikowski, 1991)

Walsham based on the analysis of three case studies, investigated decentralization of computer based Information System in public organizations (Walsham, 1993). The author concludes that IS may fail because the design and processes reflect a ***top-down approach*** which often do not support activities at lower hierarchical levels of an organization because the decisions are made at the central level of an organization. He suggests that an alternative approach would be to work from ***bottom -up***, which would assist and complement the capabilities of people at lower organizational levels. (see Table 2.1)

Table 2.1: Categories of decentralized large-scale IS

	Type A – top-down	*Type B – bottom-up*
Primary Purpose	Information for higher level control	Information for lower level support
Design approach	Designed at centre	Designed by local/centre interaction
Implementation approach	Training for lower level staff on data collection/input	Training, but also continuous learning and system modification

Some relevant characteristics of these types of IS are relevant, as follows:

- Type A systems, are improbable to be successful since:
  - They do not support staff at lower hierarchical levels in doing specific task.
  - These systems are not designed and implement in conjunction with lower levels.
  - It is probable that the information for higher level may be inadequate since good higher level information needs to be distilled from lower data which is a fair reflection at higher levels.

The reasons for governmental offices to incline towards the Type A are the cultural attitudes towards power and autonomy and a widely perceived difference between staff at different hierarchical levels in developing countries.

- Type B systems do not necessarily decentralize power to local levels, but they can empower staff at lower levels to do their job more effectively but, in closer central inspection and overall control of local activities from higher levels. However, empowering lower levels may decline the autocratic control at higher levels

Implementation of Type B is not common in the government sector since it does not suit present culture and management approaches that help centralization and autocracy of established elite. The author suggest that developing countries should try to move towards type B approaches to decentralized IS since it may provide genuine assistance to lower levels in areas such as planning and monitoring of development programmes at district level (Walsham, 1993)

2.3.3.   A perspective of Spatial Data Infrastructures in developing countries

Spatial Data Infrastructure (SDI) has been defined as a cohesive framework for the policies, standards, technology and procedures that support the more efficient and effective use, management and production of spatial data for the community. It involves users and providers of spatial information and is more than a product or collection of data sets. It is about access to data and reducing duplication of effort and expense (Williamson et al., 2003)

SDIs are multileveled in nature, formed from a hierarchy of inter-connected SDIs at the corporate, local, state or provincial, national, regional, regional (multi national) and global levels. This is important because at any higher level, an SDI is made up of one or more SDIs from the lower level; this also implies that certain political/administrative level SDIs can aggregate to form the next higher level SDI of the hierarchy. Apart from these vertical relationships, there are also complex horizontal relationships between SDIs within the political/administrative level at a horizontal level of each SDI hierarchy. Ideally, this means that the necessary institutional frameworks, technical standards, access network and people need to be available at the relevant levels to enable sharing of information (McDougall et al., 2005)

Despite sporadic reports of benefits of SDIs to local governments, systematic benefits of SDI investments are still not being achieved. For instance, Nedovic-Budic et al (2004), after assessing the New Zealand Land Information Council (ANZLIC) in Australia and the Federal Geographic Data Committee (FGDC) in USA, conclude that the full horizontal and vertical cooperation has not been achieved at the local level due to important reasons such as: reservation about data derived from higher levels of government, regarding the generalised nature and limited data relevance for local planning and voluntary challenging participation due to the number and variety of jurisdictions involved in urban management and decision-making. In addition, local cooperation (vertical cooperation) will be strong if there is an explicit institutional framework between the parties and local standards, expectations or needs sometimes do not match with higher levels.(Nedovic-Budic et al., 2004)

In the context of developing countries the problems of an SDI implementation may be magnified not only due to financial resources, but also due to a relative lack of spatial information, trained manpower and capacity of public institutions and security concerns (Georgiadou et al., 2006)

De Vries while analysing a local land information system in Indonesia, suggested that local spatial data infrastructures "need to be fundamentally different per local region" because "centrally guided policies and regulation can not be developed and enhanced by uniform copying of national spatial data infrastructure designs" (de Vries, 2005). The same case study was taken to study the inter-organizational dependencies of local and national organizations and the factors to exchange land information, the author found that local organizations exchange information due to two important reasons: necessity and stability. Necessity refers to the sharing mandate that enforce the formation of relations and stability refers to maintaining. Hence information exchange is an extra effort for organizations to reduce the "environmental uncertainty, and stabilize long-term environment". Sometimes, local organizational structures become obstacles for exchange of information because local organizations depend on external actors for collection and aggregation of information.

Another case studied in this context, is the Land Information System in Guatemala; the case was studied by Silva, who argues that due to the complexity of SDI, its institutionalization will not occur without and effective and conscious knowledge of politics. Strategies for land management require cooperation among different institutions. An institutional jealously was observed between land organizations in Guatemala due to a conflictive political and institutional past which prevented the cooperation between them. (Silva, 2006)

One success story of a successful SDI initiative in developing country has also been found. The Brazilian National SDI and Bello Horizonte Local SDI in Brazil were benefited because unlike many Latin American countries; Brazil does not have a strong centralized government. the strategy in this country was adapting the technology to the local knowledge and local conditions (Davis et al., 2006)

2.4.   Concluding Remarks

Some contradictory concepts regarding local SDI, decentralization and the influence of information technology in organizations which evolve from the discussion above which are as follows:

The authors in section 2.2 which dealt with theoretical concepts of decentralization and centralization agreed that governance, local governance, good governance are related to decentralization because it formally devolves powers to actors and institutions at lower levels (Ribot et al, 2005) which may improve the accountability of local people, through political decentralization (Batterbury et al, 2006). In addition, decentralization of decision making to local government may encourage the autonomy and accountability to local authorities. The level of autonomy devolved depends on the stage of decentralization. The fiscal decentralization which is the transference of decisions by the transference of expenses, rights and democratic values may give enhanced degree of autonomy in comparison to the administrative deconcentration which transfers tasks without local autonomy (Devas, 2004).

In section 2.2.2 the implications of centralization in organization have been discussed. Andrews et al, distinguished centralized and decentralized organizations on the basis of degree of participation of actors in decision making and the hierarchy of authority within the organization (Andrews et al., 2008)

It is suggested that information technology could be a form of control enforcing the current conditions within the organization (Orlikowski, 1991) which may be characterized as centralised organization reflected in top- down designs and process which often do not support activities at lower levels because decisions are made at the top level of the organization. The decentralized organizations rely on bottom–up designs which complement the participation and capabilities at lower levels (Andrews et al, 2008 and Walsham, 1993)

The literature of SDI discussed in section 2.3, suggests that the theoretical benefits of SDI and the complexities for its implementation may be magnified in the context of developing countries not only due to the technological and financial adversities but also due to the political and centralistic culture of these countries. In developed as well as in developing countries the inter-organizational relations which are characterised by central policies and institutional jealousy between organizations is a bottleneck for the implementation of SDI for the Land Information Systems.

3. Data Collection Methodology

3.1. Introduction

The field study was aimed at finding evidence and counter-evidence about the situation of the decentralization process and its relationship with the condition of geo information technology at local level, in order to do so it was necessary to execute a fieldwork plan for data collection. The fieldwork plan included: a list of provisional contact persons, a sequence of open-ended interviews, observations and documents collection. The relevant data for this research was collected from the primary and secondary sources which were assessed during fieldwork.

This chapter begins with a brief description of the fieldwork plan, the location and relevance of the case study for the selection of organizations and respondents in section 3.2. The operationalization of concepts from the discussion in chapter 2 and the justification of indicators used and the data collection methods are discussed in section 3.3.

3.2. Fieldwork Plan

3.2.1. Location of the case study

The fieldwork was conducted in the Province of Trujillo which is located in La Libertad Region located in the north west of Peru. Trujillo city is the capital of the province as well as the region. The city is also the third largest city in the country after the Lima and Arequipa (For more details see Figure 3.1).

Figure 3.1: Introduction of case study and location

La Libertad Region
- Population: 1,539.774 thousand habitants*
- *Administrative Division:* 12 provinces
  Coast: Chepén, Pacasmayo, Ascope, Virú and Trujillo
  Mountains: Gran Chimú, Otuzco, Julcán, Santiago de Chuco, Sánchez Carrión, Pataz and Bolívar
- **Capital:** Trujillo's City
- Area 25 569 sq. kilometers

Trujillo's Province
- *Population:* 765,171 thousand habitants*
- *Area:* 1768.65 sq. kilometres
- *Administrative-Politic Division*: 11 districts. Trujillo, Huanchaco, Victor Larco, El Porvenir, Florencia de Mora, La Esperanza, Salaverry, Laredo, Moche, Simbal, Poroto
- **Capital:** Trujillo's city
*Census 2005
Source: INEI, 2006 (www.inei.gob.pe)

According to the national constitution, Peruvian local governments are structured into Provincial and districtal municipalities. The case study selected was the Provincial Municipality of Trujillo. There are 11 districtal municipalities under the political authority of this provincial municipality of Trujillo. Trujillo's local government was selected as case study based on:

1. *Availability of data*

Trujillo's municipality is categorized as Large – Urban municipality because of its population (higher than 200,000 thousand habitants), number of employees (more than 200 employees) and a significant presence of the state and private organizations within its jurisdiction.

The main decentralized offices of national agencies, ministries and the office of regional government office which deal with land administration and management functions are based in Trujillo city. It was convenient for data collection to consider Trujillo for case study as the study required accumulation of data from diverse views of managers and GI practitioners/users from the three main governmental levels.

2. *Relevance of data*

Metropolitan Information System (SIMTRU), which aimed at spatial information exchange between local and national organizations. Since this system required information exchange an analysis of the same would generate relevant data for this study. In Annex 2 the system is described in detail.

3.2.2.   Organizations and respondent selected

Urban cadastre and land use planning are the main functions of municipal information system. Some major regional and national level organizations which are involved in land administration and management also make use of municipal information system. . Hence, in the selection process 08 organizations from municipal offices, regional government and national government were identified, important organizations of land administration and management working at regional were also considered. From each organization some departments and offices dealing with planning and cadastral activities were selected (See Table 3.1),

Table 3.1: Organizations and respondents selected

Level		Organization	Number of Respondent	Jurisdiction	Mandate
LOCAL GOVERNMENT(4)	1	Urban Planning and Municipal Information Office - PLANDET	three	Provincial	Land administration/Local Planning
	2	Economical Development Office	one		
	3	Urban Development Office	one		
	4	Taxation Office-SATT	one	Districtal	
REGIONAL GOVERNMENT (2)	1	Regional House Building	one	Regional	Regional Planning
	2	CHAVIMOCHIC	one		
NATIONAL GOVERNMENT (2)	1	SUNARP	two	Regional	Land Administration
	2	COFOPRI	one	Regional	

3.2.2.1.   Local Government Offices

Four organizations from different functional levels were selected from the Municipality of Trujillo. Figure 3.2 shows their location within the municipality's structure. The Building Office and The Licenses Offices are located inside the municipality's administration and the Planning Office and Taxation Office are established as decentralized organizations.

Figure 3.2: Local Government Offices selected
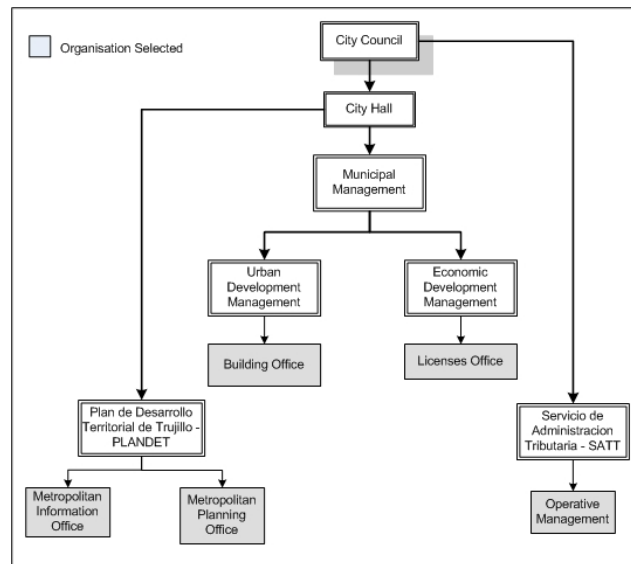
Source: ROF-MPT, 2007

Urban Planning and Municipal Information Office – PLANDET:
This office is composed of two main departments:
a) Metropolitan Planning Department
b) Metropolitan Information Department
The Planning department is responsible for urban planning tasks, such as developing master plans at districtal and provincial level, urban improvement, transportation and heritage conservation plans, projects and programs. In addition the Information Department is responsible for developing the Municipal Cadastre.

Taxation Office - SATT
The Taxation Office deals with the revenue collection, municipal contributions and payments for public activities and services within the Trujillo's district. The selected respondent was the manager of the Operational Department because this office controls and monitors the annual plan of tax collection

Economical Development Office
It controls and regulates the touristic, commercial and industrial activities and provides services within the district according to the current legal policies. The selected respondent d was the manager of the Licensing office due to its closed relationships with PLANDET since PLANDET proposes the urban regulations which are applied for licensing office.

__Urban Development Office__
This office is responsible for urban management, controlling and organizing actions and activities of urban growth, individualization, subdivisions and adjustments of buildings, land divisions and housing according to the c legal policies. The respondent selected was the manager of the Building Office because this office also has closed relations with PLANDET since PLANDET proposes the urban regulations which are applied for Building Office.

3.2.2.2. Regional Governmental Organizations

The organizations selected at regional level were the Regional Government Office and CHAVIMOCHIC. Figure 3.3 shows their location within the organizational structure of Regional Government

Figure 3.3: Regional Organizations Selected
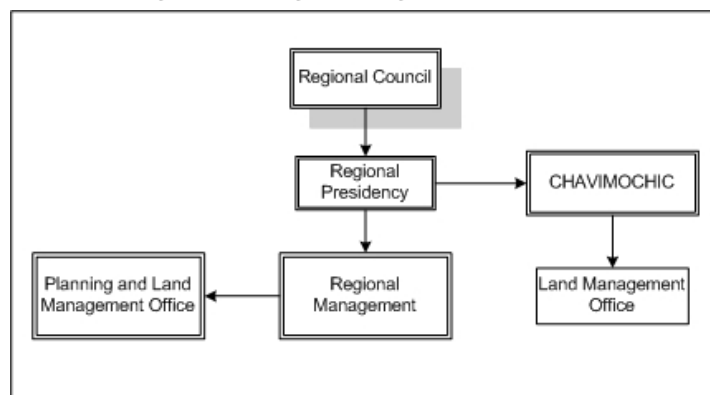
Source: ROF-RG, 2007

__Regional Government Office__
The regional government carries out the regional planning and also handles the regional public sector payroll and budget, to execute projects of public services and infrastructure for the provinces within its jurisdiction (12 provinces).
The selected respondent was the manager of the Planning, Budgeting and Regional Land Management Office because this office has the specific function to plan and execute rural-urban regional plans, projects regarding infrastructure development and public services in coordination with public sector organizations within the region.

__CHAVIMOCHIC__
CHAVIMOCHIC[3] is an important irrigation project for several coastal provinces of the region. Its functions deal with the rehabilitation of rural land that later is auctioned for agro-industrial purposes. It is also involved in rural planning within its jurisdiction.

The selected respondent was the Manager of the Land Management Office because this office executes the rural planning. It is also involved in surveying activities and collection and processing of spatial information.

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[3] CHAVIMOCHIC is made by the initial letters of the following provinces: Chao, Viru, Moche and Chicama

3.2.2.3. National Governmental Organizations

The organizations selected were the national offices of SUNARP and COFOPRI located within the provincial limit. Figure 3.4, shows their institutional role within the Executive Power of the Peruvian state. These organizations are under the jurisdiction of the Ministry of Justice (SUNARP) and the Ministry of Housing and Building (COFOPRI)

Figure 3.4: National Organizations selected
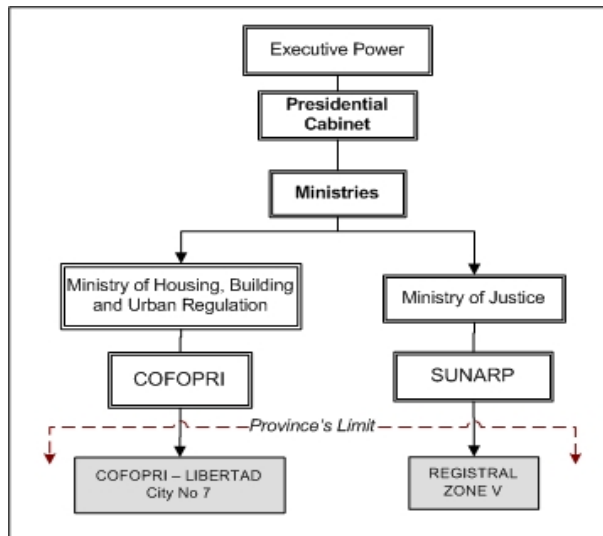
Source: Peruvian State Structure

SUNARP – La Libertad (Registral Zone V)

The Registral Zone V is a de-concentrated office of the national registry agency (SUNARP) which executes the registration and maintenance of the provincial and districtal ownership information It is involved with the administration of the land records within the region. The selected respondent in this organization was the head of the Cadastre Office because his main function is to coordinate the national cadastre within the region; hence, he had experience with local – national interactions.

COFOPRI – La Libertad

COFOPRI – LA LIBERTAD is a de-concentrated office of national titling agency which executes the titling of urban and rural informal areas outside municipality jurisdiction within the region. The selected respondent in this organization was the manager of the Technical Department because this office carries out surveying activities that deals with collection and processing of spatial information

3.3. Operationalization of concepts

From the literature review made in chapter 2, the following concepts were determined in order to achieve the fieldwork aims stated in section 3.1.
a) Organizational concepts that would describe the situation of the decentralization process
   - Autonomy and dependency relation
   - Inter-organizational relationships between local and national organizations

b)   Technological concepts that would describe the relationship between decentralization and GIT diffusion to local level

- Geo Information management practices in organizations

3.3.1.   Indicators of decentralization or re-centralizations

Assumptions which were made to organize the planned data collection are as follows:

If decentralization is supporting GIT at local level, then the findings should suggests

- An increase in control of local resources (incl. money, ICT, etc.)
- An increase in autonomy of decisions for local organization
- An increase in local co-operation and independent resource

But if there is centralization, then the findings should suggest that:

- In spite of local autonomy , national organizations still control resources and decision making
- In spite of national organizations set at local level, decision making is still placed at national level
- The role of GIT supports centralization at local as well as national level

In table 3.2 the indicators which were taken into account to apply the data collection methods are described

Table 3.2: Concepts and Indicators of decentralization and re-centralizations

Concept	Factors - Indicators	Decision level
Organizational — Autonomy - Dependency	Degree of Independence	*Whether there is an increase of financial and functional autonomy of decisions of local organization* Is the local government able to manage its economical resources? What are the benefits of functional autonomy in local government Are the decentralized national organizations able to make decisions at local level?
Organizational — Autonomy - Dependency	Level of control	*Whether there is an increase of control of local resources (incl. money, ICT, etc.)* Does the legislation clarify national and local roles? Are the local organizations able to promote local resources? Is the local government able to implement (resources, policies, etc) GI activities
Organizational — Inter-organizational Relationships	Information exchange	*Whether there is an increase of local cooperation and resource dependencies* Is there information exchange between local and national organizations? Are there communication channels between organizations? What is the status of these channels? What is the degree of participation between local and national organizations?
Technical — GI practices	Management Practices	*Whether there is an increase of autonomy in decisions of local organization* Is there a difference between IT in national organization and local organizations?
Technical — GI practices	Operating Practices	Is the local government able to fulfil the GI regulations? Are the GI regulations flexible to be implemented at local level?

3.3.2. Methods for data collection:

As explained in section 1.5, this study is an interpretative research, thus the suitable methods applied were the open-ended interviews, observations and the analysis of secondary resources.

3.3.2.1. Interviews

An open- ended interviewing process was selected to gather in-depth opinions of the managers, in this way the interviewees had freedom to answer the questions, and also the interviewer had the freedom to include new questions as they would come up during the interview. According to Kumar (2005), the advantage of open- ended interviews is the collection of in-depth information and respondent's point of view.

For the research purpose, the interviews helped to get views and perceptions of the selected respondent regarding: Limitations and potentials to carry out their activities, relationships between local, regional and national organizations, and practices of information exchange. The interviews not only helped to analyse the aspects that constrain the GIT diffusion but also aspects reflected in execution of the Urban Cadastre and Land use planning.

Using an interview guide (see annex 2) prepared before the interview, eleven (11) interviews were completed in a period of three weeks. The central entity of each one was PLANDET since this office is the connection between local government and external organizations. As this organization is mainly involved in GI activities, the interviews were focused on two main subjects, the urban cadastre and the land use planning applications within the context of the municipal information system (See table 3.3)

Table 3.3: Primary resources

Level	No.	Main Themes	Subject
PROVINCIAL MUNICIPALITY	6	- Limitations and potentials o carry out activities	Urban Cadastre/ Land Use planning applications
REGIONAL GOVERNMENT	2	- Relationships with municipality and others	Land Use planning applications
NATIONAL OFFICES	3	- Information Exchange practices	Urban Cadastre

3.3.2.2. Observations

Observation is a "purposeful, systematic and selective way of watching and listening to an interaction or phenomenon as it takes place" (Kumar, 2005). Non – participant observations were used to observe the conditions of GI within the organizations selected, so the data regarding the following was collected
a) Observation, infrastructure and equipment also some daily GI activities
b) Watching and listening, the approach of GI processes execution

For the research purpose, the observations helped to draw conclusions from the point of view of the researcher concerning with what is happening in the field. The observations also helped to draw additional information from interviews.

3.3.2.3. Secondary Sources

The secondary sources collected were management documents, legal documents and operative documents (see table 3.4) provided by PLANDET office. It was also required to collect some documents from other organizations in order to verify some opinions expressed during the interviews.

Table 3.4: Secondary resources

INSTRUMENTS	ORGANIZATIONS	PURPOSE
DOCUMENTS (28)	Management Documents: (16)	Institutional Opening Budget 2007(4), Operative Institutional Plan 2007(3), Organizational and Functional Statutes (ROF)(5), Administrative Proceeding Document (TUPA)(4), Organizational Strategic Plans (2), Urban Development Plan (2)
	Legal Documents (5)	Agreements (3), Ordinances (3) and National Laws
	Operative Documents (7)	Projects Official Documents(5), Procedure Manuals(1), Annual Memories(2)

The management documents collected were useful for analysing the financial and functional constraints also for analysing the administrative procedures of GI processes. The legal documents were useful to build the formal context in which organizations are placed. The operative documents collected helped to get statistical information also GI processes and to determine the projects in which organizations are involved.

3.3.3. Data Analysis

After fieldwork, transcripts of interviews were prepared from each respondent. In the analysis phase, the data gathered from interviews was organized according to main themes of the interview (see table 3.3) for each level (local, regional and national) so that; it was feasible to select common and relevant responses from each level to be compared. At the same time the documents that support the views of respondents were also selected in order to validate the data and to compare the interviews responses with the documentation.

3.4.　　Concluding Remarks

As this study intends to understand the problematic reality several aspects which were taken into account are as follows:

- The selection of Trujillo's local government as case study has helped to gather data from the three governmental levels placed within the local government's jurisdiction in order to understand the broad points of views of respondents from different organizational levels.

- Finding evidence or counter-evidence for decentralization and recentralization and finally possible causes and effects which may be contributed to GIT required a broad approach of data collection.

- Although indicative and hence not completely conclusive, a number of indicators which were derived and explained in chapters 4 and 5 helped us to sort out the evidence.

4. Current GI Institutions at local level in Peru – Actors and Roles

4.1. Introduction

The objective of this chapter is to describe the official roles of national and local institutions with regards to land management at national and local level in the context of the ongoing decentralization process. Such description is necessary to have a comprehensible notion of the official arrangements in order to explain and understand the problematic reality of decentralization and geo-information technology at local level. Secondary sources provided most of the information and the roles for this chapter.

The chapter describes the roles of local institutions regarding local planning, regional planning, land titling and urban cadastre in section 4.2, in section 4.3 a brief description of the national institutions and their roles at national and local level are presented and in section 4.4, relevant concluding remarks of the chapter are presented.

4.2. Local Institutions

The Regionalization Law (Toledo, 2002(3)), states that Municipal governments, or Local governments, in coordination with the Regional governments, have the duty to work for the development of their conforming communities; hence, this section describes the roles of Local governments and Regional governments as local institutions. An understanding of the position of local institutions requires a description of the actors involved in the local planning and their roles in land use, urban cadastre and land titling at the local level.

1 *Local Governments*
Peruvian Constitution classify Local Governments according to their functions and jurisdiction as: Provincial Municipalities (within a province territory and its constituted districts), Districtal Municipalities (within a district territory) and Town centre Municipalities (whose jurisdiction is determined by provincial and districtal councils).The local governments are immediate channels of citizen's participation also they have economic and administrative autonomy in the planning and implementation of actions for the citizen's benefits (Peruvian Constitution, art. 74, 2003).

2 *Regional Governments*
The Regions are considered geo-economical and territorial entities with the diversity of social, institutional and natural resources, these entities not only have a historic, economic, administrative, cultural and environmental integration but also they have different development levels, specializations and productive competitiveness. Geographically, regions are composed of several provinces on whose circumscriptions regional governments are constituted and organized. They also have political

economic and administrative autonomy in subjects of their competition. For their economic and financial administration they rely on the national budget (Toledo, 2002(3)).

4.2.1. Local Land Use Planning

a) Local Government – Municipality

Municipalities have the responsibility of planning and managing their jurisdictional territory. Regional government and other regional organizations also play a role in the local planning process because it is an integral, permanent and participatory process in which not only the public organizations but also the civil society and the neighbourhood in general are involved

Municipalities are responsible for the formulation, execution and promotion of their jurisdiction's development. The Municipal Law (Art. 73, 2003) outlines their competencies in details which are as follows:
a) Organization of the "physical space" (territory) and Land Use
b) Provision of public facilities, basic infrastructure and services
c) Protection and conservation of the environment
d) Development of the Local economy
e) Neighbourhood participation
f) Provision of Local Social Services
g) Prevention and rehabilitation of narcotics consume

The functions of municipalities regarding Territorial Organization and Land Use, their competencies are summarised as follows:
a) Zoning
b) Urban and Rural Cadastre
c) Land Management
d) Urban Renovation
e) Urban Improvement of settlements
f) Urban and Rural basic infrastructure
g) Local transport, circulation and traffic
h) Preservation of the historical, cultural and landscaping heritage

In order to fulfill these competencies, municipalities have to apply specific regulations set by the National Ministry of Building, Housing and Construction. The main regulation is *The Land Management and Urban Development Regulation* which is the technical and normative instrument that establishes the instruments for land management and urban planning and procedures for their approval) (VIVIENDA, 2003)[4]. These instruments are as follows:
1) *Land Management Plan* – PAT: This instrument at provincial level, establishes the following policies:
    a) General policies for land use,
    b) Roles and functions of provincial settlements,

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[4] Supreme Decree N° 027-2003-VIVIENDA

c) The spatial organization of economical, social and administrative activities,

d) Allocation of transport, energy and sanitation infrastructure,

e) Allocation of health, education, recreation, security, culture and administration equipments

f) Determines the protected ecological areas, risk areas and possible affected areas by natural disasters.

2) *Urban Development Plan* – PUD*:* This instrument at Metropolitan level establishes the following actions:

a) The land use planning and zoning normative

b) The norms for roads and transport plans

c) Housing requirements in order to determine the urban expansion areas, promotion of housing programs according to the existing conditions

d) Determines the requirements of environmental sanitation and basic services infrastructure

e) Conservation of historical and cultural valuable areas and buildings

f) Actions for environmental conservation and natural disasters mitigation

g) Determine the service level of education, health, security and recreation equipment

h) To increase the property value through the system of internal urban investments

3) *The Specific Plan and Urban Districtal Plan:* This technical and normative instrument is used to implement and complement the policies of Land Management Plan and the actions of the Urban Development Plan

This regulation also determines the planning scales, Provincial Scale for the Land Management Plan, Metropolitan Scale for the Urban Development Plans and Districtal Scale for the Districtal Urban Plans

These functions are common to all municipalities at provincial and districtal level but each municipality has the freedom to organize and structure the functions in the best way according to its needs.

b) Regional Government

Regional governments have to promote the integral regional development. Regional Development which is an efficient and coherent execution of policies and instruments for the economic, social cultural and environmental development is reached through plans, programs and projects and it also demands a harmonized economic growth including the equitable social development and natural resources conservation (Toledo, 2002(2)). Concerning the planning competencies of the regional governments, the law requires the following:

a) Orderly formulation and approval of the Regional Development Plan with the municipalities and civil society.

b) Promotion and regulation of activities and services with regards to agriculture, fishing, industry, agro-industry, commerce, tourism, energy, mining, roads, education, health and environment within the regional jurisdiction.

c) To stimulate competitiveness, investments and financing for the construction of projects and infrastructure within the region.

In addition, the Regional Governments Law (art. 53, 2002) specifies the instruments and regulation for regional planning which are the Regional Land Management Plan and Regional Environmental Plan. (Toledo, 2002(2))

The specific policies and actions of the same are as follows:

a) The formulation, approval, execution, evaluation, control and administration of territorial ordering and environmental plans and policies, in agreement with the Local Governments plans
b) Implementing the regional environmental system, in coordination with the regional environmental commissions.
c) Promoting the creation of regional and local areas for natural conservation within the Protected Areas National System.
d) To plan and carry out actions in order to determine the regional delimitation and the organization, evaluation and fulfilment of technical files for the regional demarcation,
e) Preservation and administration of the regional natural reserves and protected natural areas and the insulars territories which are located within its jurisdiction, in coordination with the Local Government.

In the case of municipalities, these functions are common to all regional governments but each Regional Government has the freedom to organize and structure the functions in the best way according to its needs.

4.2.2. The Land Titling and the Urban Cadastre

a) The Land Titling

Provincial municipalities have competencies to formalize the informal urban areas within their jurisdiction. They determine and execute integral Urban Improvement Plans in new urban settlements. They regularly update and the adjudicate the database of ownership titles in new urban settlements and regularization of modifications and changes in Urban Improvements(Garcia, 2006)

In specific cases the municipality provides or delivers ownership titles, for instance; in new lots and unattended lots with residence purposes, lots segmentations with or without land use change among others which are inscribed in SUNARP by the municipality or in most of cases by the users.

b) The Urban Municipal Cadastre

By law, Provincial and Districtal Municipalities have the duty to develop and maintain the Urban and Rural Cadastre within their jurisdiction (Toledo, 2003), 5% of the benefits from property taxation should be used for the implementation and maintenance of the districtal cadastre. These funds could also be used in tributary acts in order to potentiate the municipal taxation (Fujimrori, 1993)

Thus, tax collection is the main aspect in the municipal cadastral process and the ownership rights play a secondary role because taxation does not have a relationship with the registry office. Tax collection also generates financial resources to execute projects such as social, cultural and recreational equipment improving the quality of life for the citizens on one side and consolidating the local government's credibility in front of the citizens on other side (Alfaro, 2006).

In order to develop a unique methodology for the elaboration of urban municipal cadastres the Ministry of Buildings has approved the Technical Norms for the Municipal Urban Cadastre; which allow the integration of cadastral information at different geo political levels (provincial, regional and national). This information is also needed to develop the Urban Land Management Plans

4.3. National Institutions

Since the 1990's the Peruvian government has started a legal and institutional reform concerning land policy and administration with the fundamental objective of promoting a fast, low cost and massive formalization of land rights and land registration. For this reason, the government is implementing National Titling Projects in informal urban and rural areas with the economical support of The World Bank and The Interamerican Development Bank (COFOPRI, 2006) [5]

The national organizations which are parts of this study belong to the National Land Administration system. This section describes the roles of the national governmental organizations within the ongoing national programs and projects for land titling, registry and cadastre.

4.3.1. National Property Formalization Program - PNFP

The National Property Formalization Program (PNFP) financed by the World Bank aims at the consolidation of a decentralized and sustainable quality property rights system that facilitates access of a legal security property rights to the citizen. In this sense the government has implemented a legal and regulatory reform in order to build an institutional framework involving different governmental levels and ministries to support the ongoing national decentralization process.

The organizations and their specific mandates and functions are described below:

a) Commission for Formalization of Informal Property – COFOPRI

COFOPRI is the decentralized national agency under the Ministry of Housing, Building and Construction; it was created in 1996 to formalize the informal urban settlements. Since June 2006, COFOPRI is also responsible for rural titling, executed before by PETT (Special Project for Rural Land Titling and Cadastre) which has been absorbed by COFOPRI[6] with the objective to integrate and simplify the rural urban titling processes into one single process.

By Law COFOPRI, is the highest public entity responsible for the design and implementation of PNFP. It also carries out the surveying, innovation, consolidation, maintenance and updating of the real estate cadastre derived from the formalization process. Ultimately it is the technical adviser of municipalities regarding property improvements and property formalization because municipalities are also required to develop titling programs within their jurisdiction (Garcia, 2007)

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[5] Ministerial Resolution Nº 155-2006-VIVIENDA

[6] Supreme Decree 005 -2007-VIVIENDA:- Regulation of Organization and Functions (ROF-COFOPRI)

b) Superintendence of Public Registry – SUNARP

The titling process carried out by COFOPRI ends with the property registration in SUNARP. SUNARP is the decentralized organization under the Ministry of Justice. Its main function is to plan, organize, norm, lead, coordinate and supervise the registration of land records and publicity of acts and ownership rights in the Property Registry and other Registries that conform the National System of Public Registries (Fujimori, 1994)

4.3.2. The National Cadastre

In addition to SUNARP and COFOPRI, some other national agencies are active in land administration like the National Institute of Mining Leasing and Cadastre (INAAC) which is building a database related to mining rights and the National Institute of Natural Resources (INRENA) which registers the protected natural areas. These organizations are responsible for the development of non parcel-based cadastral databases. The municipalities also have the duty to develop the urban cadastre within their jurisdiction which is described above in Section 4.2.2.

The cadastral information producers follow their own technology, standards and hence the national cadastral information is disarticulated. This process lacks effective mechanisms for coordination and collaboration, being generated with different standards, technical processes, cartographic systems and information technology which lead to inconsistent cadastral information (COFOPRI, 2006)

In 2004, as a response for the lack of homogeneity and disarticulation of the current Peruvian cadastres, the national government has enacted the Law 28294 which creates the National Integrated System of Cadastre attached to Parcels Registration (Toledo, 2004). This system is meant for the real estate registration through the cadastral information; therefore, the system ensures uniformity in the generation, administration, maintenance and the cadastral real estate information. The Law also specifies the following characteristics of the system:

a) It is *initiated* because it allows the information exchange between the information producers and users
b) It is *de-concentrated* because it allows the access to users throughout the organizations of the national, regional and local governments
c) It is *dynamic*, because it is in being permanently updated for physical and legal changes of the real estate/ property
d) It is *normalized*; since it allows uniformity in the management procedures, collection and processing of the information produced
e) It is *standardized*; since it allows technical, informatics, administrative and legal standards for processes as well as data.
f) It is *secure*; because it grants legal security to the real estate transactions

At the moment National Cadastral Council has been established which consists of:
- Superintendent of Public Registry – SUNARP, that preside the council's body;
- One representative of each Regional government
- One representative from the association of Municipalities
- The head of The Geographic National Institute – ING,

- The head of The National Institute of Mining leasing and Cadastre – INAAC.
- One representative of the Cadastral Institute of Lima.

The main functions of the Cadastral council's body among others, is to determine the national policies of the system, the approval of guidelines to execute the mandatory cadastral activities. It is responsible also for the approval of the technical norms and regulations as standards and technical norms for the formulation, updating and maintenance of the cadastral information at national level[7]

Also SUNARP leads the Technical Secretary it is an entity which coordinates, advices, supervises and evaluates activities regarding the generation and administration of cadastral information elaborated by the public organizations that belong to the national cadastral system[8] At the moment, the National Council has approved the formats (07 formats) and instructive manuals for the cadastral surveying that will be used since 2008 by the cadastral information providers (SNCP, 2007)

4.3.3.   National Institutions at local level

National government by means of decentralization policies has set de-concentrated offices of the national agencies in each province and district in the country in order to guarantee the citizen's of direct access to the titling process. Hence, the functional jurisdiction of SUNARP and COFOPRI and other organizations located in a province's capital covers the regional level including several provinces and districts.

The de-concentrated organs of SUNARP or so called ***Registral Zones[9]*** enjoy registral, administrative and economic autonomy within their limits established by law (JUSTICIA, 2002). Some of their attributions and obligations are as follows:
a) To plan, to organize, to direct, to execute, to control and to coordinate technical activities of registration and cadastral use.
b) To plan, to organize, to direct, to execute and to control the administrative activities in coordination with the General Management.
c) To direct and to execute the administrative management activities of the corresponding Registral Offices, in accordance with the policies established by the higher levels.
d) To execute agreements in order to carry out it's functions with authorization of General Management.

In addition, de-concentrated organs of COFOPRI or so called ***Zonal Offices***[10] are responsible for the formulation, coordination, execution and supervision of administrative, budgetary and developmental actions (Garcia, 2007). Some of their functions are as follows:

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[7]Law 28294 – 2004,in the article.8 stated the functions of the cadastral council's body

[8] Law 28294, in the article 11 define the functions of the Technical secretary

[9] There are thirteen (13) Registral Zones of SUNARP around the country (SUNARP Statute- 2007)

[10] There are twenty-four (24) Zone Offices of COFOPRI around the country (Directoral Resolution N° 038-2007-COFOPRI/DE)

a) To execute actions for the formalization of real estate property and cadastral surveying and updating actions, in agreement with the guidelines and norms established by the head office

b) To elaborate and to propose their Annual Operative Plan (POA) to the Central Office of Planning and Budgeting for approval

c) To execute, to supervise and to evaluate the execution of planned institutional goals, informing periodic targets achieved to the office of Decentralized Coordination and to the Planning and Budgeting office

d) To execute administrative systems actions, in narrow coordination with the corresponding superior instances

4.4.   Concluding remarks

The roles of GI institutions at local level are rather ambiguous because local organizations are needed to implement, both national as well as local objectives.

Local organizations (municipalities and regional government) have administrative and financial autonomy to apply policies, regulations and procedures which are designed at national level. The law establishes their main functions, but each organization is autonomous to determine policies within their mandate and according to their own needs and possibilities

National organizations which are engaged in the implementation of land policies regarding titling and cadastre, build up an institutional body with a common aim which is strengthened with specific policies and competencies.

The national policies encourage the real estate property registration (National Cadastre) but, the local policies encourage tax collection (Urban Cadastre). According to the GI roles the local and regional governments have been given complementary competencies for land use planning. Furthermore it is understood that Regional planning is an integration of local planning since regional planning covers not just several provinces and districts (local governments) but also several fields of information regarding their essence.

5. Views and perceptions of actors pertaining to decentralization and GIT

5.1. Introduction

This chapter presents the findings of the fieldwork plan in relation to the views and perceptions of actors concerning decentralization and GIT. The views and perceptions of actors were determined with interview responses and the official roles of national and local institutions described in chapter 4 and other secondary resources collected during fieldwork, with the objective to find out, how far is the process of decentralization in Peru and the conditions of geo-information technology at local level.

The chapter starts by addressing the organizational limitations and potentials in organizations in section 5.2, and then in section 5.3 the inter-organizational tensions are described. Some procedures and GI regulations in section 5.4 are analyzed and in section 5.3, the characteristics of IT and resources in local and national organizations are presented. Finally, in section 5.6 concluding remarks of the issues addressed are presented in brief.

5.2. Organizational limitations and potentials

Organizations have important concerns about their limitations and possibilities to carry out GI activities efficiently. They pointed out the following issues:
- **Functional** issues, related to their position within the functional structure.
- **Financial** issues that explain their limitations to implement projects, activities, automation and personnel training and
- **Technical** issues such as the lack of enough funding to implement any GIT approach.

They also discussed other issues such as political issues that may prevent the communication with other organizations. The issues are believed to be relevant because they are in a way affecting the implementation processes and coordinative activities with other organizations.

However, aspects that were assumed as limitations or constraints in some cases were assumed as potentials by organizations. In other cases the potentials have been determined by analyzing the managerial and operative documents collected.

In table 5.1 the organizational limitations or constraints and potentials perceived by organizations are summarized which shall be described in the following sections.

Table 5.1: Summary of organizational limitations and potentials

Organization		Office/Department	Aspects		
			Financial	Functional	Other
National Institutions	SUNARP	Cadastre Office	P	L	Human Resources
	COFOPRI	Technical Department	P	P	
Local Institutions	Provincial Municipality	PLANDET	L	P	
		SATT	P	P	
		Building Office	L	L	
		Licenses Office	L	L	
	Regional Government	Planning, Budget and Development Management Board Office	L	L	Human Resources
	CHAVIMOCHIC	Land Management Office	P	P	Political/Technical

L=Limitation   **P**=Potential

5.2.1.   Local Institutions

5.2.1.1.   Municipal Organizations

The financial limitations related to their insufficient budget, is the major concern for municipal offices that are involved in planning and dealing with the use of geo information. Another important concern is the functional issues related to their position within the municipal structure. Although it is considered to be a limitation it can be seen as an opportunity for them because this autonomy in the municipal structure provides them better possibilities to attract funds. It also provides them the ability to make autonomous decisions and implement projects or infrastructure (See Table 5.2)

Table 5.2: Summary of issues mentioned as limitations in municipal organizations

Organization	Issues and tensions mentioned as limitations
Planning Office - PLANDET	Despite of our administrative and economical autonomy which is beneficial for us, we have a restrictive budget as all local governments, so our budget is never sufficient for the activities we perform, hence we need external financial support and the national investment funding. We do not have enough resources to use the GIT… I feel like we are wasting it in spite of the huge financial effort by the municipality, because our staff need to be trained.
Taxation Office - SATT	We depend on the tax collection benefits so we have an exhaustive operative annual plan in order to reach our financial target.
Building Office	Our main constraint is basically financial because we depend on the municipal budget (ordinary expenses) which is restricted…Yes it is a problem due to the lack of computers no process is automated so to deliver any file takes us long time (3-6 months) We need GIS because we control the planning process but we can't implement such kind of projects as PLANDET because only des-concentrated offices are able to get budget from the national or international organizations.
Licenses Office	It is economical because we do not have enough resources to get information from other organizations as RENIEC or SUNARP also our informatics resources are limited because our budget depends on the Ordinary Expenses.

The issues mentioned above were contrasted with the current municipal arrangements, comparing their functional and financial differences in order to understand their concerns. The following sub sections explain the functional and financial characteristics of the municipal offices which are also summarized in Table 5.3.

Table 5.3: Organizational characterization of municipal offices

OFFICE	ORGANIZATIONAL CHARACTERISTICS		
PLANDET	FUNCTIONAL	De-concentrated Office Functional autonomy in its duties and competencies	Capacity to allocate personnel Capacity to sign agreements with National and International organizations Capacity to submit investment projects with national contribution
	FUNDING	Ordinary Funding Investment Funding (from National Treasury)	
SATT	FUNCTIONAL	Decentralised Municipal Organization Organization with legal-administrative identity, budget and economic autonomy.	Capacity to allocate personnel Capacity to sign agreements with external organizations
	FUNDING	Ordinary Funding Own funding from Tax collection	
Building Sub Management Office	FUNCTIONAL	Dependent on Urban Development/Economic Development Management Office Operative Office	Depend on superior decisions Impossibility to allocate personnel Impossibility to propose projects
Licenses Sub Management	FUNDING	Dependent on the Ordinary Budget (taxation, municipal transactions, national funding)	

Source: Municipal ROF and MOF[11] document

a) Functional characteristics

In the case of Trujillo's municipality, the Planning Office (PLANDET) and Taxation Office (SATT) are "*decentralised"* and *"de-concentrated"* organizations respectively; these conditions offer these organizations more possibilities than the Building Office and Licensing Office, which are the "*operative offices"*. The difference between them is based on their implementation capability or incapability (personnel, projects, agreements) because *decentralised* and *de-concentrated* organizations have the capacity to propose and to implement their projects while operative offices execute the municipal plans and projects. (See Table 5.3)

In order to carry out their mandate, *decentralised* and *de-concentrated* offices are closer to the top municipal hierarchy. They functionally depend on the Mayor and the City Council, so these organizations also enjoy functional and economical autonomy within the municipality; whereas *operative offices* have to first depend upon the decisions of the Municipal Management and later the decision of the Mayor and City Council. (ROF – (MPT, 2007)

Organization and Functions Regulation (ROF) and Organization and Functions Manual (MOF) are managerial documents used in all public organizations.

b) Financial characteristics

The municipal budget is a management instrument that proposes the revenues, expenses and plans based on the integral development plan in each municipality. The sources of revenue are composed of common or ordinary revenues and capital revenues. Capital revenues are resources directly collected by the municipality, transfer of funds from national government, donations and debt. The expenses are composed of common and capital expenses. Ordinary revenues which is the main source comes from the regular and periodic collection for taxation, contributions, sale of goods, leasehold, fines, authorizations and other revenues (MEF, 2003)

The majority of Peruvian municipalities especially districtal municipalities, base their budget on the funds received from the national government because their directly collected resources are scarce. In the case of Trujillo's municipality the urban cadastre and the tax collection plays an essential role to increase the ordinary revenues; the organizations PLANDET and SATT carry out these activities (See Annex 2), so their specific budget not only includes the ordinary revenue but also include funds received from national government (ordinary and capital).

In the Y axis of Figure 5.1, the location of municipal offices studied within the hierarchical levels of the municipal organizational structure is shown. The implementation level is the lower level which is constituted by operative offices and their respective management offices. In this level the Building and Licensing Offices are located. The highest level is the decision making level, constituted in this level are locate PLANDET that depend on the decision of the Mayor and SATT that depend on the decisions of the city council. The closer to the top hierarchy the more functional and financial capabilities and autonomy is awarded.

Figure 5.1: Local government hierarchy
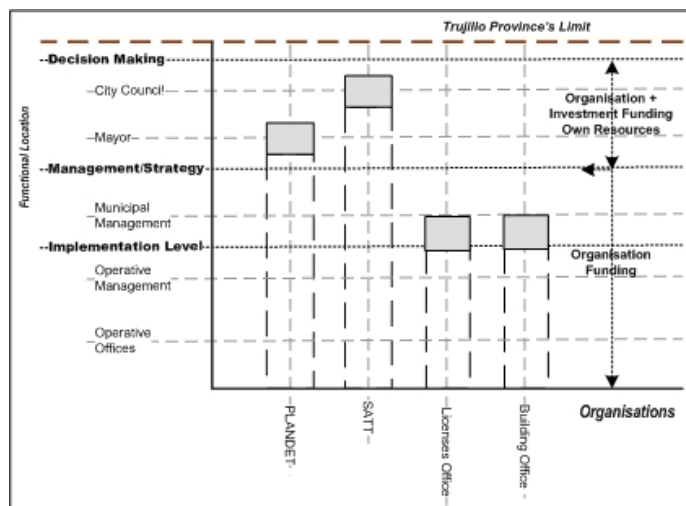
For instance, just like the urban cadastre, PLANDET is able to propose investment projects to the national government in order to attract more funds to implement the proposed project; the office is also

able to hire extra personnel to execute temporary activities using ordinary funds (FONCOMUN[12]) from the national government. SATT's budget is based on funds directly collected from the municipal ordinary revenue sources.

The facts mentioned above confirm the functional and financial differences mentioned by the managers during the interview (see table 5.2). These differences lead to limitation of resources, computers, and staff for Building office and licensing office, and promote *financial dependency of these organizations to the restricted municipal revenue*. It also promotes autonomy for SATT and PLANDET that have the capacity to propose and use external financial resources in order to implement the urban cadastre because without these external resources it won't be *possible to maintain the cadastral system"*. The SATT and the PLANDET also enjoy the autonomy to administrate their budget and financial policies. However, these potentials are also restricted for PLANDET which when contacted affirm that their budget *is never sufficient"* execution of the urban cadastre activities because it demands extra investment on personnel and technology. The PLANDET states "*to apply to external financial cooperation national or international require personnel for proposals formulation and waiting time for the approval and implementation*".

5.2.1.2. Regional Government Organizations

The concerns of regional organizations are functional and financial. They are dependent upon the national ministries and other public sectors. These organizations also face political and technical issues that somehow promote a negative perspective about implementation of projects or coordination of activities with other governmental organizations (See Table 5.4)

Table 5.4: Summary of issues mentioned as limitations in regional organizations

Organization	Issues and tensions mentioned as limitations
Regional Government	We have autonomy to determine our activities and plans but we are controlled by national organizations, Because we depend on various national offices, for example the Ministry of Economy and Finances, Council of Ministries. We have to fulfil many requirements set by different ministries as education for health or transport for roadwork to obtain resources and to implement our projects. Our budget comes from national resources mainly for our funding and project's implementation, so we cannot implement the projects that do not match the national priorities. The low budget for salaries is also constraint for us
CHAVIMOCHIC	Since we are under the control of the Regional Government, we have limitations to coordinate with the municipality due to political issues. We still have operational autonomy because we promote our own resources so we are able to implement projects and activities.

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[12] Funds of Municipal Compensation (FONCOMUN), established in the Political Constitution, with the objective to promote the investment in the municipalities, with a redistributive criterion in favour of the remotest and depressed zones, prioritizing its allocation to the rural and urban-marginal localities of the country

The functional and financial issues were also compared with the organizational arrangements in order to understand and confirm the interviewed opinion. The political issues were also taken into account but no contrasting formal evidence was found.

Table 5.5: Organizational characterization of regional organizations

OFFICE			ORGANIZATIONAL CHARACTERISTICS		MANDATE
Regional Government	Regional Board of Planning ,Budgeting and Land Management	*FUNCTIONAL*	Hierarchically dependent on General Regional Management Office **Board Organization Composed by five directions:** Land Management, Budget and Treasury, Regional Public Investment Programs, Institutional development and Land administration	Capacity to sign agreements with external organizations	To asses, to manage, to supervise and to control the Regional Government actions regarding planning, budget and treasury, public investment and land management, also to control public enterprises, investment and cooperation funds
		FINANCIAL	Depend on the Regional Budget		
CHAVIMOCHIC	Land Management Office	*FUNCTIONAL*	Under jurisdiction of Regional Government **De-concentrated organization**	Capacity to sign agreements with external organizations Functional priorities depend on regional government policies	Sustainable use of hydrologic resources, building hydraulic infrastructure to promote the irrigation improvement, incorporation of dry areas to the agriculture, generation of electrical energy and use of the superficial and underground water for other uses; also promoting and fomenting the private sector participation in order to consolidate the farming and agro-industrial development
		FINANCIAL	Financial Autonomy Budget is based on its own resources generated through land transactions		

Source: Municipal ROF and MOF document

a) Functional characteristics

The Regional Planning, Budgeting and Land Management Board (PBLMB) is a board within the main organizational structure. Thus, the office has the capacity to propose and execute plans and projects of regional planning and to construct infrastructure for basic services such as health centres and basic schools around the Region. These activities need the approval of related ministries and public sector (R OF-(GRLL, 2006)

As part of the decentralization process, CHAVIMOCHIC[13] was transferred to the Regional government as *decentralised* organization that constitutes an *executive entity* with technical, economical, financial and administrative autonomy. Its autonomy allows it to carry out policies, plans, activities and strategies according to common policies with the Regional government. The president of the regional government takes part in the election of the main body of CHAVIMOCHIC (CHAVIMOCHIC, 2004)

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[13] Until 2004, CHAVIMOCHIC belonged to the Ministry of Agriculture

b) Financial characteristics

Just like the budget of the Local governments, the Regional budget takes into account the same regulations so that the regional budget is composed of revenue and expenses plans based on the integral development plans of the region. The regional revenues are mainly ordinary and capital fund transfers from national government. As a part of the decentralization process, the funds from the national government are designated to be used for the execution of physical infrastructure and implementation of projects because the ordinary revenues are scarce. However, the Regional government also has the capability to propose and execute investment projects and to sign agreements with the international cooperation and private sector in order to increase its budget.

CHAVIMOCHIC promotes and manages its budget which comes mainly from the rural land transactions and services provision (drinking water and electricity). It also receives donations and revenues from the national government (PIA - CHAVIMOCHIC, 2007)

The above-mentioned characteristics clarify the functional and financial concerns expressed during the interview (see table 5.4). In spite of financial autonomy of regional governments, there is an important dependency on the decisions of the national government. Therefore, the organization is not able *to increase the salary of the GI staff due to the lack of resources*; the regional manager also expressed his concern *because most of GI staff has been outsourced from contractors in the private sector due to a common agreement. This agreement will conclude soon, so it will not be possible to find personnel to work for them for the same salary.*

For CHAVIMOCHIC the lack of economic resources is not a concern as expressed during the interview, but the lack of GIT is an important concern so the organization is implementing a GIS unit with its *own resources.*

Figure 5.2: Regional government hierarchy
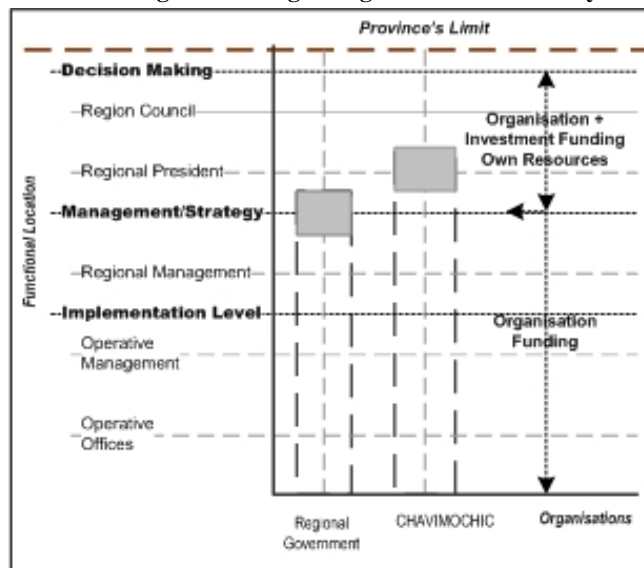
In the Y axis of Figure 5.2, the location of the regional offices studied within the hierarchical levels of the regional organizational structure is shown. Similarly like the municipal structure the lower level is

the implementation level, but the organizations studied are located in the management strategy level PBLMB office whereas CHAVIMOCHIC is located in the highest level The closer to the top hierarchy the more functional and financial capabilities and autonomy awarded.

5.2.2.   National Institutions

The zonal offices of COFOPRI and SUNARP, being de-concentrated organizations of national organizations have some important concerns that are mostly about their operative limitations related to the lack of personnel and technology resources (see Table 5.6)

Table 5.6: Summary of issues mentioned as limitations in de-centralised agencies

Organization	Issues mentioned as limitations
SUNARP	I don't have enough technical support…my staff is contracted for short periods, so we can't train them, also informatics support is limited. We don't use any GIS software because we don't have specialized staff…we only use AutoCAD
COFOPRI	Technical limitations because we cover more territory than before but we have less employees (40 employees in the offices between survey team, legal team and staff) so sometimes we cannot fulfil the community expectations. We have to fulfil annual targets…the progress of our activities is controlled by the main Office (Lima) there is a system which controls our progress.

Comparing the organizational arrangements of these organizations it is apparent that these issues may have their origin in their functional and financial characteristics as explained in table 5.7.

Table 5.7: Organizational characterization of national organizations

OFFICE			ORGANIZATIONAL CHARACTERISTICS	
SUNARP	Cadastre Office	FINANCIAL	Depend on the organizational Budget Operative Office Promote its own Resources	Depend on the organization politics Some autonomy to implement
		FUNCTIONAL	Decentralised Office within La Libertad Region Implementation Office Registral, administrative autonomy	
COFOPRI	Technical Department	FINANCIAL	Depend on the organizational Budget World Bank Credit Funding	Depend on organization policies and plans
		FUNCTIONAL	De-concentrated office Zonal Office within La Libertad Region	

Source: Institutional ROF and MOF documents

The secondary resources obtained from these organizations were not as specific as required; however, observations and the institutional regulations helped to draw up the functional and financial characteristics which are as follows:

a) Functional characteristics

COFOPRI has placed a *zonal office* and SUNARP has established a *registral zone*; whose jurisdiction is La Libertad region; in addition, the Registral Zone of SUNARP-La Libertad, has set eight (08)

registral offices in several provinces. Both offices have the category of de-concentrated offices and depend on superior levels which are set in the Head Office as explained in section 4.3.

Within the jurisdiction of Trujillo's province both offices carry out operative activities regarding land registration, land titling and cadastre. The Zonal Office of COFOPRI is engaged in the execution of the formalization process for the urban areas, and then Registral Zone of SUNARP registers the property rights in the Property Registry of SUNARP which later is delivered to the user. The information produced in each decentralised office is delivered to the head office located in the country's capital.

b) Financial characteristics

For budgeting SUNARP, is considered as a public organization with enterprise treatment, because its resources do not come from the ordinary resources of the public budget. Several sources compose the revenues of SUNARP such as revenues resulting from the registral fees that is used in compliance with the Tributary code; legacies, donations, transferences and other resources from public and private institutions as well as from international cooperation, revenues resulting from investments in the financial system and own resources generated by publications and services offered (JUSTICIA, 2002)

Also, COFOPRI being attached to the Ministry of Building (see section 4.3.1), is allotted funds from the national annual budget. Since it is funded from the national annual budget target fulfilment and the achievement of the institutional goals is determined in every fiscal year by the ministry. The sources of revenues for COFOPRI are composed of the allocation and transferences of ordinary resources from the national government, donations and revenues from the promotion of property access fund, revenues resulting from financial operations and internal or external credit which are subject to Public Indebtedness Law and revenues directly collected (VIVIENDA, 2003)

The concerns of the managers like, '*lack of technical support'* (SUNARP) or '*we have to fulfil annual targets'* (COFOPRI) are related to the functional issues more than the financial issues. Summarizing the organizational characteristics, the Registral Zone V-La Libertad of SUNARP has functional and economic autonomy due to its position as public enterprise, which provides the capacity to promote own resources whereas, the Zonal office of COFOPRI – La Libertad is responsible for institutional plans but without financial autonomy because its funding its is aimed at achieving the institutional goals, but both organization have the capacity to get external funding (see table 5.7); however, both have to fulfil specific attributions and functions which follow the norms and activities determined in the concerned superior offices located in country's capital as explained in section 4.3.3 and suggested in the interviews.

In the Y axis of the figure 5.3, the location of the zonal offices of SUNARP and COFOPRI within the organizational hierarchy is shown. In both organizations, the decision making is located outside the local level. SUNARP seems to have more local autonomy for finances than COFOPRI, in spite of their functional characteristics as de-concentrated offices (see section 4.3.2) the decisions are still made at national level

Figure 5.3: National organizations hierarchy
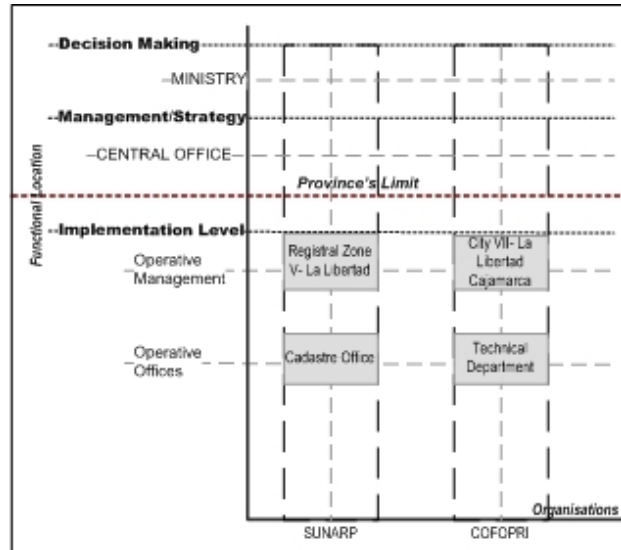
5.3. Inter - Organizational tensions

This section describes the inter-organizational tensions between local government and national organizations and between local government and regional government. These tensions seem to occur when organizations need to share spatial information regarding on cadastral management or land use planning. This is because of the differences in organizational priorities and the degree of participation for national and local organizations.

5.3.1. Organizational Priorities

5.3.1.1. Local Government and National Organizations

As explained in chapter 4, municipalities and national organizations as COFOPRI and SUNARP carry out similar land management activities that have been given by law. The actors' point of view suggests the presence of tensions between local and national organizations for exchange of cadastral information due to differences of priorities, which may be caused due to an inadequate legislation and unlike interests.

The priorities of organizations are based on their mandate as shown in table 5.8., in order to understand the issues raised by the respondents; we compared their viewpoints with the organizational formalities:

Table 5.8: Summary of views suggesting tensions between municipality and national organizations

Organization	Mandate	Interview Quotation: Perceptions and views
SUNARP	Real estate Registration/National Cadastre	We depend on information from other organizations such as COFOPRI-PETT and Municipalities Predial Cadastral Base is supposed be composed by COFOPRI, PETT and Municipal Cadastres… COFOPRI and PETT send us cadastral information to be registered but we do not receive the same from Municipality, so the cadastral process is not closed" For us the Urban cadastre is just an accurate description of the reality which cannot be registered…the ownership should be on top of the benefits of tax collection
COFOPRI	Titling Program/National Cadastre	Municipalities or users inform directly to SUNARP without informing us. Nowadays there is a overlapping of competencies with municipality since both execute titling activities…
PLANDET	Municipal Cadastre/Titling Program	There are uncommon interests between organizations… cadastral information for SATT should not only include the legal element but also the used area and the built up area…for SUNARP lot is only what the property title say…different meanings. If the municipality is able to increase tax collection then we will be able to provide better services to the citizens so it is indispensable for us to keep our cadastre updated

- *The Titling process is incomplete because municipality does not execute urban improvements (SUNARP)*

The titling process in municipality is concluded when the ownership title is delivered; the user does the registration process later when it refers to private property but, if it refers to improvement of urban areas, municipality makes the registration (TUPA – PLANDET, 2007). SUNARP receives the information from the user when it is registered; as a result, the real estate database is incomplete because the property registration is not mandatory to users. However, the titling process in COFOPRI concludes when the title is registered in SUNARP. In addition, SUNARP, by means of institutional agreements with COFOPRI, is periodically informed when COFOPRI's database is updated. Other concerns of SUNARP relates to the incompleteness of their database, for instance "*we cannot collect more taxes from land records*" also "*sometimes we have legal issues because our information is not updated or incomplete*"

- *There is uncommon interest between organizations…for tax collection cadastral information should not only include the legal element but also the information about used area and built up area (PLANDET). It should also provide priority to information regarding the ownership over the tax collection benefits(SUNARP), and If the municipality is able to increase tax collection then we will be able to provide better services to the citizens so it is essential for us to keep the cadastre information updated (PLANDET)*

Hence, tax collection strongly supports the municipal funding. Taxes account for around 40% of municipal budget (MPT, 2006). With the implementation of Municipal Cadastral System (see annex 2), the tax collection has increased from 20% to 87% annually since 1998, real estate tax collection accounts to 28% of the total tax collection (MPT-SATT, 2007). Due to the increment in

taxation, municipality has assigned 5% of tax collection for updating and maintenance of the cadastre (Fujimori, 1993)

In addition the cadastral information for tax collection also cover the requirements of internal offices as PLANDET, Building and Licensing Office because it is used to control the application of urban regulations such as zoning, urban growth, urban parameters and land use permits.

In summary, at local level the urban cadastre is essential not only to increase the lack of ordinary revenues but also for planning purposes in order to provide better services. But the fact that at the national level the local information does not fulfil the requirements for land titling and registration affects the whole process.

In Figure 5.4, the opposite rows or different organizational priorities, represent the organizational tensions between national and local government for the spatial information that land parcel can provide to both levels.

Figure 5.4: Inter-organizational tensions for cadastral information
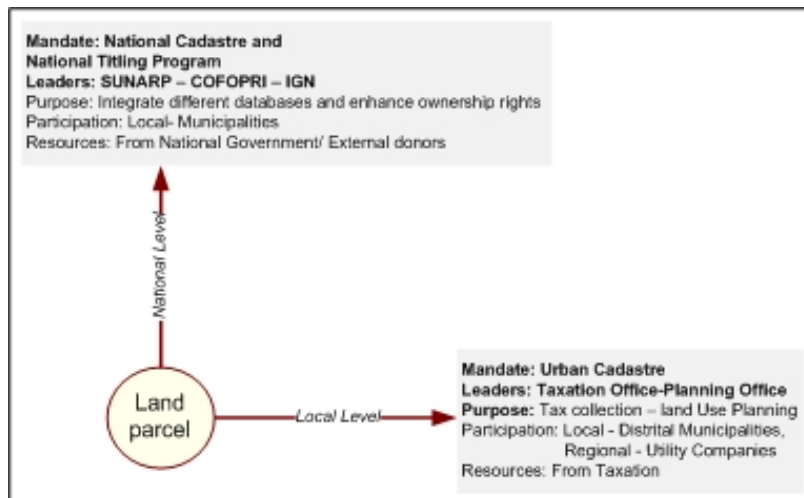
5.3.1.2.   Local Government and Regional Organizations

Local institutions such as Municipality and Regional Government, even though their complementary mandates as discussed in chapter 4, also present tensions due to different organizational priorities for exchanging information pertaining to land use (see table 5.9)

Table 5.9: Summary of views suggesting tensions between local institutions

Organization	Comments	Interview Quotation: Perceptions and views
PLANDET	Local planning and Urban regulation	We got information of RG with the SIMTRU project, so we do not have problems to get data from other offices but we need to systematize the data according to our necessities, because the data used for Regional planning does not match with data used at provincial and mostly at districtal level.
CHAVIMOCHIC	Local Planning	We have common interest with the municipality because we have the rural land property and they need land for planning purposes but since CHAVIMOCHIC is under the control of the Regional Government, we have limitations to coordinate mainly with the municipality due to political issues. During previous Regional administration we had officially closed relations with municipality but nowadays our relations are not official but we still keep communicating with PLANDET because we both need to update our information.
REGIONAL GOVERNMENT (RG)	Regional Planning	In the process of decentralization, the roles between local and regional government are not well defined. For example, the previous regional administration promoted the rural development due to the high poverty rate in rural areas; so we only participated in few projects particularly in Trujillo. Regional planning is independent of local planning guidelines, also local planning is independent of regional planning so without a common vision it is difficult to have common initiatives. Nowadays we don't have any agreements with Trujillo's municipality.

As in the previous case, the central points of views of interviewees were compared with the organizational formalities as follows:

- *Regional planning is independent of local planning guidelines, also local planning is independent of regional planning or Regional planning data does not match with the data used for provincial and mostly for districtal scale planning (PLANDET)*

The Regional government's jurisdiction covers twelve (12) provinces and eighty (80) districts[14] (INEI, 2007). Its mandate covers aspects like poverty, economic development, and citizens' rights. It also deals with regional planning, addressing the integration and development of regional spaces as potential industrial areas, tourist areas, etc. It is also responsible for projects with regional impact such as transport and sanitation (Regional Development Plan, 2004). In summary, as the regional government manager's opinion "regional government *is a tough organization due to its multiple functions and large jurisdiction"*

Local government's jurisdiction covers eleven (11) districts (See chapter 3, section 3.2), local planning also covers several fields of regional planning in order to develop the urban regulations requested by law (see Chapter 4, section 4.3). The local government is concerned regarding the local details in the regional data as it needs to be integrated for local planning purposes.

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[14] Only 27 districts located in 5 provinces of the region, are located at the coastal zone which is the most populated zone.

This concern may validate the regional government's point of view which states that *without a common vision it is difficult to have common initiatives.*

- *Since CHAVIMOCHIC is under the control of Regional Government we have limitations to coordinate specially with the municipality due to political issues (CHAVIMOCHIC)*

Nowadays the agreement between CHAVIMOCHIC and Trujillo's municipality to exchange information is closed, however the communication between these organizations still subsist through informal channels of communication, because as mentioned by regional government's manager *"both determine the land use planning so it is necessary to have permanent communication link between us"*. This concern is related with the functional issues described in section 5.2.1.2 since CHAVIMOCHIC keep its financial autonomy, however the intervention of regional government seems to affect its relationships with other organizations.

In summary, the context and direction of regional planning does not support local planning because as stated by regional government's manager *"in the process of decentralization the roles between local and regional government are not yet well defined.* Each government is autonomous to carry out its institutional policies in spite of their co-operative functions. Also, autonomy of regional organizations may be constrained by a superior decision.

In Figure 5.5, the rows represent the parallel functions between local and regional government without a common point of intersection for integral planning, due to the autonomy and the lack of clear roles in each governmental level

Figure 5.5: Inter-organizational tensions for land use information
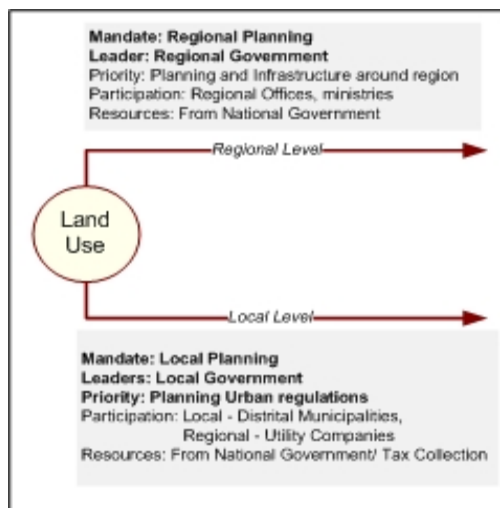
5.3.2.   Participation

Participation is a cooperative strategy to share information from other organizations. Table 5.11 summarizes the current GI projects of the studied organizations. These projects are basically associated with the implementation of the Titling Program and National Cadastre within national organizations and implementation of Municipal Cadastral System in Local government organizations

Table 5.10: Current GI projects

Lead Organization	Project's name	Participant	Role	Funding
SUNARP	Consolidation of Immovable Property"	SUNARP COFOPRI National Geographic Institute - IGN	Partners	External funding (World Bank)
COFOPRI	Registral Cadastral Mosaic	Only the lead organization	-----	Own funding
PLANDET	Districtal Cadastre of Routes	Municipal Transport Office Municipal Civil Engineering Office Utility companies	Provider Provider/user provider	Investment Funding
	Districtal Cadastral System	Districtal Municipalities Cooperación Alemana al Desarrollo (GTZ[15])	Provider/users	International Cooperation (GTZ Funding) Investment funding
	Study of Public Transport	PLANDET/ Municipal Transport Office Andean Development Corporation (CAF[16])	partners	International Cooperation – CAF Funding
	Fiscal Cadastre	Taxation Office	partner	Investment funding Own funding
	Geodesy Project	Only the lead organization	-----	Investment funding

Source: Official documents of GI projects

National organizations are involved in common projects but at the time of data collection, there was no evidence of mutual GI projects between national and local organizations

As explained in Chapter 4, SUNARP and COFOPRI collaborate for the project entitled "Consolidation of Immovable Property" which is co-financed by the World Bank. The de-concentrated offices of these de-centralised organizations survey the areas determined under their territorial jurisdiction. For instance, COFOPRI surveys and formalizes informal areas around La Libertad Region; SUNARP concludes this process with the registration of land records as described in previous sections.

SUNARP is implementing the "Registral Cadastral Mosaic" project, related with the digitalisation (CAD format) of old land record archives, it is financed with ordinary resources from the decentralised office The project is executed by all decentralised offices which will later deliver the information to the Head Office in order to be integrated.

The local government is implementing several GI projects with the participation of internal offices as PLANDET, SATT, the Transport Office and the Civil Engineering Office and districtal municipalities. It is also implementing some projects with external organizations such as Utility Companies and International Organizations. The main objective of these projects is to improve the Municipal Cadastral System with complementary information like conditions of routes and provision of basic services. They are also aimed at integrating the districtal cadastres into a single system which may be administrated by the provincial municipality to standardize the cartographic database. The projects are

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[15] GTZ is an International Cooperation enterprise for sustainable development
[16] CAF is a multilateral financial institution which supports the sustainable development of shareholder countries.

basically financed by Investment Funding from the national government and international funding from some international co operations.

5.4. Accessibility and Standards

Some views regarding the accessibility to information and standardization requirements put forth by the national organizations to local organizations, suggest that GI regulations of national organizations restrict the accessibility to information at local level (See table 5.11)

Table 5.11: Summary of views about accessibility and standards

Organization	Interview Quotation: Perceptions and views
MUNICIPALITY - PLANDET	To obtain data from national offices is complicated because we have to fulfil many requirements, agreements, etc. Sometimes, the approval takes long time because the approval from the head office located in Lima is necessary Our cartography is not validated according to the official standards. SUNARP supports us to validate our cartography. Now we are able to standardize the cartography because now we have the technology.
CHAVIMOCHIC	SUNARP has strict procedures regarding registration of properties. Sometimes it is necessary to send our requirements after several corrections and each time we have to pay the official fee We have proposed to subscribe a "collaboration agreement" with SUNARP in order to avoid this problem but SUNARP is a closed organizations. COFOPRI owns cadastral information of new areas under its jurisdiction but in order to access that information we need to sign an collaboration agreement after the evaluation of our request

5.4.1. Accessibility

In Table 5.12 the information providers and information provided are described, the users, the clients and how the information is provided is also described. In general, Local organizations have concerns regarding the access to information of land records. They also have concerns regarding registration of properties the procedure for which is related to the procedures of national organizations.

Between national organizations like SUNARP and COFOPRI there is a current institutional agreement for coordination and information exchange due to the National Property Formalization Program, therefore; the exchange of information is facilitated when required. Also, COFOPRI provides cadastral information to the municipalities after registration, through simple formal agreements because it is part of COFOPRI's function.

However, the accessibility of national information for local organizations seems to be complicated because national organizations are not allowed to sign agreements without approval from the Head Office which is set in the capital. Some point of views expressed during the interview affirm this fact, for instance "...*the approval from COFOPRI or SUNARP takes long time because the approval is required from the head office located in Lima is necessary*" (PLANDET) *or* "*we need to request a formal agreement which when evaluated can be approved*" (CHAVIMOCHIC). At the time of data collection there weren't any agreements signed between local and national organizations regarding the same.

Also, Building and Licensing Offices need to verify the ownership of property concerning the approval for building modifications as part of their functions. However, the access to information of land records means a charge for any query requested (TUPA-SUNARP, 2007).This situation is a concern for the managers, as stated by one of the managers during the interview *"my office does not have budget to request continuous information"*. Hence, the citizen requesting the document is required to make the request for information to SUNARP and then when the information is received he is required to submit it to the building and licensing office in order to get the formal approval for building modification (TUPA-Building office, 2007).

Table 5.12: Accessibility to land information

Organization Provider	Information provided	Need Information	How is provided	Comment
SUNARP	Land record Information (Ownership)	COFOPRI	Formal agreements	Current institutional agreement
		SATT	As client*	Information can be provided as document
		Building Office	As client*	
		Licenses Office	As client*	
		PLANDET-**Metropolitan Information** Office	Formal agreement/Only as users*	SUNARP provides information after analyzing the request and through formal agreement
		CHAVIMOCHIC	As client*	
COFOPRI	Cadastral information (Ownership)	SUNARP	Formal agreements	Current institutional agreement
		CHAVIMOCHIC	As client**	
		PLANDET-**Metropolitan Information** Office	Formal agreements	COFOPRI provide free cost digital information to municipalities with a formal agreement
		PLANDET-Metropolitan **Planning** Office		
PLANDET-Metropolitan Information Office	Cadastral information (Fiscal)	SUNARP	formal Request	Information is provided only through formal agreement. There is no current formal agreement
		COFOPRI	formal Request	Information is provided only through formal agreement. There is a current agreement between organizations
		PLANDET-Metropolitan Planning Office	Informal/Internal request	Information is provided
		SATT	Formal agreements	There is an institutional agreement between them
		Building Office	As user through intranet service	Offices have access to information trough intranet service
		Licenses Office		
SATT	fiscal information	PLANDET-**Metropolitan Information** Office	Formal agreements	There is an institutional agreement between them
		Building Office	As user through intranet service	Offices have access to information trough intranet service
		Licenses Office		
PLANDET-Metropolitan Information Office	titles in new urban areas	SUNARP	formal Request	Information is provided after a request
		COFOPRI	formal Request	Information is provided after a request

Note: *Client pay for any request of information

5.4.2. Standards

Our cartography is not validated according to the official standards (PLANDET)

The technical regulations of the National Cadastre require meeting specific standards for accepting and inscribing land information; so that the user needs to present a "geo referenced coordinates record" which is provided by the municipality (TUPA-SUNARP, 2007). The law requires spatial geo-referenciacion of the parcel according to the current Geodesic Referential System – SWG 84(Toledo, 2004)

In the case of Trujillo's municipality, this national request has meant to standardize their cartographic database which *is a slow process due to lack of technical staff and lack of resources* (PLANDET). It also required the financial support from international cooperation to implement a Geodesic System and the technical support of IGN which is the highest organization that regulate the geographical and cartographic activities in Peru (MPT-PLANDET, 2006)

5.5.   IT Architecture and Resources

Views regarding IT resources differences between local government organizations and the IT architecture in national organizations, evidence technical constrains due to limited capacity of data handling in local organizations and control of information in national organizations

5.5.1.   Local Government organization

The municipal organizations have significant concerns due to the difference of IT resources which relates to the restricted internal information exchange between them (See table 5.13)

Table 5.13: Summary of views regarding of IT differences

Organization	Mandate	Interview Quotation: Perceptions and views
PLANDET	Local planning	Our relationship with municipality offices is continuous and permanent but, in municipal offices there is a lack of information culture because they do not have a clear knowledge about what do they need from us and in which activities we can support them
		At Districtal scale we need information from other municipal offices but they do not have digital or systematized data because of their lack of personnel and technology so we have to do that task.
		Our internal limitation is the lack of specialized GIS staff. Because we only have specialized staff in Information Systems (computing engineers), for our staff it is tough to get used to the specialized GI technology and advances.
Building Office and Licensing Office	Control of Urban regulation	Our possibilities of cooperation or participation with PLANDET are minimal due to the differences in personnel and technology. If we had same potential as PLANDET many of our process would take less time and our services would be efficient. We need GIS because we control the planning process but we can't implement such kind of projects as PLANDET Not all the offices know how to use GIS or the intranet I think, but I think it is a duty of PLANDET to train us about the use of this technology because we only use Autocad

The central points of views of interviewees were compared with the inventory of IT resources in the municipal offices as follows

- *Our possibilities of cooperation or participation with PLANDET are minimal due to the differences in personnel and technology (Building Office) and "municipal do not have digital or systematized data because of their lack of personnel and technology so we have to do that task (PLANDET.)*

The functional and financial characteristics of municipal offices described in section 5.2.1.1 have direct relation with the IT resources potentials or limitations in municipal offices. Geo information technology is concentrated in PLANDET; the office has more IT resources in software, hardware, equipments and human resources than the Building and Licensing Offices, which has minimal IT resources as shown in table 5.14

Table 5.14: Municipal IT Resources

Office/ Department	Software	Hardware	Equipment	Human Resources
Planning Office - PLANDET	Auto CAD ArcGIS, ArcIMS, Ilwis. others	Own LAN network Central Server- Web Server Database Server desktop PCs Geodesic Network	Topographic equipment GPS System	Network Administrator Information System Developers System engineers Architects, Engineers, lawyers Surveying staff
SATT	Databases software	Own LAN network Central Server- Database Server desktop PCs desktop PCs	---	Network Administrator Information System Developers System engineers Surveying staff
Building Office	AutoCAD	Municipal LAN network desktop PCs		Architects, Engineers, Lawyers
Licenses Office	AutoCAD		---	

- *Our internal limitation is the lack of specialized GIS staff…for our staff it is tough to get used to the specialized GI technology and advances (PLANDET)*

In spite of the fact that PLANDET concentrate IT resources and GI business as explained in previous sections; it has limited specialized staff. The organizational units within PLANDET are composed by one Department Head for each one; the staffs are composed of architects, engineers and other professionals and technicians like lawyers, topographer, and draftsmen amongst others (MPT, 2007) but, there is no skilled GI staff in technical applications team and also in management team of geo information, within the organization

In addition, the interviews demonstrated the unawareness of use of GI in municipal offices and confirmed the limited capacity for data handling in the municipality. The manager of the building office stated that "*not all the offices know how to use GIS or the intranet, but I think is the duty of PLANDET to train us about the use of this technology because we only use Autocad*", for its side manager of PLANDET argued that, "*there is a lack of culture of geo information, because they do not have a clear knowledge about what they need from us and in which activities can we support them*"

Thus, the capacity of data handling in municipal offices seems to be limited due to the inadequate distribution of IT resources and qualified personnel which is a consequence of the lack of financial resources in the municipality as was discussed in section 5.2.1.

5.5.2. National Organizations

The views in organizations are related to their functional dependency and control by the central offices located in the Peruvian capital as shown in table 5.15.

Table 5.15: Summary of views regarding of IT

| Organization	Interview Quotation: Perceptions and views
SUNARP	We don't use any GIS software because we don't have specialized staff…we only use AutoCAD. My personnel are temporary because our projects are planned annually.
COFOPRI	We use AutoCAD to elaborate our cartography following specific standards such as: colours, layer's names, line type, etc) determined in Lima because there, the information is processed into GIS software. We have a system called SIGCAT available, in this system the user can see the status of a specific map (inscription date, resolution, versions, etc) hence we only have permission to see the information not to modify or update. We have to fulfil annual targets…the progress of our activities is controlled by the main Office (Lima) there is a system which controls our progress.

Table 5.16 shows some distinctions between de-concentrated offices and head offices of national organizations regarding the distribution of IT resources. Decentralised offices seem to have adequate resources for land survey and legal procedures as in COFOPRI, or personnel to carry out temporary tasks as in SUNARP which suggests that technology is distributed according to the activities executed at different levels.

Table 5.16: National Organisation IT Resources

Organisation	Office	Technical Aspects			Human Resources
		Software	Hardware	Equipment	
SUNARP	Head Office	ArcGIS	Centralised Network to Head Office- Wide Area Network	----	---------
	Cadastre Office	AutoCAD,	Peripheral PCs Zone Server connected to Main Server		technical personnel temporary personnel
COFOPRI	Head Office	ArcGIS	Centralised Network to Head Office – Wide Area network	-----	--------
	Technical Department	AutoCAD GPS	Peripheral PCs Zone Server connected to Main Server		Surveying team Lawyers draughtsman

The secondary resources obtained from these organizations were not as specific as required; however, the inventory of IT resources and observations made during the interview helped to draw up the IT characteristics which is shown in graphic 5.6.

The horizontal lines in graphic 5.6 represent the levels of decision making, from the lower level or implementation level to the higher level or decision making level which is located outside the local level as discussed in section 5.2.2.

Figure 5.6: IT architecture in national organisations
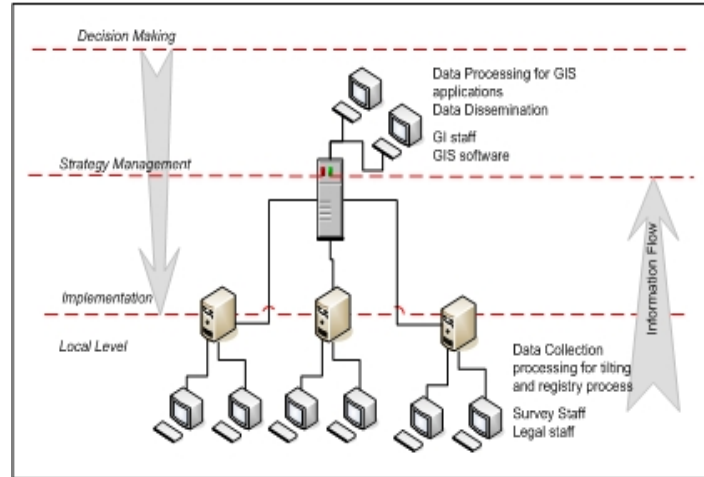
Some views regarding the use of information technology in the office, suggest that the de-concentrated offices have the personnel and equipment needed to carry out surveying activities (see table 5.16), also that information processing is executed according to the standards required at the strategic management level, as COFOPRI interviewed stated *we use AutoCAD to elaborate our cartography following specific standards such as: colours, layer's names, line type, are determined in Lima*, It is supposed that all de-concentrated offices execute similar activities, then the implementation level generate and deliver specific information to the higher level. Another relevant responses as *we only have permission to see the information not to modify or update* or *in Lima the information is processed into GIS software (COFOPRI) or and we don't use any GIS software because we don't have specialized staff (SUNARP)* suggest that the information flows from the implementation level (local level) to superiors levels whereas, decision making flows from the higher level to the local level (see Figure 5.6)

5.6.   Concluding Remarks

From the discussion regarding views and perceptions of actors concerning decentralization and GIT, it was found that organizational and technical issues affect local, regional and national organizations. Organizational issues regarding functional and financial aspects and the presence of tensions between national and local organization for land information exchange was experienced. Technical issues regarding the differences regarding IT strategies between local and national organizations were found.

These findings describe how far is implemented the decentralization process and also the present situation regarding the implementation of GIT by local organisation.

In the next chapter, these evidences will be interpreted using the concepts discussed in chapter 2 and their operationalization as defined in chapter 3.

6. Dilemmas about GIT and decentralization

6.1. Introduction

In chapter 4 the findings presented have described the state of decentralization process and the conditions of geo information technology at local level from the point of view of the local actors, compared to their organizational and technical characteristics and the results of the interviews and observations made. In this chapter the findings are interpreted based on the literature reviewed in chapter 2, in order to understand the implications of these variables for the diffusion of geo information technology to local level. The possible critical conditions in the form of dilemmas that organizations often face when they seek the decentralization of GIT at local level for the implementation of local SDI are also addressed.

In section 6.2 the state of decentralization at local level and its effects on local organizations are interpreted, in section 6.3 the relationships between state of decentralization and the roles of GIT at local level are addressed, finally in section 6.4, the critical conditions for GIT decentralization at local level are suggested.

6.2. State of decentralization at local level

6.2.1. Autonomy & Dependency

Summarizing the findings of section 5.2, Local government presents an administrative and political autonomy but due to the insufficient local funding there is a financial dependency. Administrative autonomy is evident in Regional Government; however it is dependent on national government for political and financial issues. In addition, the de-concentrated offices of national organizations are dependent on the central offices for administrative, political and financial reasons.

Hence, Peruvian decentralization is characterised by:
- An administrative decentralization in local and regional governments,
- An administrative de-concentration of national organisations to local level.
- A political decentralization at local levels which is an incomplete process in regional governments
- A financial centralization at the three levels of government set at the local level (See Table 6.1)

Table 6.1: Summary of findings of peruvian decentralization state

Aspects/levels	Local	Regional	Decentralized National Offices
Administrative	Autonomy	Autonomy	Dependency on main offices
Political	Autonomy	Dependency on national ministries	Dependency on national political path
Financial	Dependency due to insufficient budget	Dependency on National funding	Dependency on institutional funding

These characteristics are promoting an organizational centralization in local and national organizations since centralized organizations are characterized by a high degree of hierarchical autonomy and lower levels of participation in decisions (Andrews et al, 2008) which is explained as follows:

a. Local autonomy but financial dependency promotes centralization in an organization

Local Government

As discussed in section 4.2, local and regional governments have economic and administrative autonomy and the freedom to organise their functions according to their needs. However, from the discussion in section 5.2.1 local organizations face several functional and financial issues that constrain their autonomy. These issues are promoting an internal organizational hierarchy that limit or encourage the financial and functional dependency in some offices and the autonomy in others, which generates differences within the organization. Financial centralization may force local government to enforce organizations which can improve the municipal revenues (PLANDET and SATT) at the expense of regular organizations (See Figure 5.1).

Regional Government

Regional governments are supposed to be the base of the Peruvian decentralization (section 1.1 and section 4.2). However, the findings in section 5.2.2 prove that in spite of the given autonomy, regional governments are highly dependent on the decisions of the ministries that control the implementation of projects and infrastructure. Their financial limitations are complicated by their inability to promote their own resources; like local governments have.

The financial centralization in the national government promotes a kind of organizational centralization at the regional level, forcing regional governments to rely on decisions of the central government by reducing their autonomy.

As a result, the essential *discretionary authority* of local organizations (Ribot et al., 2006), does not seem to be transferred effectively, because the regional governments need an approval from superiors for any action. The lack of resources limits the decision making ability of local organisations.

b. Administrative de-concentrated but centralized national organizations affect the locals

Through administrative deconcentration, tasks are transferred to field offices of central government without local autonomy (Devas, 2004). The findings from section 5.2.3 prove that although national government created "de-centralised" (SUNARP) or "de-concentrated" (COFOPRI) offices (see section 4.3) at the local level; these organizations are still highly centralised organizations because decisions needed at local level are made at national level.

The objective of decentralised offices is to allow easy access of national services to the citizens (see section 4.2.2). However, at the local level, these organizations are not static entities; they perform important local functions like the urban cadastre management (see section 5.3). Thus, their inability to make decisions at local level may not be an issue for the national organizations, but it is an issue for the local governments as was found in sections 5.3 and 5.4. These issues are further described in the following sections.

6.2.2.   Inter-organizational relationships

Summarizing the findings of section 5.3, the inter-organizational relationships between the three governmental levels at local level present important tensions that may jeopardize the necessity for spatial information exchange (see table 6.2). The tensions between local and national organizations prevent the exchange of cadastral information due to incompatible institutional priorities. There is no evidence of information exchange between local and regional government due to the pressure on regional government to other important functions and cover their jurisdictional borders.

Table 6.2: Summary of findings of the state of inter-organizational relations at local level

Levels/Aspects	Local	Regional	Decentralized National Offices
Local	**X**	No relation at all	Tension in relations
Regional	No relation at all	**X**	Tension in relations
Decentralized National Offices	Tension in relations	Tension in relations	**X**

a) National priorities prevent information exchange with national organizations

In section 4.3 the roles of national GI organizations related to land management were discussed. Their roles include the implementation of the National Cadastre which is supposed to be an *open, de-concentrated and dynamic system* since it allows the information exchange between producers and users of cadastral information. In addition in section 4.2.2 it was discussed that land titling and urban cadastre are also important functions of local government. Both cases have been justified through formal regulations. However, findings in section 5.3.1.1, demonstrate that in practice, the national priorities are not aligned with the local necessities thus, cadastre has different importance/priority at the national and local level.

On the one side, the urban cadastre strongly supports the increment in the revenue of the local government which may be used to provide better services; by increasing this revenue, the credibility of local governments will be enhanced in the eyes of the local citizens. On the other side, the national cadastre and tilting program needs the local governments to fulfil some requirements in order to complete land titling and national cadastre process. Both reasons are legitimate, but they show a centralistic behaviour of national organizations which, like Silva (2006) suggests, is a predictable behaviour in land management organizations, since land information implies cooperation of diverse actors.

b) Unclear legislations prevent information exchange with regional organizations

In section 4.2.1, the roles of regional governments regarding land use planning functions that complement to the local planning carried out by local governments were discussed. Findings in section 5.3.1.2 show that in practice, this formal co-operation does not effectively apply, because both organizations carry out planning activities independently. As Ugarte (2006) points out that the difficulty in the process of decentralization is in the confused legislative framework that generates competencies superposition and additional complications. The following statement by one of the actors mentioned in section 5.3.1.2 clarifies the situation. The actor stated that *"in the process of decentralization, the roles between local and regional governments are not yet well defined"*.

Sometimes national governments tend to create ambiguous policies limiting the scope of powers they are supposed to transfer by instituting new patterns and systems of oversight (Devas, 2004). Urban planning is an extensive function under the jurisdiction of regional government which differs from the functions and jurisdiction of local government.

6.3.　　　Geo information Technology for control and centralization

The findings in sections 5.3 and 5.4 suggest that some GI practices in local and national organizations tend to control and centralize GIT. Complex procedures in decentralized organizations constrain the access of spatial information to local organizations. Fulfilling the national GI requirements for standardization implies an additional financial effort for local government (see table 6.3).

Table 6.3: Summary of findings of GIT usage at local level

Levels/Aspects	Accessibility	Standards	IT Architecture	Specialization
Local	Restricted by national GI procedures	Given at national level	Locally Centralized	Services provision Urban planning Land administration
Regional	Restricted by national GI procedures	----	-----	Services provision Regional Planning
Decentralized National Offices	-----	-----	Nationally centralized	National Land Administration and Land Information

Specialization is an additional finding that was included in table 6.3. It was determined from the discussion in chapter 4, regarding the roles of GI actors at local level. These findings describe how and why geo information is used for centralization and control, particularly for land information.

a) Centralization of spatial information in national organizations

Specialization and IT architecture are closely related to the organizational GI strategy. Andrews et al (2008) argues that the impact of centralization is dependent on the organizational strategic orientation.

The GI roles of national organizations only deal with land administration and land information which is implemented by the de-concentrated offices around the country (see section 4.3 and 5.2.2). It can be inferred that the IT architecture (see figure 5.6) in national organizations is a *centralized information system* because information flows from bottom to top levels whereas decision making flows from top to bottom levels (Walsham, 1993), this may also prevent the information exchange with national organizations as discussed in the previous section.

The GI roles of local organization i.e urban planning and provision of services are affected by functional and financial constraints (see section 4.2 and 5.2.1), which is observed by the shortage of IT resources and capacity to handle data, promoting the concentration of GIT in a leading office (PLANDET).

b) GI regulations and procedures do not represent local capacities

The findings in section 5.3 suggest that *accessibility* of cadastral information seems to be difficult for local organizations, due to complex procedures in de-concentrated national organizations at local level. This finding is strengthened in section 6.2.1, because accessibility of data is also a decision made at national level.

The findings in section 5.4 suggest that fulfilling the requirements of National Cadastral System for standardization implies an additional financial effort for local government, which should be done by them because the regulation also covers the urban cadastre executed by municipalities.

Indeed, GI regulations and procedures do not represent local capacities due to the state of decentralization studied in section 6.2, from the previous discussion it is suggested that there are different reasons for the centralization of land information. In national organizations centralization means power and control of information (Dedrick, 1997),. But, in local organizations centralization may mean the extension of power to the national government over local government due to the lack of financial resources. Centralization also promotes an unbalanced data handling capacity of GI within the local government.

6.4.   Dilemmas about GIT decentralization

Decentralization of GIT means the diffusion of geo-information technology to local level, allowing the local institutions (regional and local governments) to enhance their autonomy and to implement and carry out GI activities like land use planning and land management. The study has justified the necessity of GIT decentralization or diffusion to local level due to planning functions awarded to local governments as a result of decentralization policies.

From the discussion in the previous chapters, the diffusion of geo information technology to local level requires:
a) An increase in the financial capacity of local governments trough a financial decentralization
b) The adaptation of GI regulations to local necessities and capacities
c) Determination of clear and complementary roles for national and local organizations in order to implement effective national and local geo information systems like the cadastral system.
d) Promoting channels for information exchange between local and national organizations at local level which means enhancing the capacity of de-concentrated national organizations to make decision about specific common issues with local organizations.

The study has shown that in spite of the progress made in administrative and political decentralization, the process has not achieved financial decentralization, which at local level leads to: autonomous but local centralized organizations, dependent regional governments and decentralized but controlled or dependent de-concentrated national offices at local level (section 6.2). These facts lead to concentration and control of GIT within national organizations. Hence, these facts also lead to the centralization of local organizations (section 6.3)

Hence, the diffusion of geo information technology to local level is a complex process which will not happen automatically, but it will go along with the decentralization process, therefore, government needs to aware that some of its policies need to be amended for the adjustment of GIT to the organizational conditions:

Some, critical factors or dilemmas emerge in the diffusion of GIT to local level:

1) *Local centralization due to local autonomy would result in the fragmentation of the national state.*
2) *Regional centralization due to the lack of autonomy would result in the enforcement of central government (re-centralization)*

Some of the following arguments and questions arise in view of these critical conditions:

The fact that regional and local governments in Peru are composed of 25 regional governments, 195 provincial municipalities and 1637 districtal municipalities which is considered by some scholars groups an obstacle for an effective decentralization, because small units like municipalities would not be able to reach a minimum economy of scale (Zavala, 2004) and hence it may promote a re-centralization, so:

- Is the local government an appropriate lower level for a balanced decentralization process?

- Should there be regional monitoring of GI functions in local governments? Would an immature regional and dependent local government be able to deal with it?

- How to promote conditions in which local government's GI roles in fact could be integrated with the regional government's GI roles?

3) *The combination of national and local priorities that would support the success of an open, de-concentrated and dynamic national cadastral system, which would fulfil the local requirements but, the probability of national government to lose control and power of geo information*

4) *The definition of clear and integrated GI roles for regional and local governments but, the probability of national government to lose political control and power over regional governments*

Some arguments and questions which arise regarding the two previous critical conditions are as follows,

Decentralization is supposed to be a permanent policy of the government, which is divided in progressive and ordered stages because it is a complex process implying several aspects (politics, economy, culture, etc). The discussion in previous sections has suggested a centralistic behaviour of national government and also the passive attitude of local organizations, hence:

- How national government would be aware of the local demands?

5) *The need for flexible GI regulations in order for local GI institutions to access, update and contribute to the national cadastral system would mean loss of control of the national organisations over geo information technology and complex aggregation of information to higher levels*
The following arguments and questions may arise in response to the previous comment

Flexibility of GI regulations do not imply that GI regulations should not have the optimum standards because for local governments it is not achievable because their insufficient capacities. It may imply that if national government have specific requirements to fulfil by local government, then also there should be an understanding of local capacities from national level, but:

- What national government would motivate to take into account the local demands?

- How much flexible could be the national GI initiatives to the local necessities?

7. Conclusions and Recommendations

7.1. Introduction

This chapter presents the conclusions and recommendations of the study. The conclusions are presented as answers for the research questions. Some recommendations for further research are also made.

7.2. Conclusions

The main objective of this research was to determine the possible critical conditions in decentralization of geo-information technology at local level towards a further implementation of Local SDI in Peru.

To achieve the main research objective, the sub objectives and questions were stated in chapter 1 which were answered in the previous chapters as follows;

Sub Objective 1: To analyse the state of decentralization process and geo-information technology at local level

1. *What policies determine the roles of GI actors at local level?*
Ambiguous national policies determine the roles of GI actors i.e the national, regional and local organisations at local level. The National organizations studied have specific functions related to land administration and cadastre; whereas the GI functions of local institutions are related to land use planning and also land administration; thus local organizations are needed to implement, both national as well as local objectives.

From the discussion in chapter 4, it was realized that national organizations which are engaged in the implementation of titling and cadastre, have formed an institutional body with a common aim to strengthen specific policies and competencies, which encourage the real estate property registration (National Cadastre) but, the policies of local organisations encourage tax collection (Urban Cadastre). It has also been observed that local organizations have administrative and financial autonomy to apply policies, regulations and procedures, but these policies are designed at national level, and due to their complementary competencies for land use planning they lead to the formation of a local institutional body.

2. *Are the actors able to execute their GI roles at local level?*
The organizations studied are not able to execute their roles efficiently, because they evidence important functional, financial and technical issues as discussed in chapter 5.

In local organizations the issues related to their insufficient budget and their position within the municipal structure affect their given autonomy. These issues have promoted an internal

hierarchy, because strategic offices have better possibilities to attract funds and the ability to make autonomous decisions and implement projects or infrastructure whereas regular offices evidence total functional and especially financial dependency upon the regular budget which is scarce.

In regional organizations the issues related to their dependency upon the national ministries and other public sectors constrains the autonomy granted to them. They also face political and technical issues that somehow promote a negative perspective about implementation of projects or coordination of activities with other governmental organizations.

The de-concentrated offices of national organizations are mostly concerned about their operative limitations related to the lack of personnel and technology resources due to their financial and functional dependency on the Head Offices.

In conclusion, in the ongoing decentralization process, the capability of GI actors (local and regional government and national organizations) to execute their roles is constrained due to their dependency to the national government, which promotes financial, functional and political issues.

3. *How much are the local organizations able to collaborate/co-operate with national organizations at local level?*

The research could not quantify how much are the local organizations able to collaborate/co-operate with national organizations at local level. But the research found that aspects such as the functional dependency of de-concentrated national organizations at local level play an important role for information exchange as discussed in chapter 5 and 6. It can also be attributed to the evidenced organizational tensions between local government and national organizations due to different institutional priorities. In spite of co-operative mandate each government is autonomous to carry out its institutional policies hence regional planning does not support local planning because of unclear legislations between regional and local organizations.

In conclusion, local organizations (local and regional government) evidence important tensions that may prevent their capacity to cooperate /collaborate with national organizations. These tensions may have been originated due to a contradictory autonomy & dependency promoted by an unclear legislation.

4. *What differences of GI practices between local and national organizations can be related with decentralization/centralization?*

From discussion in section 5.4 and 5.5, it is clear that the major difference in GI practices of local and national organizations is that the national organizations present closed GI practices. For instance, Participation is a local practice; local organizations are involved in several participative GI projects without the participation of national organizations in spite of the fact the these projects are related to cadastre management which is a common GI activity. Also from the discussion in sections 5.4 and 5.5 it was realized that procedure to provide access to land information produced by de-concentrated national organizations is complicated because

decisions are still made in the Head Office. In addition, requirements for standardization are also an issue for local organizations due to their lack of financial resources and data handling capacity. So far, it is evidenced that national organizations impose mechanisms of control over local organizations. In national organizations means centralization of information in the higher level, which is located outside the local boundary, whereas in local organizations means concentration of information technology in strategic offices which will support the increment of financial resources.

Sub Objective 2: To determine the relation of decentralization process and geo-information technology at local level,

1. How much centralized/decentralized are the organizations at local level?
The research could not quantify centralization or decentralization in the organizations studied. But it has characterized the state of decentralization in Peru as, an administrative decentralization in local and regional governments, an administrative de-concentration to local level of national government, a political decentralization at local levels which is an incomplete process in regional governments and a financial centralization at the three levels of government set at the local level (chapter 6, section 6.2)

An efficient devolution of powers to the local level is prevented because of lack of financial decentralization, this results in autonomous but centralized local governments, dependent regional governments and decentralized but controlled or dependent de-concentrated national offices.

In conclusion, national and regional governments are still centralized organizations; whereas, local government is internally a centralized organization.

2. Is the state of decentralization having any influence in geo information technology at local level?
The research has found that the state of decentralization influences GIT at local level. It was understood that GI practices in national organizations may mean power and control of information, in particular land information because the findings in chapter 5, (sections, 5.3, 5.4 and 5.5) evidenced different priorities that prevent information exchange with local organizations, restrictions for accessibility to land information, extra financial efforts in local organizations to accomplish standardization requirements which are characteristics of centralized organizations. Also, GI in local governments is centralized due to the lack of financial resources which has promoted the concentration of GI in strategic offices which can improve the municipal revenues at the expense of regular organizations.

In conclusion GIT at local level is influenced by the state of decentralization, because it not only is concentrated in national organizations and controlled by them it also supports the centralization in local organizations as explained in chapter 6.

7.3.   Recommendations

Some recommendations are drawn from this research regarding decentralization of geo information technology at local level.

- As mentioned before, decentralization is a very complex process hence; there are very complex variables to be analyzed. The research made an analysis taking into account relevant organizational, functional, financial and technical aspects in order to draw up a view regarding the state of decentralization in governmental organizations; however due to the time constrain, the research has not analyzed economical, political, cultural and other factors in detail. These factors should be taken into account in further studies to complement the interpretations made in chapter 6.

- The study is the base for further research regarding the implementation of local SDI in Peru, from the base of this study. The next step for the implementation of a Local SDI would be to develop specific studies about local governments and regional governments, in order to propose strategies for organizational development that would reduce the dilemmas found in this research.

- Other further research would be the analysis of the scope for a local SDI in relationship with the appropriate level of implementation. Local government are most strong organizations at local level with competencies related to land administration and land use planning which could be benefited with a Local SDI; however, the study has shown that also local organizations could promote centralized organizations that may negatively affect the decentralization process.

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9. Annex

Annex 1: Guide for Interviews

I need to know	Basic Questions
Autonomy - Dependency	
- National Politics of Decentralization and its application at local level: Financial, mandates. - How much are the national politics influencing/determining its independency for decision making - Is there any overlapping in mandates and functions? - Which functions or activities cannot be done because of dependence and control with the national government? - Are their possibilities of decision making enough for them? - What control mechanism is applied? - How do they feel about the control and dependency of the national government?	- In your opinion what are the main constraints to develop your activities properly? - Financial---Functional---Technical----Political----Other - Why do you consider it is a limitation? - Is your office able to propose any project? - Is your office able to hire personnel?
Inter-organizational Relationships	
- Participation level - Partnerships degree - Agreements Fulfilment - Coordination mechanisms type - Actors Interest	- What relationships do you have with other offices? What office? - Do you have any communication with the office of…? - On what regards are your relations with this office? - Do you have common activities with this office? - How much important is the municipality for your activities? - In your opinion, it is easy to collaborate with this organisation?
GI practices	
- Accessibility - Standards - IT architecture - Specialization characteristics	- From which of these organisations you need spatial information? What kind of information/data you need? - Do your organisation exchange information with others? - What mechanism do you use to get the information? - Do you provide spatial information to any of these organisations? - What kind of information/data you provide? - What type of processes are you able to do? - Do your organisation collect, process and disseminate spatial data - How much important is spatial data for your daily activities

Annex 2: Urban Planning and Cadastre in Trujillo's Municipality

In order to fulfil the given mandate and implement the planning instruments, the Municipality of Trujillo is carrying out the so called 'Strategic Planning' practices. Hence, the municipality has established the Agenda 21 Trujillo which relates to planning and management process to develop policies and projects through alliances between public and private sectors, NGOs and the civil society in order to achieve the integrated and sustainable development of Trujillo.

In 1995, the Development Master Plan of Trujillo for 20 years period (1995-2015) was elaborated, the plan has been modified and updated by the years. The objectives of the Master Plan cover the territorial, social order and institutional politics aspects. In relation to the Institutional aspects, the plan points out "the modernization of public management for local development" with the implementation of planning tools by the adoption of geo information technology.

Since 1993, the municipal planning office is adapting GIT, it is producing and using CAD based maps which were used for planning and building control purposes. The use of GIS software started in 2002 with the development of the Environmental Atlas of Trujillo and the Cadastral System. Since 1995, the Municipality of Trujillo is implementing the Municipal Urban Cadastre or the so- called Cadastral Information System of Trujillo. The initial aim of the municipality was to integrate the fiscal information with the ownership information through a municipal information system in order to improve the municipal taxation policies and to support local land planning of the city (MPT, 2001)

With this objective the municipality called for the support of external organizations such as COFOPRI and SUNARP and internal organizations as Building, Licensing and the Taxation Office – SATT. The Municipal Taxation Office – SATT and the Planning Office-PLANDET, due to its planning and fiscal functions respectively; leads the implementation of the system. PLANDET and SATT have the obligation of coordinative activities for data collection, maintenance and permanent updating through tributary policies, cartographic updating, reports and information exchange with the partners (Municipal Ordinance 019-2000-MPT)

In 2002, with the approval of the cadastral code "as unique identifier referenced to its spatial location", the official surveying activities within the district were executed by SUNARP and PLANDET. The same cadastral code joined the fiscal databases provided by Taxation Office and the real state database provided by SUNARP (Municipal Ordinance 005-2002-MPT). Also, COFOPRI provided topographic and cadastral information of titled areas within the province in order to build the basic cartography. Until 2003 the cadastral information was used by SATT for fiscal purposes, by SUNARP for ownership purposes and by PLANDET for planning applications. But in 2003 SUNARP ended the agreement with the local government so the link between the ownership and fiscal information was broken. Nowadays, the system has only internal participants; PLANDET and SATT and is used for planning and tax collection purposes.

In 2003 -2004 a web map service providing interactive GIS maps through the municipal web portal was implemented with the support of external donors. In addition the municipality has implemented distrital cadastral projects in 9 of the 11 districts.