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Grassroots Geographic Information Systems

An Examination of Spatial Information Technologies in the Local Community Context: The Case of Tallaght, Dublin, Ireland

Submitted as fulfilment of the Requirements for the Degree of Ph.D. by Research to Trinity College, Dublin.

Patrick Haughey
November 2003

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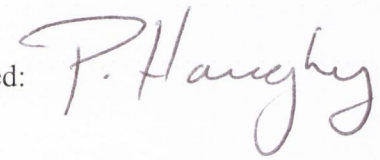
Signed: 

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Grassroots Geographic Information Systems

An Examination of Spatial Information Technologies in the Local Community Context: The Case of Tallaght, Dublin, Ireland

Patrick Haughey

Summary

The use of Information and Communications Technologies (ICTs), including Geographic Information Systems (GIS), by community based and non-governmental organisations in society is a growing phenomenon. This research undertook a longitudinal study of the design and implementation of a new grassroots model of Public Participation GIS (PPGIS) in the Tallaght community of Dublin, Ireland. This research spanned three years of regular observations of local residents and workers for Community Based Organisations (CBOs) engaged in various community development activities and initiatives.

The importance of accessing and disseminating information in the context of community development cannot be underestimated. Community based PPGIS as designed and implemented in the form of the grassroots model of GIS developed during this research can offer residents and workers for CBOs the ability to collect and store large amounts of formal data and local knowledge. However, citizens cannot effectively utilise this knowledge without accurate, relevant and up-to-date information about their community and the technical abilities to undertake PPGIS related activities. A grassroots GIS has the potential to meet the needs of local actors engaged in community development activities.

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ABSTRACT

Grassroots Geographic Information Systems

An Examination of Spatial Information Technologies in the Local Community Context: The Case of Tallaght, Dublin, Ireland

The importance of accessing and disseminating information in the processes of community development and planning cannot be underestimated. In "community planning" exercises the access to, and dissemination of, relevant and up to date information is held up as a priority. However, the importance of information can often be neglected or undervalued by planners, workers in non-governmental organisations (NGOs) and community based organisations (CBOs) and citizens alike. Public Participation Geographic Information Systems (PPGIS) and Information and Communications Technologies (ICTs) have the potential to affect positive change in the flow of information and increase communications between residents, those working for CBOs, planners and politicians alike. Actors in the local setting have not implemented technologies or practices that take full advantage of new participatory techniques including the implementation of participatory planning models using GIS and PPGIS. This research explores in detail access to digital spatial information by community based organisations and seeks to answer important questions on the nature, quality and usefulness of the various kinds of data and techniques available and readily employed in community development and planning contexts.

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GLOSSARY OF TERMS

CAD	Computer Aided Design
CBO	Community Based Organisation
CD-ROM	Compact Disk - Read Only Memory
CGIS	Canadian Geographic Information System
CSDSS	Collaborative Spatial Decision Support Systems
CSO	Central Statistics Office
CTCs	Community Technology Centres
DDDA	Dublin Docklands Development Authority
DED	District Electoral Division
DXF	AutoCAD Vector Format
ESRI	Environmental Systems Research Institute
ESRI	Economic and Social Research Institute (ESRI)
FOIA	Freedom of Information Act, 1997 (Ireland)
GI	Geographic Information
GIS	Geographic Information System
GIS/2	Second Generation GIS
GIT	Geographic Information Technology
GRO	Grassroots Organisation
GUI	Graphical User Interface
HUD	U.S. Department of Housing and Urban Development
IAP	Integrated Areas Program (Ireland, Department of the Environment)
ICTs	Information and Communications Technologies
IT	Information Technology
IRLOGI	Irish Organisation for Geographic Information
NCGIA	U.S. National Center for Geographic Information and Analysis
NDP	National Development Plan, (Ireland)
NGOs	Non Governmental Organisations
ONR	U.S. Office of Naval Research
OS	Ordnance Survey United Kingdom
OSI	Ordnance Survey Ireland
PLA	Participatory Learning and Action
PPGIS	Public Participation Geographic Information System
PRA	Participatory Rapid Appraisal and Participatory Rural Appraisal
PSS	Planning Support System
RAPID	Revitalising Areas by Planning, Investment and Development
SDCC	South Dublin County Council
SDSS	Spatial Decision Support Systems
SYMAP	Synagraphic Mapping System
TINs	Triangular Irregular Networks
UCGIS	University Consortium for Geographic Information Science
URISA	Urban and Regional Information Systems Association
WGIS	Web-based Geographic Information System
WPPGIS	Web-based Public Participation Geographic Information System
WTRC	West Tallaght Resource Centre
WWW	World Wide Web

1.1. INTRODUCTION

The importance of accessing and disseminating information in the context of community development and planning cannot be underestimated. In "community planning" exercises the access to and dissemination of relevant and up-to-date information is held up as a priority (Forester, 1989 and Innes, 1998). However, the importance of information can often be neglected or undervalued by residents, workers in non-governmental organisations (NGOs) and community based organisations (CBOs) and planners and government officials. Public Participation Geographic Information Systems (PPGIS) and Information and Communications Technologies (ICTs) have the potential to affect positive change in the flow of information and increase communications between residents, those working for CBOs, planners and politicians alike. Actors in the local setting have rarely implemented technologies or practices that take full advantage of new participatory techniques including the implementation of participatory planning models using GIS and PPGIS.

This research explores the access to digital spatial information by CBOs through the introduction of a "grassroots" GIS into the Tallaght community of Dublin, Ireland. It seeks to answer important questions on the nature, quality and usefulness of the various kinds of available data. This research also explores different methods of data collection and discursive processes and the support and empowering characteristics of PPGIS primarily through observations on the "organic" evolution of a grassroots GIS. Research on this important case has implications for geographers, planners, community development workers and volunteers, information system developers and all those interested in the use of GIS in community settings. The next section in this chapter, outlines the structure of this dissertation. The local contextual setting and nature of the research problem are described in section 1.2 and 1.3, respectively. The motivation for this research is examined in section 1.4. The objectives of the research and the research questions are contained in sections 1.5 and 1.6, respectively. The final section, 1.7, concludes this introductory chapter.

1.2.1. The Local Study Area: Historical Context

Tallaght is identified by name in an ancient Irish manuscript as early as 766 when St. Maelrvain (the bright sun of Ireland) founded the Abby of Tamlacht called Tamlactense Monastery (Handcock, 1899: 29). The monastery is known to have been located on the current site of the Tallaght castle built in 1324 by Dublin's Archbishop. The ruined castle is to this day an important historical landmark in the area. Many locals are aware and proud of the history and importance of Tallaght to Dublin and Ireland as a whole. Handcock's work is an important resource tracing the history and folklore of the Tallaght community up until the start of the 20th century.

Until the mid 1960s, Tallaght was a small rural village in a predominately agricultural area. By 1966 the population of Tallaght had reached 25,000, and although it was still a small village it would soon become involved in a phase of, "radical planning policies for the development of the Dublin Region." (Partlin, 1998: 24). The "vision" for the "Tallaght New Town" can be attributed to Myles Wright, a U.K. planning consultant, appointed by the Minister for Local Government in April 1964. In this capacity Wright prepared an advisory regional plan for Meath, Kildare, Wicklow and the town of Drogheda, which identified areas for Dublin's suburban expansion and development (Ward and Bannon, 1988).

Wright's report, published in 1967, advocated the development of the four "new towns" of Clondalkin, Blanchardstown, Lucan and Tallaght, all to the west of Dublin, "which would accommodate a population of almost half a million people." (Bartley and Waddington, 2001: 11). The new towns were planned to be as self-sufficient as possible in order to sustain resident populations with housing, shopping services, employment and social economic and cultural well being. The new towns were also grouped so as to better manage traffic flows between the towns rather than to and from Dublin (*Ibid*).

The new approaches to urban planning that developed in the late 1960s had a great impact on Dublin. Bartley and Waddington (2001: 11) state, "In short, Dublin transformed very quickly from a European type city designed for maximum accessibility and low vehicular mobility to an American type urban sprawl model where private car ownership and mobility became essential for access to work opportunities and services." This approach

would soon prove to have a detrimental impact on those who would call Tallaght home as many of the problems experienced there can be closely linked to past planning practices.

Rapid growth marked the early modern, post Wright Plan phase of Tallaght's development and by the late 1970s the town's population had reached 45,000. Tallaght grew much faster than the other new towns in the Wright plan. By 1983 its population rivalled the second and third largest cities in Ireland, Galway and Waterford, respectively (Partlin, 1998). By 1993, with a population of 75,000 Tallaght was the 2nd largest urban area in Ireland outside of Dublin city itself (Partlin, 1998: 33). The modern planning concepts adopted in this case promised, in the long term, to turn Tallaght into, "a town described then as 'The Garden City of Europe'" (Thomas, 1988), however, this did not occur.

For some, "... Planning lost its way in Tallaght a long time ago." (Thomas, 1988). Tallaght soon came to be identified with urban decay, marginalisation and exclusion, poverty, unemployment, drug addiction, teenage pregnancy and high crime. The failure of Tallaght in many respects can be partly attributed to the pressures to supply housing together with limited additional financial resources, resulting in a delay in the provision of other community services (Partlin, 1998). Additionally, the failure to adhere to the original "New Town" plan itself, for example, in the provision of a town centre, as there was no town centre until recently, can also be considered a contributing factor to problems in Tallaght (*Ibid*).

Today the Tallaght community of West Dublin is widely recognised as one of the most disadvantaged areas in the Dublin region and Ireland as a whole. In "*Poor People, Poor Places: A Geography of Poverty and Deprivation in Ireland*" (1999) Haase, conducted a spatial analysis of affluence and deprivation based on the 1991 Census of Population of Ireland (Haase, 1999: 33). He states, "In Dublin, the analysis fully confirms the known areas of deprivation. These are the North and South Inner City, Coolock, Ballymun, Cabra, Finglas, parts of Blanchardstown, Rialto, Kilmainham, Ballyfermont, Cherry Orchard, Clondalkin, Kimmage, Crumlin, Walkinstown, West Tallaght and pockets in Dun Laoghaire." (*Ibid*).

1.2.2. Local Community Organisations in Tallaght

Currently the Tallaght community has more than 250 government agencies, NGOs, and CBOs working in the local area. Appendix A contains a list of these compiled by the Tallaght Partnership, a Local Area Partnership set up in 1991 and funded by the Irish Government's Department of Community, Rural and Gaeltacht Affairs to the sum of €1,121,814 in 2003 (Ó Cuív, É. 2003). The Tallaght Partnership is described as, "a structure which has developed, since the 1980's, out of a multitude of initiatives developed at the local level in Tallaght, an economically disadvantaged area of Dublin. The partnership was a response to a call from central government, to develop a network and bring coherence into the operation of the community initiatives which had sprung up to fill the existing gaps in social, cultural, educational and economic services and planning in the area." (Council of Europe, 2003).

The Tallaght Partnership is comprised of local community, voluntary, statutory and private sector organisations and agencies such as Get Tallaght Working, which has the remit for much of the enterprise development work in the area. Other education and training initiatives funded by the Tallaght Partnership include the Killarden Education Network (KEN) and The Jobstown Education and Training Strategy (JETS). The Tallaght Partnership supports a large number and variety of CBOs and other local initiatives. Many of these groups use computers and ICTs, including the Internet in their day-to-day operations. Members of some of these local groups have shown an interest in GIS technology and a willingness to participate in PPGIS research. Residents, CBOs and planners in the Tallaght community have demonstrated a need to share information on local projects and a host of other issues and concerns.

The organisations working in the Tallaght community are familiar with the issues and problems of concern to local residents. Information or a lack there of is one of the most important issues to organisation working in the area. The Tallaght Welfare Society (TWS) stated in 1987 that 42,000 callers used the TWS information office, an increase from the 2,700 who used it in 1977. Clearly the demand exists for a relevant, up-to-date and contextual community information resource. The new model of community based, "bottom-up" or "grassroots" GIS, designed and implemented during this research has the potential to address these needs.

1.3. THE RESEARCH PROBLEM

The fundamental research problem identified by this dissertation involves weaknesses with the current amount and quality of information flows among the actors involved with community development initiatives in the Tallaght area. In Tallaght there is evidence to suggest that many such local initiatives are undertaken by CBOs without ICTs. The use of the Internet, GIS and PPGIS technologies and associated data, particularly the spatial data, widely available and used in other communities for such purposes are not in evidence in Tallaght. In many jurisdictions GIS is often used to enhance the efforts of CBOs engaged in community development activities, development and planning processes and participatory governance. The current limits and restrictions placed on the "two-way" flow of and access to information in the Tallaght area can potentially be addressed through the implementation of a grassroots GIS.

This research on the design and implementation of a grassroots GIS involves the applicability of PPGIS to address the needs and agendas of NGOs and CBOs involved in community development initiatives. Theory and practice in the fields of planning, community development and GIS suggest that the use of these new technologies has the potential to improve communications between local citizens, workers for CBOs and planners and enhance community development initiatives. This can be achieved through access to information and the ability to collect, store and disseminate information to meet the needs of organisations and citizens alike. Community based, grassroots GIS has the potential to address information access and communications problems and provide a solution to the lack of communication and information sharing evident in the Tallaght area.

1.4. THE NEED FOR THIS RESEARCH

This case study adds to the body of knowledge on PPGIS in community settings. The implementation of a grassroots GIS with a focus on informal data, local knowledge and community networking is an important and understudied phenomenon. Additionally, the Irish local community context is unique and has not been researched thoroughly to date. This case is a critical test of existing theory put into practice offering a revelatory look into PPGIS in the community setting.

Numerous scholars in a variety of disciplines have undertaken the study of new and emerging ICTs and their impacts on society. Geographers, urban planners, sociologists and others have highlighted the importance of research on society and technology and have contributed greatly to our understanding. While acknowledging the importance of the research to date in these fields, it is obvious that gaps in our knowledge remain, particularly with regard to GIS, PPGIS and ICTs in community development contexts. A large number of authors from a variety of disciplines have called for further study in this area making the need for this research clear.

One of the most prominent researchers in the area of ICTs and community is Castells. In his *"Informational City"* (1989) he states that, "There is little reliable research on the interaction between communications technology and urban social life." Since 1989, even with the explosion in the areas of personal computing and the Internet this situation has changed little. The complexities of the interactions between community organisations and new technologies need to be explored. GIS and PPGIS can be considered as types of ICTs having much to contribute towards the study of "urban social life" and interactions with new technology.

Aoyama, also writing more generally on information technologies, cities and telecommunications, understands the complexity of "technology-space relationships". He states that a framework that encompasses the various aspects of technology use and its social impacts still eludes us. Additionally, he is of the opinion that the overly optimistic or pessimistic views towards ICTs have been rejected and, "replaced with more complex and dynamic views." (Aoyama, 1999: 291). The PPGIS research undertaken in this dissertation recognises these complexities and is well suited to contribute to the understanding of GIS and community development practices.

Many researchers have alluded to the need to study GIS and community groups. There are only a few examples that address issues like access to information, power, exclusion and sustainability. Sawicki points to the work of Sieber (1994) who assessed the use of GIS by environmental advocacy groups, stating, "To date no other study has looked at neighbourhood and community groups use of the technology." (Sawicki, 1996: 514). The few case studies that exist in this area are valuable in that they explore the new and innovative tools and technologies of GIS in different surroundings. Few cases explore the

incorporation and use of non-traditional, informal or "indigenous" data in a truly community led or "bottom-up" approach, however.

To Ball the missing piece of the PPGIS "jigsaw" is how it can be used to enable locals to express their views, or "native knowledge" to the experts (Ball, 2002: 125). Talen (1999a: 535) states that translating local resident perceptions into GIS, "is the most underdeveloped and has received the least attention" in the research to date. She goes on to state that the few attempts to capture these views in GIS occur, "almost entirely outside of the domain of community and neighborhood planning". Therefore a critical assessment of the design and implementation of PPGIS that incorporate a variety of data types and views in the community settings is needed.

Campbell and Masser (1995) have studied GIS and organisations in city governments in great detail. They call for a different research approach and state that it is, "Vital to improve understanding of the interrelationships between new technological developments and the organisational contexts that they are intended to benefit." (Campbell and Masser, 1995: 7). They go on to state that it is, "important that future detailed studies be conducted on a range of organisations." (*Ibid.* 161). Their work helps shed light on GIS innovations in large organisations. However, their focus on large, hierarchical, well-funded government agencies ignores smaller NGOs, non-profits and community groups. This research seeks to fill this gap in the current state of knowledge by looking closely at smaller organisations and the importance of various types of information to them.

Other authors have called for the impacts of spatial information technologies on community organisations to be studied in more detail specifically with regards to access constraints as well as the needs, concerns, activities and agendas of community groups (Elwood and Leitner, 1998: 87 and Van Winden, 2001: 867). Elwood asserts that, "Given the explosion of GIS adoption by community organisations and the obvious barriers they face in this endeavour, these efforts to more fully understand and assist community based GIS use are important and necessary." (Elwood, 2001: 740).

More recently Elwood calls for research into the use of GIS by community groups, "in a local-government context that has no commitment to including community-level actors."

(Elwood, 2002a: 919). These "uncooperative" and data poor environments are variations in context that,

> *"...highlight a need for comparative study assessing how community organisations using GIS within different social, political, and economic contexts might experience different configurations of distributive, procedural, and capacity-building forms of empowerment and disempowerment. Such a comparative study is an important step in advancing the critical GIS agenda..."*
>
> (*Ibid.* 920)

Van Winden states that, "Much additional empirical research is needed to improve our understanding of the role of ICT in social inclusion and exclusion." (Van Winden, 2001: 867). His focus on European policy initiatives and their impacts on communities has shed light on recent developments in the field. Van Winden calls for thorough in-depth research to, "study the uptake of ICTs by weaker social groups, and the difference it makes to their participation in social, economic and political life." (*Ibid*).

Innes agrees with the need to study these issues further. In her work, "*Information in Communicative Planning*", she states that, "the literature still reveals little about how and under what conditions such information makes a difference." (Innes, 1998: 54). She highlights the need for research in particular areas when she states that, "research on practice should pay explicit attention to identifying many types of information and their role in planning, and to the ways information comes to be embedded in the new practices and institutions." (*Ibid.* 60). She suggests the direction for future research when she states that, "Most research on practice simply does not use a lens that allows researchers to see what types of knowledge are in play, much less to document their functions." (*Ibid.* 60).

Shiffer one of the leading researchers on Collaborative Planning Systems (CPS) calls much of the evidence of the effect of recently developed information technologies on communities somewhat "anecdotal". He suggests reflecting on three questions in future research, namely: "Do community networks lead to community networking? How do collaborative planning systems support rhetoric? Can representational applications play a role as strategic weapons for advocacy?" (Shiffer, 1998: 93).

This research undertakes a critical approach to the design and implementation of PPGIS in the community setting. It studies PPGIS in a different social, political and economic context to what has generally been the case to date. Looking at GIS in a different context to what has been studied to date, (i.e. large, hierarchical and structured institutions) is vital to its development. This research will include insights and perspectives from the community development and planning arenas as well as those from grassroots organisations and individual participants. The detailed study of these different perspectives and approaches will provide answers to the research questions, which will contribute to the theory and practice of GIS and community development.

1.5. OBJECTIVES OF THE RESEARCH

The overall objective of this research is to study in detail how a grassroots PPGIS can be introduced into the Tallaght community of Dublin Ireland. This new model is a truly community led, "bottom-up" approach designed to promote and enhance participation in planning and community development processes. Some claim that PPGIS have the potential to enhance public participation in planning and community development and aid the organisations and individuals utilising them. This research aims to test these theories through the design and implementation of a grassroots PPGIS. Additional objectives of this research are:

- **To study in detail the collection, storage and sharing of community information through the use of a PPGIS in order to refine and improve the technology and associated processes**
- **To compare and contrast different methods for the collection of community information to determine their appropriateness in grassroots GIS design**
- **To determine if the new model of grassroots GIS as designed and implemented in Tallaght has the ability to support and empower the individual and organisations using it**

Finally, this research has as an objective to evaluate how a grassroots GIS can be introduced into a disadvantaged community; how it can be adopted, populated and sustained by local community participants and how the concept of ownership can be nurtured.

1.6. THE RESEARCH QUESTIONS

The following section contains the research questions that this dissertation will address.

1.6.1. Research Question One

How can grassroots GIS improve the collection, storage and sharing of local community knowledge and formal or government information?

The potential practical tool that grassroots GIS represent can in theory address issues involving information collection, storage and retrieval. Some ICTs have been shown to increase information availability, information dissemination, improve access and transparency and address shortcomings in the communication of information between residents, CBOs and planners. The implementation of "new progressive social-technologies", including PPGIS, has the potential to contribute to increased public participation in the collection of local information, access to information and communications in community development processes.

1.6.2. Research Question Two.

What are the limitations of the currently available data for use in grassroots GIS in Tallaght?

GIS and PPGIS are well suited to collecting, storing, retrieving and disseminating data in digital form. However, the adage with regards to computer analysis "garbage in, garbage out" (GIGO) needs to be adhered to by PPGIS researchers and community actors alike. Addressing questions regarding the quality and usefulness of the spatial and non-spatial data incorporated into PPGIS will contribute greatly to the fields of GIS, planning and community development.

1.6.3. Research Question Three.

How effective are PPGIS process meetings compared with Participatory Learning and Action (PLA) sessions as a means to solicit and collect local community information?

These approaches were tested during the fieldwork for this research. Different types of information were collected for use in the grassroots GIS including informal data and local

knowledge held within the community by these approaches. Both approaches were "bottom-up" in nature and community led. The researcher played the role of facilitator and actively listened to the concerns of local participants during the collection of these data. The success of each approach was evaluated via interviews with members of the local community and workers with local CBOs.

1.6.4. Research Question Four.

A) How can the new model of grassroots GIS, designed in this research, support local residents and CBOs involved in community development activities?

B) How can the new model of grassroots GIS, designed in this research, empower local residents and CBOs involved in community development activities?

The tool that grassroots GIS represents can in theory address issues involving information access, communication and power relations between local residents, workers for CBOs and other actors in planning and community development processes. Some ICTs have been shown to increase information availability, information dissemination, improve access and transparency and address inequalities and power imbalances. The implementation of "new progressive social-technologies", including PPGIS and grassroots GIS have the potential to contribute to increased public participation and communications in community development initiatives. This has the potential to lead to the empowerment of local communities.

1.6.5. Research Question Five.

How effective are the "organic" and "bottom up" approaches to PPGIS, as designed and implemented in this research, compared to other methodologies?

There are a large number of techniques and technologies to support participatory processes in community development and planning such as public hearings and meetings, presentations, citizen panels, citizen juries and consensus conferences (Vindasius, 1974, Talen, 2000, Kenyon, *et al.* 2001 and Niemeyer and Spash, 2001). This research explores the new technique of grassroots PPGIS used in an organic, bottom up and innovative approach. Grassroots GIS as introduced into the Tallaght community, sheds light on the important issues of applicability, legitimacy, appropriation and sustainability of GIS and ICTs use in the local context, which will be discussed.

1.7. CONCLUSIONS

This research is designed to study in greater detail new information tools, particularly GIS, as they are used in practice by community based organisations in local community settings. This research will answer important questions on the nature, quality and usefulness of the various kinds of data available and readily employed in the context of community development. Additionally, the methodologies used to collect, store and communicate information provided by the community and other sources are examined in detail. This research will determine the extent to which the tools of grassroots GIS support and empower local residents and the workers in CBOs in the local setting.

The detailed exploration of the access to and dissemination of digital spatial information by local actors through the use of a grassroots PPGIS will contribute to the fields of planning, community development and GIS. The importance of accessing and disseminating information in the processes of community development cannot be underestimated. Public Participation Geographic Information Systems (PPGIS) and Information and Communications Technologies (ICTs) have the potential to affect positive change in the communities and organisations that choose to use them.

CHAPTER 2: AN INTRODUCTION TO PARTICIPATION AND GIS

"It is a grave situation when a citizen can't participate for that citizen sinks further into apathy, anonymity and depersonalisation. The result is that he comes to depend on public authority and a state of civil sclerosis sets in."

(Alinsky, 1972: XXVI)

2.1. INTRODUCTION

This chapter provides definitions and background information through a review of the relevant literature on public participation, planning, and GIS. This chapter looks at the importance of public participation and the different types of data, both formal data and local knowledge, employed in PPGIS as they are currently implemented. Additionally, recent developments in computing and GIS are reviewed in this chapter providing a perspective on the issues impacting GIS use and uptake, namely, access, ease of use and costs. These developments are closely associated with the spread of computer technology in our society, which is also explored. An examination of these topics provides a backdrop to the research undertaken herein on the design and implementation of grassroots GIS in community settings.

2.2. PUBLIC PARTICIPATION

2.2.1. The Importance of Public Participation

It is useful to define "public participation" which makes up one of the two constituent elements of PPGIS. The term public participation has been applied to a broad array of concepts, practices and ideas within both the planning and GIS research communities. The term is widely used in modern democratic societies and can include everything from voting in national and local elections to public input into policy debates, planning decisions and individual membership in community groups. Coppock recognises public participation as an evolving concept that is clearly shown to be a complex subject with issues that are rarely clear-cut (Coppock, 1977: 203). He goes on to state that it is easy for politicians to accept the importance of the concept of participation but that it is difficult to implement in practice. To Coppock, "The form it takes will be determined by the ways in

which politicians and officials view their respective roles and the effectiveness with which they perform them." (*Ibid.* 208).

Healey, a prominent UK planning theorist, captures the importance of public participation from the point of view of planners and elected officials in her "*Collaborative Planning in a Stakeholder Society*" (1998a). In it she states, "One of the main reasons for widening involvement in the process of policy development and delivery is that public officials and professionals lack sufficient knowledge about the qualities of places, about problems, potential solutions and about how to make policies work effectively." (Healey, 1998a: 1539). Healey sees a close connection between participation and planning. The importance of participation is revealed as a means to collect information and make the system of planners, plans and government policies run more effectively. Healey's statement also acknowledges the importance of local knowledge and information to the planning process.

For the purposes of this research, the term public participation refers specifically to neighbourhood residents providing information to local projects for various community-building purposes and activities. This participatory information can include comments, opinions and other forms of local knowledge, which are often of value to the planning process but which may be neglected by traditional information gathering exercises, such as, public forums, hearings, roundtables and surveys. Within planning theory and practice, the concept of public participation is widely developed and can be used to support grassroots GIS and community development activities.

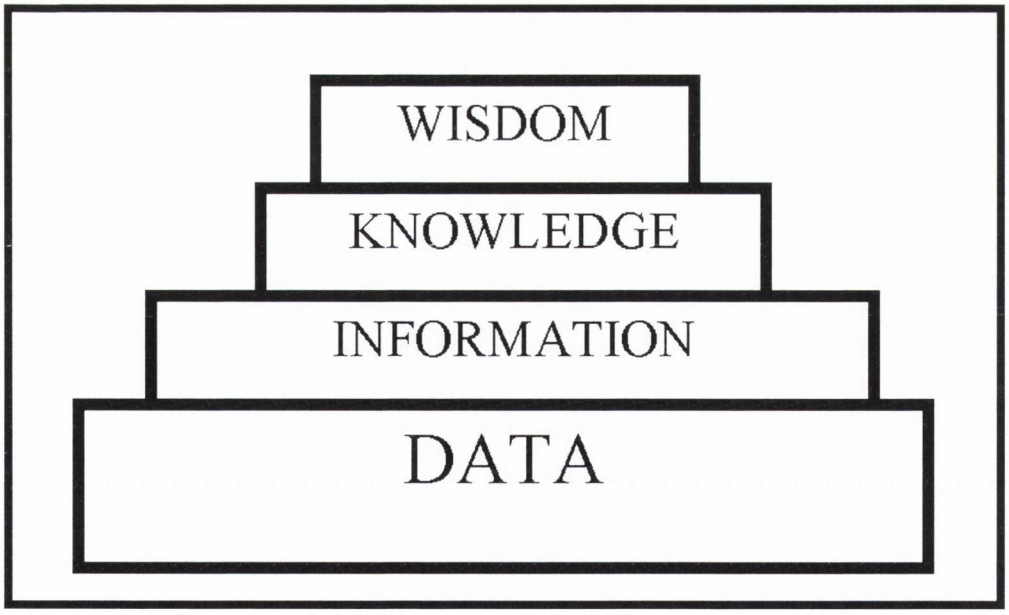
2.2.2. The Importance of Information

The importance of information and of access to information by the public is highlighted by numerous researchers in the fields of planning, GIS and community development. The importance of the dissemination of relevant and up-to-date information is always held up as a given in these fields. However, providing access to information is seldom explored in sufficient detail to satisfactorily answer several important questions. Questions have been raised regarding how information is stored, accessed, modified and retrieved (Shiffer, 1995), who controls the information (Forrester, 1989) and how it is used in planning and community development (Innes, 1998).

Information is a widely used term that is important to define. GIS has as one of its basic concepts the storage and retrieval of information. Information is a vital component within PPGIS, GIS and other ICTs. The term is also widely used by theorists and practitioners in disciplines such as planning and community development and is a key component of Innes' communicative planning theory (Innes, 1998). Information can be broadly defined for the purposes of this research as the "facts" that are utilised within a community for the purposes of planning and community development. These facts include descriptions, issues and points regarding specific locations of importance to the members of a community including the physical, social, economic and cultural characteristics of a place.

Information can be derived from "raw" data including spatial data. When data are accessible facts and information can be derived for them. Information can then be used to create knowledge. Knowledge when it is applied to solve problems is called wisdom. Thought of in this way, information is situated in a continuum from data to wisdom. Decker sees information as the second layer in a "data to wisdom pyramid" (Decker, 2001: 5), (Figure 2.1.).

Figure 2.1 The Data, Information, Knowledge, Wisdom Pyramid.



Adapted from: Decker (2001).

Decker defines data as the term used to describe basic facts. He uses elevation as an example, which describes height above sea level and is one of any number of physical variables or data associated with a particular point on the earth's surface. Data are the

bottom rung; the foundations or building blocks needed for the generation of information. To Decker, data are less significant than information, which is the element that you, "really need and bother to stop and read." (Decker, 2001: 4). Information is similarly less important than knowledge and knowledge less so than wisdom. This forms a data to information to knowledge to wisdom pyramid or hierarchy.

The data to wisdom pyramid as described by Decker (2001: 5) involves several progressive steps. In the first step data are located or collected and then converted into information. In the second step information becomes knowledge when it is understood and interpreted or in other words, "By analysing and synthesising information, we generate knowledge." (Laurini, 2001: 42). To Barndt, the importance of knowledge is that it is translated into decision support for informed choice (Barndt, 2002: 348). Researchers in the areas of public participation, planning, community development, GIS and PPGIS have recently begun to recognise and incorporate different forms of data, information and knowledge into their research and planning projects. Referred to for the purposes of this research as formal data, local knowledge or informal data they are the constituent elements of PPGIS.

2.2.3 Formal Data

Formal data can be defined as official government, scientific and other data derived from "standard" sources or from "top-down" perspectives. National mapping agencies, national statistics offices, environmental agencies, national and local governments and international agencies and institutions are but of few of the organisations that collect, maintain and disseminate formal data. Formal data can be disseminated in the form of official government statistics, data and maps or other means. These formal data sources also include those of the scientific establishment, which use a rational, empirical and instrumental approach to the study of the world and the objects that are contained within it. These sources of formal scientific data often discount the human experience and "non-scientific" knowledge.

With regards to the inclusion of different types of data within a PPGIS, it has been suggested that formal data types including those containing information on the environment have been given greater emphasis due to the ease of capturing physical

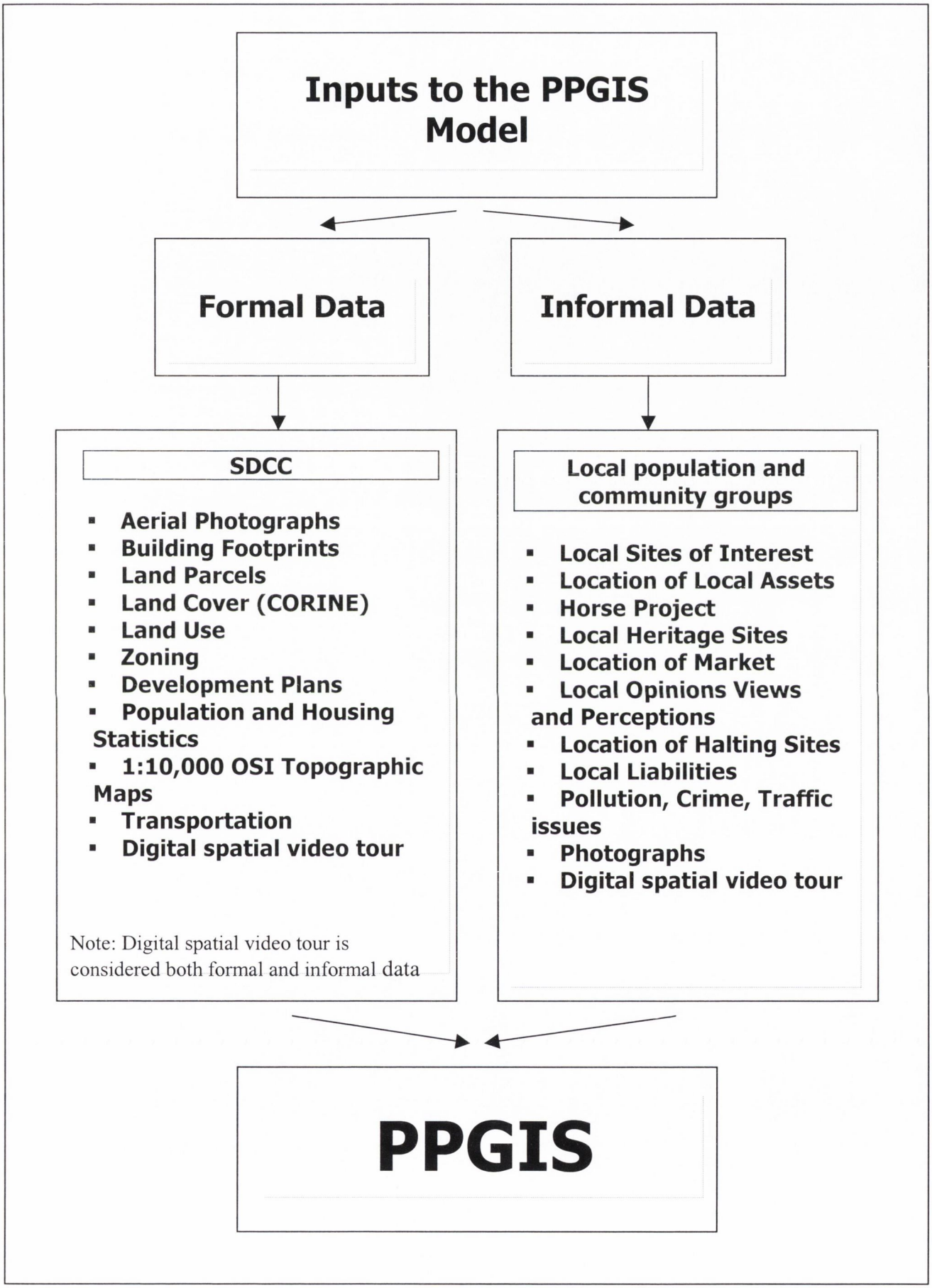
objects relative to the more complex forms of cultural or societal phenomena (Harris and Weiner, 1998: 70). The grassroots GIS for Tallaght has incorporated within it numerous formal datasets including those that are derived through remote sensing, Computer Aided Design (CAD) and national census and planning surveys. Figure 2.2 contains a listing of the various datasets incorporated into the Tallaght grassroots GIS (Haughey and Rybaczuk, 2002). The biases introduced through the over representation of formal data in PPGIS are potentially ameliorated through the inclusion of local knowledge and informal data.

2.2.4. The Concept of Local Knowledge Introduced

Local knowledge is a term widely used in a variety of fields. The term is often used in the PPGIS, GIS, planning, information systems, community development, sustainable development, public participation and environmental management research literatures. Local knowledge encompasses a wide range of types of information derived from non-traditional sources. Examples of the sources of these data include: indigenous peoples in developing areas and neglected and disadvantaged populations such as those who live in inner cities or poor people, the young, disabled and women. Additionally, Curry states that there is an under representation in current GIS models of those who do not have a real attachment to place such as non-property owners, transients, the homeless, undocumented workers and gypsies (Curry, 1998: 144).

Taken broadly, the term local knowledge captures the contributions of those not of the established order. Ball describes it as "native knowledge" and states that the value of "native knowledge" should never be underestimated (Ball, 2002: 89). The term has also been described as "tacit" or "lay" knowledge by Selman (2000: 113) who focuses on different types of knowledge networks including social ones and those of local actors, issues and policies. He recognises the importance of local knowledge and the fact that this type of knowledge is often ignored by the scientific and government sectors charged with decision making.

Figure 2.2: Data Inputs to the PPGIS Model, Formal Data and Informal Data



Some of the difficulties with the incorporation of local knowledge into GIS have been outlined in the literature. Harris and Weiner (2002: 256) attribute several interesting characteristics to local knowledge. They state that local knowledge is:

- **Spatially Imprecise**
- **Qualitative**
- **Cognitive**
- **Visual**
- **Graphical**
- **Aural**
- **Narrative**
- **Socially Differentiated Information**

These characteristics combine to create issues and difficulties with regards to the capture, storage, analysis and dissemination of local knowledge. Additionally, many from the scientific community call into question the veracity of these types of data. Finally, for the designers of PPGIS the answers to these questions as well as questions on how and for whom the final map and data products are used are of great importance.

Innes (1998) outlines the value of many kinds of information in her "*Information in Communicative Planning*". She acknowledges the importance of scientific knowledge but states that it is not privileged. To Innes, consensus-building exercises require scientific knowledge and technical information that has to, "meet demanding standards of scientific acceptability and agreement among experts holding different values" as well as be, "socially meaningful, appropriate for the context, and practically useful." (Innes, 1998: 58). In her research on socially meaningful, contextual and practical data Innes has identified five types, they are:

- **Technical, formal or scientifically validated information that participants can use to argue, persuade, determine the nature of the problem, or decide what strategies might work**
- **The participants own experiences**
- **The stories participants tell**

- **The images and representations used in discussions that influence the framing of the problem and thus the direction of action**

- **The intuition of the participants, their personal sense of the situation and of the other participants**

These can be considered types of local knowledge or informal data that "science has not yet caught", (*Ibid*), and not the anecdotal and unscientific reports that some critics make them out to be.

Finally, with regard to local knowledge, Meredith, *et al.* (2002: 212) in their review of the importance of data selection to the success of PPGIS, place an emphasis on "non-conventional" data. They state that these data need to be codified and communicated by GIS technicians in their call for the inclusion of local knowledge. There are many terms used to describe local knowledge in the research literature. No single definition of local knowledge is appropriate for all the contexts in which it is found. However, the definition below is suitable for grassroots GIS as implemented in community settings.

For the purposes of this research, local knowledge refers to the data that are derived from the individuals and non-governmental organisations participating in PPGIS projects. These datasets or themes within the PPGIS contain points of interest to community members including: historical references, community assets, issues, problems, opinion and concerns. They take the form of standard points, lines and polygons within the PPGIS as well as multimedia, text, photo and video objects. This local knowledge can also be referred to as "informal data" once it has been transferred into the PPGIS through the process of data entry or digitalisation.

2.2.5. Informal Data

Informal data can be defined as information derived from community local knowledge through data entry, conversion or digitisation. In digital form these datasets can consist of image, text or multimedia data and are often converted to standard vector and raster GIS data themes. However, the integration of these data into a GIS can prove difficult and there are many issues concerning their use.

Barndt states that, "data are often a weak reflection of reality." (Barndt, 2002: 349). To Barndt, data are only valuable to the extent that they challenge the myths about a community by the facts represented in the data. Challenging myths as well as creating myths can be accomplished through the inclusion of informal data, local knowledge and human perceptions into a GIS. To Barndt, however, local perceptions may be different from reality. They may also be different from the formal data collected by government agencies, which has important ramifications for those using these types of data. Figure 2.2 contains a listing of informal data included in the Tallaght PPGIS.

Another important issue regarding these types of data involves representing knowledge, which may not conform to scientific models of "truth" in a GIS. This poses ethical questions for many and runs counter to the pursuit of accuracy, comprehensiveness, quality and error minimisation that concern cartographers, planners and GIS theorists and practitioners alike. Similar critiques and other ethical considerations and dilemmas faced by many planners with regards to GIS can be found in the works of Onsrud (1995) Crampton (1995) and Miller (1995). It is important that the designers and users of PPGIS and GIS are aware of these issues and the problems associated with the use of formal and informal data or local knowledge.

2.3. GEOGRAPHIC INFORMATION SYSTEMS

2.3.1. What is (are) GIS?

It is valuable to define and explore GIS and spatial information technologies, as they are understood in the literature. There are many definitions of GIS. In most instances the acronym "GIS" is plural and stands for Geographic Information Systems. In defining GIS Goodchild states, "most (definitions) identify a database in which every object has a precise geographical location, together with software to perform functions of input, management, analysis and output. Besides geographical locations, the database will also contain numerous attributes that serve to distinguish one object from another and information on the relationships between objects." (Goodchild, 1995: 35).

Recently GIS have been divided into two major types. The first, referred to as first generation GIS or GIS/1 can be considered part of the large number and variety of ICTs

employed for many purposes by government, industry and other organisations for the collection, storage, analysis and dissemination of digital spatial data. Second generation GIS or GIS/2 seek to meet the needs of expanded access to geographic information for more participatory kinds of activities as well as for personal use (Nyerges, *et al.* 1997: 225).

Definitions of GIS can depend on the use and context into which the technology is implemented. Heikkila (1998) thoroughly reviews the definitions of GIS that "abound" and offers as the most prominent those of the U.S. National Center for Geographic Information and Analysis (NCGIA) and the Environmental Systems Research Institute (ESRI). He calls the NCGIA definition, "crisp, functional and to the point, with an implicit focus on the software itself and how that software is used to interact with spatial data." The NCGIA (1990) definition states, "GIS can be seen as a system of hardware, software and procedures designed to support the capture, management, manipulation, analysis, modelling and display of spatially-referenced data for solving complex planning and management problems." (Heikkila, 1998: 351).

ESRI (1990), founded by Dangermond, defines GIS as an, "organized collection of computer hardware, software, geographic data and personnel designed to efficiently capture, store, update, manipulate, analyse and display all forms of geographically referenced information." (Heikkila, 1998: 351).

Dangermond (1990: 203) states that GIS has five elements:

- **Computer Hardware**
- **Computer Software**
- **Data**
- **Personnel to run the system**
- **A set of institutional arrangements to support the other components**

With regards to ESRI's definition, Heikkila states that it, "has a more diffuse less software centered focus, and explicitly includes personnel, hardware and data within its purview." Heikkila also reviews the definitions of other authors, "shorthand" and "product" definitions as well as definitions for professional planning and scholarly use in his work.

It is the scholarly use definition that is modified for use in this research. In its original form, this scholarly definition states, "GIS is a modelling tool integrating spatial and non-spatial elements." (Heikkila, 1998: 351). The modified definition for the purposes of this research defines GIS as follows. "Geographic Information Systems are computerised mapping and database systems capable of integrating various types of data with both spatial and non-spatial elements." This definition accounts for the uses and methods of GIS/1 and GIS/2 as well as for the inclusion of formal, informal data and local knowledge into many GIS and PPGIS.

With regards to the definition of GIS in the context of planning, Innes and Simpson, leading theorists and practitioners in the planning field state, "GIS, at present are ambiguous, as many groups, including planners, compete to define their purposes, and technicians design for different perceptions and objectives." (Innes and Simpson, 1993: 231). Similarly, Levine in a personal communication to Innes and Simpson on the definition of GIS points out that, "GIS could, like the combustion engine, become part of a wide range of applications in a broad array of contexts and that their definition might not become narrow." (*Ibid.* 235). It is clear from this introduction that the definition of GIS is not "narrow".

The different types of GIS and the uses and contexts into which they are implemented does not allow for an easy definition. GIS like the Information and Communications Technologies (ICTs) in Castells' research, "can be used, in the pursuit of different social and functional goals, because what they offer, fundamentally, is flexibility." (Castells, 1999a: 348). This flexibility is inherent in the simplicity of the representation of real world objects in digital form in GIS. This flexibility is also inherent in grassroots GIS, which is defined as community owned and supported GIS for the pursuit of social goals through the use of spatial information technology.

2.3.2. GIS Issues and Developments

In this section three major issues identified in the literature with regards to the uptake of GIS in the fields of planning and community development are reviewed. To summarise, the three major issues are:

- **Lower Costs**
- **Better Access**
- **Increasing Ease of Use**

These are similar to the forces and issues driving the spread of computers and ICTs in society as a whole. The first of these issues is the availability of new, low cost, powerful computers. These are seen as key requirements for local community GIS and PPGIS projects. The second issue is identified as better access, to data, particularly inexpensive spatial data, as well as access to training and the Internet. The third issue is recognised as the increasing ease of use of GIS and ICT hardware and software. Little attributes these trends to the "ubiquity" of the base information system technology, which means that access, "does not depend on large investments, or on esoteric technical skills - a point sometimes missed in otherwise justifiable criticism of technological optimism." (Little, 2000: 1822). These points are explored in greater detail in the next sections.

2.3.3. Lower Costs

It has been well documented that the computer industry has been able to produce increasingly powerful computer chips at lower costs, thus driving the spread of computer hardware and associated software throughout society. Every eighteen months computer microchips double in performance at a given price, according to the generally acknowledged "Moore's Law". This law is named after Gordon Moore the former Chairman of Intel Corporation, "the world's largest and one of the most profitable firms in microelectronics." (Castells, 1996b: 39). Moore's Law has also created the phenomenon of "built in obsolesce" with regards to computer hardware and software. Software firms develop increasingly sophisticated and computer resource dependent software applications to avail of the new processors, which makes the older software obsolete. Unfortunately, (or fortunately for Wintel – the Microsoft Windows, Intel monopoly on the consumer computer market), new hardware must then be purchased to avail of the increasingly powerful new software applications.

Many have benefited from the advancements in computer and information system technologies, however. In the planning literature, the changes brought on by the lower cost of computer hardware and software have been well documented (Hughes and

Schirmer, 1994, Doyle, *et al.* 1998, Talen, 2000 and Aitken, 2002). Doyle *et al.* point to the less extensive employment of physical models due to the "increasingly more powerful desktop computing with constantly improving graphics capabilities, available at modest financial cost to individuals and agencies alike." (Doyle, *et al.* 1998: 138).

To Dangermond (1990: 203), GIS hardware and software should be "off the shelf" technology and the least critical elements in terms of cost and ensuring reliable results. He sees data as the most costly elements within GIS especially if data collection costs are included. Dangermond (2002: 304) points to the millions of dollars in grants to local governments and agencies as well as donations of software, data, training and ongoing technical support and support services from many GIS corporations and developers, including his own. These "community demonstration projects", software grants and free packages can be considered a tactic employed by ESRI and other GIS software vendors to increase market share by "hooking" potential future clients thus undermining the competition.

Many educational and non-profit organisations have benefited from donated software, corporate grants and free technical support. It was through the development of commercial applications of GIS that the potential to provide the technology to a wider user base was realised. GIS in grassroots settings rely on inexpensive hardware and user-friendly commercial software. Many "low budget" systems have been implemented incorporating advanced computer and multimedia components, (Hughes and Schirmer, 1994). Others rely on local knowledge, which can be less expensive and easier to input, (Talen, 2000) or newly available low cost digital data (Mason, *et al.* 1997: 189). These developments in conjunction with the spread of computers and ICTs throughout society have allowed GIS to filter into many organisations not traditionally thought of as users of spatial information technologies.

2.3.4. Better Access

Another issue alluded to in the literature on the applicability of ICTs and GIS within the planning and community setting is access. Leitner, *et al.* (2002: 38) recognise that groups often depend on the openness of government agencies and freedom of information regulators as well as local expertise availability and financial considerations, specifically

for the purchase and maintenance of hardware and software. Access in this context is broadly defined and refers to information, resourses and expertise.

Walker, *et al.* (2002) see several issues to support the effective participation of stakeholders in planning processes including: access to information, access to the analytical tools to use the information, the capability to use the tools and datasets and a legislative and institutional environment that fosters effective participation (Walker, *et al.* 2002: 137). Carver, *et al.* explore access to information and the related issues of accountability and trust with regards to PPGIS (Carver, *et al.* 2001: 919). They also note the increasing numbers of users with access to the Internet and the important implications that has for planning and GIS (*Ibid.* 917). It could be said that the more people with access to the Internet and computers, the more potential users there will be for GIS technologies. However, Harris and Weiner state that the trends of more access to and dissemination of GIS through web publications are being countered by increasing privatisation of the technology and restrictions on public access to data. (Harris and Weiner, 2002: 68)

These developments are generally portrayed as positive. However, there are questions attached to this assumption, which demonstrate the dual nature of the technology. In this respect, Elwood specifically identifies the changes that are fostered by the use of GIS in community based organisations along three different axes in her, "*GIS use in community planning: a multidimensional analysis of empowerment*" (Elwood, 2003). She identifies distributive, procedural and capacity-building dimensions of GIS use and the simultaneous empowering and disempowering aspects of the technology in these areas.

To Elwood, it is important to recognise the effects of GIS use, "at different scales of interaction, and for different social groups participating in community planning and problem solving." (Elwood, 2002a: 919). She calls the impacts, "more uniformly positive" and empowering at the scale of the relationship with the local state in all three dimensions. A negative implication drawn from this is that, "organizations that do not have access to this technology, given the competitive urban political environment in which community organizations try to garner resources and political favor", will subsequently find themselves to be at a disadvantage (*Ibid*).

2.3.5. Ease of Use

The increasing ease of use of GIS technology has been identified in the literature. Heikkila notes that, "what one does observe over the long-term is a steady gain in both the capabilities and the ease of use of computer systems in general." (Heikkila, 1998: 358) He predicts that these trends will continue as the systems become more widely available. Craig *et al.* state with regards to GIS technology that it is, "possible for children in elementary school to use it effectively." (Craig *et al.* 2002: XXI). The benefits of these changes according to Barrett and Philip include the freeing of users from specialists (Barrett and Philip, 1984: 26).

On the other hand, Monmonier posits the claim that, "because of powerful personal computers and "user-friendly" mapping software, map authorship is perhaps too easy, and unintentional cartographic self-deception is inevitable." (Monmonier, 1991:123). Ghose still questions the elitist and anti-democratic nature of GIS technology, "by virtue of its technological complexity and cost." (Ghose, 2001: 141). There is also the paradox of the democratising, counter-technocracy trends in more powerful, less expensive and easier to use systems that go, "hand in hand with a centralisation of the geographic modelling programming that under pins the GIS." (Obermeyer, 1995: 78).

In general however, the trends of lower costs, better access and ease of use of ICTs bode well for the use of GIS and PPGIS by community organisations. Little is optimistic for the future and recognises the role that new inexpensive and user-friendly ICTs are playing towards the valuable concept of "information justice". Little states, "The growing maturity of the contributing technologies means that relatively stable standards are emerging, allowing both commodification (and consequent cost reduction) of components and the diffusion of appropriate technical literacy and skill among the general population." (Little, 2000: 1822). If the general population develops higher levels of computer skills then the successful use of ICTs including GIS in community settings can potentially be increased.

2.4. CONCLUSIONS.

The field of GIS is evolving rapidly in our society. Much of this rapid evolution is closely associated with advances in computer technology and the Internet and their uptake by individuals and organisations. It is in this context of rapid change that we see the growth of PPGIS. This introduction has focused on defining participation and GIS, understanding the commercial origins of the technology and shedding light on current developments impacting GIS use. These current developments are identified as access, ease of use and costs, which are closely associated with the spread of computers in our society.

It was through the development of the commercial applications of GIS that the potential to provide the technology to a wider user base was finally realised. GIS in grassroots settings rely on inexpensive hardware and user-friendly commercial software. Many "low budget" systems have been implemented incorporating advanced computer and multimedia components (Hughes and Schirmer, 1994). Others rely on local knowledge, which can be less expensive and easier to input (Talen, 2000). These developments in conjunction with the spread of computers and ICTs have recently allowed GIS to filter into many organisations not traditionally thought of as users of spatial information technologies including NGOs and CBOs involved in community development activities. Defining GIS and outlining the importance of public participation and the different types of information used in various participatory processes provides important background information to this research. A detailed examination of the PPGIS research literature is undertaken in the next chapter.

CHAPTER 3: LITERATURE REVIEW: PUBLIC PARTICIPATION GEOGRAPHIC INFORMATION SYSTEMS

"All men by nature desire knowledge."
(Aristotle, 384 B.C. to 322 B.C.)

3.1. INTRODUCTION

This chapter is divided into several sections, which introduce and trace the evolution of Public Participation Geographic Information Systems (PPGIS). These sections contain a complete and up-to-date review of the PPGIS literature and an examination of the models or categories of PPGIS projects. The three major models or perspectives identified in the literature are: Planning and Participation, Community Development and Geographic Information Systems, respectively. These three categories serve to organise the models identified in the literature into an appropriate and explanatory framework helping to provide a better understanding of the subject matter.

This chapter places particular emphasis on the access to spatial information in the areas of planning and community development through the use of PPGIS as they are currently implemented. This literature review also contains a detailed review and critique of the current research. This review is not intended to be all-inclusive. Many PPGIS projects are unpublished and there are a large number and variety of them. One study alone identified some sixty-five PPGIS-related projects in forty-eight cities in the U.S. alone (Sawicki and Peterman, 2002: 31). The "Glossary of GIS Models" contained in Table 3.1 lists the various PPGIS projects reviewed for this research and gives some idea as to their number, extent and variety.

The literature in the area of PPGIS reveals many university research efforts, government initiatives and private consulting projects on the topic. Many have as their primary focus the inclusion of public views and opinions within the context of formal governmental planning processes. Descriptions of the use of new and innovative technologies and the

Table 3.1. Glossary of PPGIS Models

Acronym	Name	Author (s)
*NA	Arguemaps	Rinner (1999)
NA	Asset Maps	Kretzman and McKnight (1993)
NA	Barefoot Mapping	Berg (1988)
NA	Bioregional Mapping	Ball (2002)
BUGIS	Bottom-Up GIS	Talen (2000)
*NA	Community Cartography Projects	Towers (1997)
CIGIS	Community-Integrated GIS	Harris and Weiner (1998)
CIS	Community Information Systems	Ghose (2001) and Barndt (2002)
*NA	Counter Mapping	Stonich (2002)
CPP	Community Planning Projects	Dufour and Haughey (1998)
CPS	Collaborative Planning Systems	Shiffer (2002)
CRIC	Collaborative Resource Information System	Walker, *et al.* (2002)
CSCW	Computer-Supported Co-operative Works	Dourish (1999)
CSDSS	Collaborative Spatial Decision Support Systems	Karimi and Blais (1996)
CTCs	Community Technology Centers	Servon and Nelson (2001)
EGIS	Equitable Geographic Information Systems	Christman (1987)
EMAPS	Electronic MAPS	Han and Peng (2003)
*NA	Equity Maps	Talen (1998)
FS	Future Search	Weisford and Janoff (2000)
gIBIS	Graphic Issue Based Information System	Conklin and Begeman (1988)
GIS/2	Second Generation GIS	Nyerges, Barndt and Brooks (1997)
*NA	Groupware	Various authors
IBIS	Issue Based Information Systems	Kunz and Rittel (1970)
IGIS	Intuitive GIS	Mark and Egenhofer (1996)
ITV	IT Visioning	Borelli and Fernandez (1998)
KMS	Knowledge Management Systems	Wasco and Faraj (2000)
MUSIC	Multi User Sessions in Community	Shaw and Shaw (1995)
NIS	Neighbourhood Information System	Kellogg (1999)
ODGIS	Ontology Driven GIS	Fonseca, *et al.* (2000)
PGIS	Perceptual Geographic Information Systems	Talen (1999b)
*NA	Parish Mapping	Clifford (2000)
PFR	Planning for Real	Neighbourhood Initiatives Foundation
PPGIS	Public Participation Geographic Information Systems	Various authors
PSS	Planning Support Systems	Various authors
PPVis	Public Participation Visualization	Krygier (2002)
RGGIS	Resident-Generated GIS	Talen (1999)
SUDSS	Spatial Understanding and Decision Support System	Jankowski and Stasik (1997)
UPPGIS	Unassisted PPGIS	Ball (2002)
UGISs	Urban Geography Information Systems	Laterasse and Pauchard (1995)
UGIS	Urbanizing Geographic Information Systems	Casey and Pederson (1995)
VA	Village Appraisal	Ball (2002)

*NA Not Applicable

technical specifications of the individual information systems are also prevalent in the literature. These aspects are important to PPGIS and will be considered within this research to the extent that they shed light on and inform the community building or community networking implications of grassroots GIS. It is important to consider that this research seeks to design and implement PPGIS in a new way, which includes an emphasis on local community and "bottom-up" or "grassroots" initiative. These local considerations are largely unexplored by the GIS, planning and community development research communities.

3.1.1. Defining Public Participation Geographic Information Systems

"Public Participation Geographic Information Systems" are defined by the U.S. National Center for Geographic Information and Analysis (NCGIA) as follows: "The term Public Participation GIS can be applied to significant information technology projects providing community information to community groups. These projects contribute to public participation in community decision making by providing local area data to community groups. These projects may also offer analysis of data via reports, maps etc. and can become a valued source of local level spatial information." (NCGIA, 1998).

The first usage of the phrase "Public Participation GIS" is attributed to Xavier Lopez of the University of Maine. During planning sessions for the University Consortium for Geographic Information Science (UCGIS) Annual Assembly in 1997, Lopez suggested using "Public Participation" in the title of a workshop on how to improve access to GIS among Non Governmental Organisations (NGOs) and individuals (Schroeder, 1997: 2 and Obermeyer, 1998: 65). The term became widely adopted, most notably by the NCGIA, which sponsored workshops and funded additional research projects on the topic. This NCGIA sponsored research was published in Craig *et al.* "*Community Participation and Geographic Information Systems*" (2002), a key reference source on the topic of PPGIS.

Within the small group of researchers funded by the NCGIA, the term PPGIS eventually expanded from a term coined to, "represent the vision of those interested in the socio-political contributions of GIS to communities", to include GIS tools easily used, understood and available to all in public policy debates and as real time aids to debate in public hearings (Barndt, 1998: 105). The term was also used as a challenge to GIS and

database software developers to open up the market for more "user-friendly" and less expensive products, services and applications (*Ibid*). Notably, the recent availability of more "user-friendly" software as well as new improved access to public domain and inexpensive datasets have been important factors contributing to an increasing number of PPGIS projects.

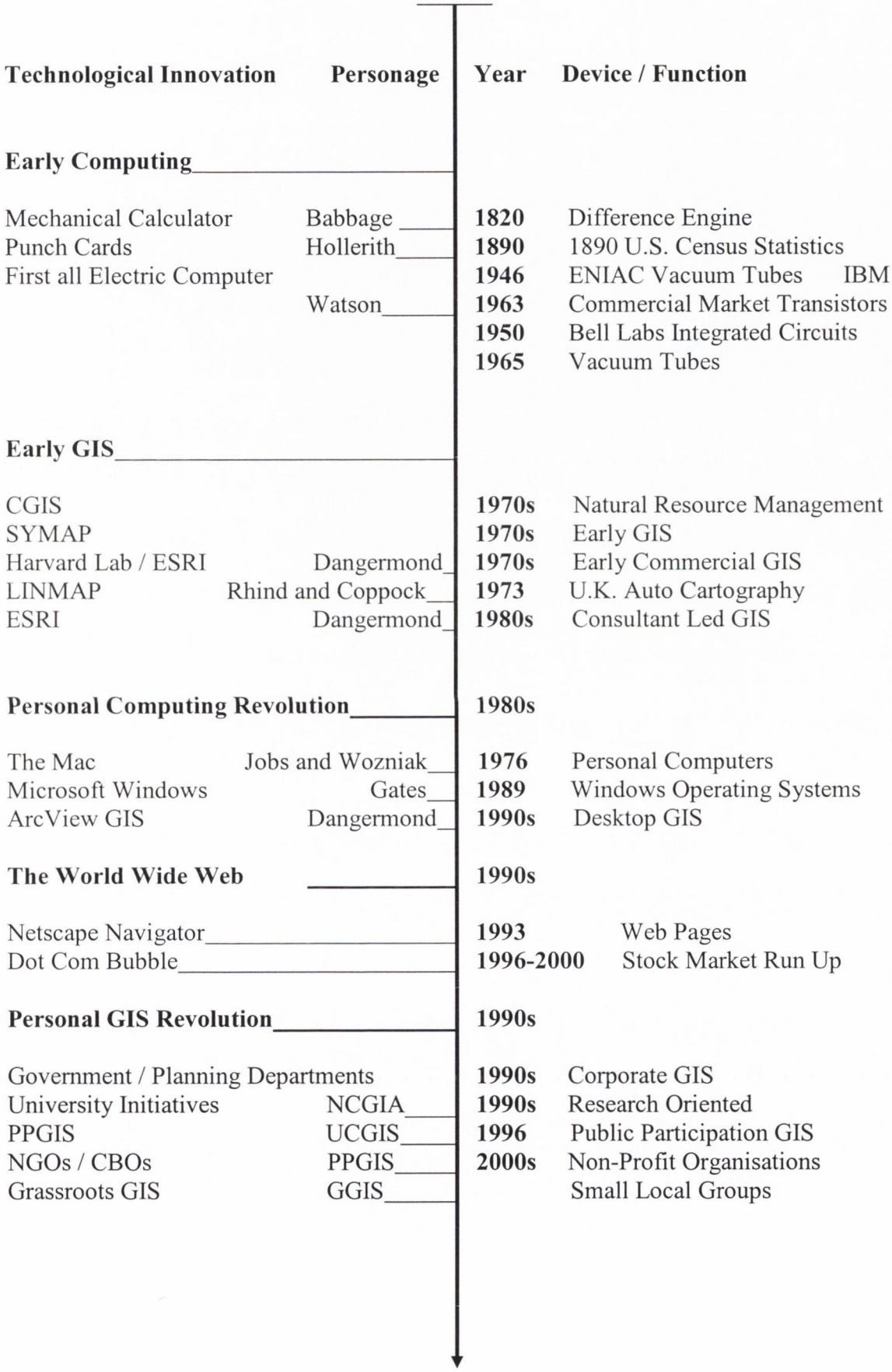
It is in this context of change and with an impetus from various researchers, civil servants and consultants that we see the growth of PPGIS. Efforts to delineate the meaning and usage of GIS technologies from these different perspectives and in various contexts are ongoing as is the study of their impact on society. Defining PPGIS is an important introduction to this field of study and the research undertaken in this dissertation. It should be noted, however, that the definition of PPGIS varies depending on the perspective and context into which they are implemented.

PPGIS research did not evolve spontaneously or in a vacuum, rather, it evolved out of two separate fields of study, namely, those of Planning and GIS. The GIS community has borrowed heavily from the theories and practices of planners in the design and implementation of PPGIS. This is reflected in many areas including the origins of the term "PPGIS", where the term public participation was selected because of, "its use and familiarity among planners, who also have a long and close affiliation with GIS" as described by Lopez in Obermeyer (1998: 65). These close and symbiotic relationships between the fields of planning and GIS as well as community development are a recurring theme throughout this research and are explored in detail subsequently.

3.1.2. The Development of Participatory Information Systems

Prior to the early 1990s when the term PPGIS was coined there were a number of GIS projects with strong participatory elements. The timeline in Figure 3.1 provides an overview of the evolution of PPGIS and places them in the context of other major developments in computing and GIS.

Figure 3.1. GIS Research Context Timeline



Major developments in the evolution of PPGIS follow closely those of the computer industry, software and hardware innovations and the development of the Internet. None of these technologies would have come into existence without the pioneering efforts of many of the early innovators in the fields of mathematics and engineering. The timeline in Figure 3.1 also helps to put these developments into perspective.

In the early 1970s, the development of the commercial applications of the technology in the form of computer assisted cartography and the uptake of GIS by planners and other government agencies helped them diffuse widely throughout the government sector. With the advent of the personal computer and the Internet, GIS applications were situated to become a tool used by a variety of commercial industries, educational and other organisations and individuals. The initial developers of GIS technology did not foresee the variety of these applications or types of users.

Research articles on the early developments of GIS in participatory settings are few and far between. The Urban and Regional Information System Association (URISA) journal is an important source of this literature. The journal contains several articles specifically addressing efforts to develop community based participatory information systems. The *reason-de-artre* of URISA is urban information systems and articles published by the journal span the entire evolution of participatory applications and include inner city, non-profit and community group access to computers. Sawicki (1996: 514) reviews the early and groundbreaking literature in his search of the relevant periodicals, (mostly URISA), since 1960. Focusing entirely on the U.S., these efforts include community based census analysis, "geocoding" and the use of databases for planning, community development and historic preservation projects.

Laurini traces the development of Issues-Based Information Systems (IBIS) from the 1970s to their most recent incarnations as models using "hypermaps" in "*Information Systems for Urban Planning: [A hypermedia co-operative approach]*" (Laurini, 2001). Laurini also reviews "*gIBIS*" (Graphic Issues-Based Information Systems) and "*Arguemaps*", as developed by Conklin and Bergeman (1988) and Rinner (1999) respectively, (Laurini, 2001: 167-173). These computerised information systems allow for the establishment of debating positions that can be justified or attacked through arguments by opponents. The debates or arguments are displayed as graphical elements such as links

attached to textual information. Employed by planners they are used for collaborative spatial decision making, which can, according to Laurini, help structure the debate between multiple stakeholders in various planning and development controversies. The abilities to structure and promote debates as well as resolve disputes are important considerations for those interested in PPGIS and grassroots GIS.

Laurini's work makes a major contribution to the field. He suggests innovative and participatory approaches to the design of information systems including the bringing of GIS and the "expert" to the user through the use of video-conferencing and audio coaching. These techniques, however, require bandwidth and added production efforts as well as dedicated, highly motivated and trained users. Some of his other insights into system design and technical requirements are more in line with the needs of smaller, non-profit organisations; those for the most part ignored in the literature.

For example, he states that systems should incorporate the following characteristics:

- **They should be relatively inexpensive and run on off-the-shelf personal computers**
- **They should use commercially supported communications hardware and software**
- **They should support unmodified commercial GIS software (Laurini, 2001: 241)**

He also states that no GIS software should be installed on remote computers and that systems should require almost no training (*Ibid*). These characteristics lend valuable insights to the practical considerations of grassroots GIS project design and implementation. Additionally, the incorporation of these characteristics into grassroots GIS can overcome potential difficulties.

Haight and Rubinyi (1983: 113) describe another early participatory community information system, the Electronic Information Exchange System (EIES). Consisting of software used in office automation tasks, event scheduling, early electronic messaging and accounting software this system was not widely adopted by the community organisations studied by Haight and Rubinyi. They attributed this to a fear of computers and an "anti-technology bias" among some of the individuals using it, a lack of appropriate information in the system and expensive and not very user-friendly software. Also, the heavy emphasis on office efficiency, commercial applications and the service provider's

aggressive efforts to develop a market in the NGO sector may have reduced uptake of the system (*Ibid.* 115). It was not until more recently that critical research specific to GIS in participatory settings and particularly PPGIS began to appear.

3.1.3. Recent Research

In Pickles, ed. "*Ground Truth: The Societal Implications of Geographic Information Systems*", several researchers critically explore GIS and its use in participatory settings (Pickles, 1995). Harris, *et al.* (1995) implemented a PPGIS in the Eastern Transvaal region of South Africa. This work takes a critical approach to the technology stating that, "GIS utilization for research, planning and project assessment has generally come to be seen as a, "technicist legitimisation of the historical power relations associated with traditional development." (Harris, *et al.* 1995: 197). Aitken and Michel (1995) address issues of power, gender, exclusion and accessibility in GIS. They distinguish between "ownership of a process" and "participation in a process" and recognise that citizens, "may become overwhelmed or intimidated by complex technical processes and rhetoric." (Aitken and Michel, 1995:17). This creates disparities of power between planners, GIS practitioners and those affected by the decisions derived from GIS.

In 1998 Sawicki and Peterman submitted an overview of PPGIS projects to the NCGIA's "Specialist Meeting on Empowerment, Marginalisation and Public Participation GIS". This overview collected information on,

> *"83 organizations... 38 nonprofits, 20 affiliated with universities, 20 government offices and 5 private companies sponsoring some PPGIS related project. These came from 48 cities (Washington D.C. led the list, followed by New York city and several other cities with multiple organizations) and one foreign country."*
>
> (Sawicki and Peterman, 1998: 10)

The work of Sawicki and Peterman is useful as a survey of PPGIS projects in the U.S. However, they fail to detail the activities of non-profit groups using GIS or to distinguish between them, simply categorising them by location. The lack of an international perspective is also a shortcoming, as there is only one non-U.S. project, which is not reviewed in detail. An in-depth review of the PPGIS literature, both in the U.S. and internationally is undertaken in the following sections.

"Community Participation and Geographic Information Systems", (Craig, *et al.* 2002) contains twenty-eight chapters encapsulating the current state and future directions of research, in both practise and theory, in the area of PPGIS. The researchers represented in this work come primarily from the disciplines of geography and planning with the works of anthropologists, computer scientists and community development researchers also represented. Consisting of three parts, the Introduction, PPGIS Case Studies and PPGIS Futures, this book is a valuable resource containing theory and practical community based applications of GIS technology. The PPGIS case study section consists of four groups or models of PPGIS: "Inner City", "Planning", "Environmental Management" and "Development". These models reflect the perspectives inherent in the theories and philosophies of the various disciplines and fields of their authors.

Craig, *et al.* is an important resource for those interested in the theory and practice of PPGIS. Containing the best practice and lessons learned from years of research on various PPGIS cases, it should prove invaluable for those wishing to implement such projects. However, like the work of Sawicki and Peterman (1998), this research is focused primarily on the U.S., arguably one of the most data rich environments. The many lavishly funded and successful PPGIS projects in the U.S. over shadow some of the projects that have met with limited success in other jurisdictions, for example, that of Macnab (2002). The works of Onsrud (1995), Lupton and Mather (1996) and Towers (1997) also explore the technology more critically and reveal additional cases of the outright failure and abuse of PPGIS and GIS.

Additionally, the issues, difficulties and limitations of developing PPGIS in countries without supportive data environments are glossed over in the works of Craig, *et al.* For example, PPGIS in developing countries require the provision of datasets from government, industry or private consulting firms (Harris and Weiner, 2002 and Walker, *et al.* 2002). Others rely on outside support mainly from U.S. foundations and universities, (Kwaku Kyem, 2002 and Laituri, 2002). Outside funding and support can raise questions regarding the objectivity of the research and project outcomes as well as concerns of possible "co-option" by the authorities. These types of questions, issues and concerns are only superficially examined in the case studies contained in the work of Craig *et al.*

3.1.4. The Provision of PPGIS to Community Groups

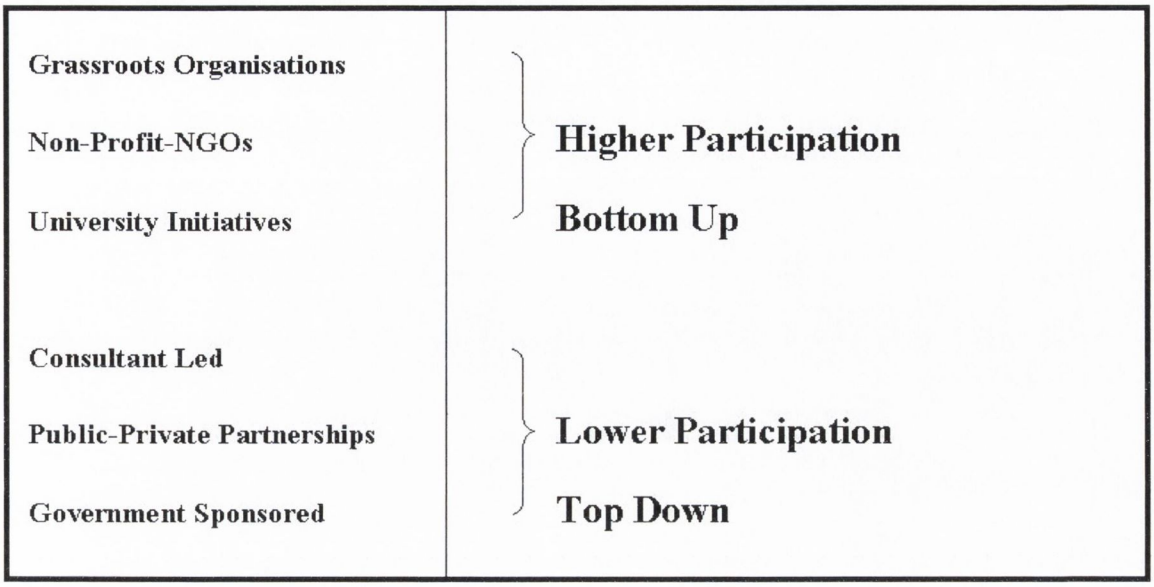
Attempts have been made to categorise the mechanisms for the provision of PPGIS to community groups. Leitner, *et al.* (2002: 41) describes six models for making GIS available to community organisations. These are:

- **In House**
- **University-Community Partnerships**
- **GIS Facilities in Universities and Public Libraries**
- **Map Rooms**
- **Internet Map Servers**
- **Neighborhood GIS Centres**

These categorisations are useful for those wishing to implement community GIS. However, they fail to fully describe the different perspectives, strategies and approaches that PPGIS undertake in various implementation contexts. For a more explanatory schema than Leitner's *et al.* models of PPGIS provision to community groups, see Figure 3.2, which offers a means to categorise the large number and variety of PPGIS projects and strategies and places them in the context of a public participation continuum. This continuum from top-down or less participatory to bottom-up, citizen controlled and more participatory helps shed light on the nature of the provision of PPGIS to community groups.

This continuum of PPGIS project provision progresses from government sponsored to grassroots organisations. Placing projects along this continuum can help explain many of their attributes and establish a framework upon which PPGIS models can be assessed. Although not all-inclusive, this is a useful exercise as it frames PPGIS projects in a schema consistent with the theoretical constructs of participatory planning and community development literature. The next two sections of the literature review will undertake the task of organising and examining the case studies in a more explanatory framework. This will aid in a better understanding of the issues involved with the models of PPGIS designed and implemented in local settings.

Figure 3.2. Continuum of the Provision of PPGIS Models to Community Groups



3.2. MODELS OF PPGIS

Four broad models of PPGIS projects can be identified corresponding to the chapter groupings contained in Craig, *et al.* (2002). They are:

- **Inner City**
- **Planning**
- **Environmental Management**
- **Development**

These PPGIS models are outlined in Table 3.2. This table also includes the strategy and broad underlying perspectives or principles of the model. This categorisation of the PPGIS models offers a means to understand the literature that is more appropriate than the chronological ordering, timelines or the alphabetical listings of authors or case locations undertaken by other researchers. This categorisation aids in the understanding of the types of PPGIS case studies and provides background information and context for this research. However, as a means to gain further understanding of the types of research projects undertaken in the area of PPGIS, the categories in Table 3.2 are limited in many respects.

Table 3.2. PPGIS Project Perspectives and Strategies Identified in the Literature

Category	Strategy	Perspectives/Principles
Inner City	• Resident Generated • Social Network Maximisation • Mapping/Database • Anti-Gentrification • Urban Design/Housing Improvement • Infrastructure Improvement • Employment Schemes • Crime Prevention	• Bottom-Up • Grass-roots Activism • Community Tool • Economic Revitalisation • Empowerment
Planning	• Increase Public Participation • Increase legitimacy in the Planning Process • Communication Maximisation • Visualisation as a Planning Tool • Web-Based	• Top-Down Models • Computer Modelling • Data Analysis
Environmental Management	• Anti-Pollution • Eco-System Protection • Anti-Capitalism	• Sustainable Development • Bio-Regionalism • Local Control
Development	• Focus on Developing Countries • Anti-Poverty Strategies • Ameliorate Injustice • Ameliorate Impacts of Globalisation	• Economic Development • Redistribution of Wealth • Redistribution of Power

The categories contained in Craig *et al.* as illuminated above are not exclusive. The "Inner City" and "Planning" categories contain cases with the characteristics of both models. Additionally, the "Development" category restricts cases to those in developing nations. However, it is clear that the perspectives, principles and strategies used in developing nations are also employed in "Inner City" and "Environmental Management" cases in the developed world (Ball 2002). These and other inconsistencies and conflicts are resolved through a new explanatory PPGIS framework.

3.2.1. A New Explanatory PPGIS Framework

Organising the literature into a new three-perspective framework provides better understanding than the four categories or groupings of chapters in Craig, *et al.* (2002).

The new schema outlined in Table 3.3 is a more useful means to gain understanding and aid in the review of PPGIS as they are currently designed and implemented. The three perspectives are:

- **Planning and Participation**
- **Community Development**
- **Geographic Information System perspectives**

Table 3.3 contains each category and lists the perspectives and principles associated with each. The strategies employed by each model and the authors associated with the particular strategy are also shown. This organisational framework sheds light on important considerations both theoretical and practical for the design and implementation of PPGIS.

Table 3.3. PPGIS Project Perspectives and Strategies

Category **Perspective/ Principles**	**Strategy and Authors**
Planning and Participation • Top-Down Models • Economic Development • Economic Revitalisation • Communications	• Increase Public Participation (Shiffer, 1992 and 2002) • Increase legitimacy in Planning Process (Kingston, 2002) • Mapping/Database (Casey and Pederson, 2002) • Urban Design/Housing Improvement (Al-Kodmany, 2000) • Infrastructure Improvement (Nyerges, 1995) • Communication Maximisation (Lupton and Mather, 1996)
Community Development • Bottom-Up • Grass-roots Activism • Community Tool • Sustainable Development • Bio-Regionalism • Local Control • Empowerment • Redistribution of Wealth • Redistribution of Power	• Resident Generated (Talen, 1999a) • Anti-Gentrification (Parker and Pascual, 2002) • Social Networks (Borelli and Fernandez, 1998) • Focus on Developing Countries (Harris and Weiner, 2002) • Ameliorate impacts of globalisation (Birkeland, 1999) • Anti-Capitalism (Ball, 2002) • Anti-Pollution (Tulloch, 2002) • Eco-System Protection (Sieber, 2000) • Anti-Poverty Strategies (Stonich, 2002) • Ameliorate injustice (Laituri, 2002)

GIS Perspectives	
• Computer Modelling • Data Analysis • Information Dissemination • Administrative • Technological Determinism	• Visualisation as a Planning Tool (Maune, 1998) • Data Intermediaries (Sawicki and Burke, 2002) • Census/Landuse/Housing (Elwood and Leitner, 1998) • The Internet/Web-Based (Peng, 2001) • Facilities Management (Han and Peng, 2003) • Organisation Capacity Building (Craig and Elwood, 1998)

The following sections explore each of the categories in more detail.

3.3. PLANNING AND PARTICIPATION MODELS OF PPGIS

The GIS, PPGIS and planning literatures reveals that geographers, planners and other researches began to seriously explore cases of GIS design and implementation in the mid 1980s as the technology was being introduced into the planning departments of more and more large cities. Two important researchers in the areas of planning and GIS to emerge during this time period were Shiffer and Kingston.

3.3.1. Shiffer and Planning Support Systems

In the area of GIS and planning one of the leaders has been Michael Shiffer. His work at the Massachusetts Institute of Technology (MIT) involving multimedia and GIS in the planning process was innovative and groundbreaking at the time. His use of digital pictures and sound with links to maps and the use of projection systems allowed data and spatial technologies to be brought into planning meetings held in local community halls. By 1996 Shiffer began to experiment with the World Wide Web (WWW) and in his own words, "determine how emerging information technologies (IT) such as the internet and multimedia representational aids, can be used to inform (or misinform) discourse in planning and community related settings." (Shiffer, 1996: 1). This recognition of the potential to both inform and misinform through spatial technologies is important as it hints at the potential power relations and contradictions inherent within GIS and PPGIS.

In 1999 Shiffer's work was included in the book "*High Technology and Low-Income Communities: Prospects for the Positive Use of Advanced Information Technology*" (Schon, *et al.* 1999). In this research he details some of the important aspects of Planning

Support Systems (PSS) and Collaborative Planning Systems (CPS). The issues covered include the implementation of PSS and the representation of data, particularly the display of formal data through multimedia technology (Shiffer, 1999: 209). Shiffer's work is widely cited in the research literature and many of the concepts and issues outlined by him are of influence on the design and implementation of PPGIS and grassroots GIS. His work can be viewed, as "top- down" in nature as the sponsors and beneficiaries of his projects are primarily local government and planning departments.

Shiffer comes to the conclusion that CPS are not a cure for the challenges of participation but a, "practical catalyst towards a more inclusive process" (Shiffer, 2002: 309). He goes on to state that they can empower groups and individuals who have traditionally been disadvantaged due to a lack of both cognitive and physical access to traditional graphic analysis tools (*Ibid.* 317). His *technological determinist* approach is tempered by his statement that information systems must serve as a supplement and not a replacement to traditional planning measures. To Shiffer, CPS' are designed to promote experimentation and exploration that might result in the identification of related issues or aid in the generation of new alternative approaches to problem solving (*Ibid*).

3.3.2. Kingston, Web Technologies and the Legitimisation of the Planning Process

Research conducted by Kingston (2000 and 2002) was incorporated into a top-down, planner led "*Planning for Real*" (PFR) exercise in Slaithwaite in the U.K. Funded by the Kirklees Metropolitan Council and the Rural Development Commission, the "PFR" exercise was a means of, "involving local people more closely in local environmental planning problems and decision making." (Kingston, *et al.* 2000: 112). The project experimented with putting more information into the PFR process through the use of computers and GIS. The three broad principles that Kingston, *et al.* (*Ibid.* 122), used to guide this experiment on participatory GIS were:

- **Accessibility**
- **Understandability**
- **Accountability**

Some of the difficulties that Kingston *et al.* encountered included: IT training for those users with little or no computer skills, access to the Internet and conceptual problems associated with understanding basic maps or "spatial cognition" as it was referred to by the authors. However, one of major potential difficulties revolved around the use of Ordnance Survey U.K. (OS) maps of the United Kingdom. Kingston *et al.* state, "any system that is map based could potentially be tied up in complex copyright and legal issues...as well as the initial expense of buying the OS digital data in the first instance, the need to pay a fee every time someone visits your Website to look at a map could make the whole exercise impractical." (Kingston, *et al.* 2000: 120). This research serves to highlight issues of cost and the licensing of digital spatial data in a restrictive regulatory environment and the difficulties associated with top-down types of efforts, specifically those that can serve to legitimise planning and development processes.

Recently, Kingston (1998), Talen (1999a), Kingston, *et al.* (2000), Peng (2001) and other researchers have started to explore the potential of the Internet in the design and implementation of PPGIS. Kingston *et al.* "Arguably among the first such systems available to the public in a real public participation process" (Kingston, *et al.* 2000: 115) implemented a Web-based GIS as an "add on" to a process undertaken by the local government. However, the project was considered to have a poor "rate of return" with only thirty-five people participating online; marginally better that the twenty-nine participants utilising more traditional methods. In a similar conclusion as that reached by Shiffer, Kingston *et al.* point out that these projects are intended to enhance not replace current planning practices (*Ibid.* 124).

Kingston *et al.* also argue that new Internet-based technologies, "are a useful means of informing and engaging the public and can potentially bring the public closer to a participatory planning system." (Kingston, *et al.*, 2000, 109). Variations on these principles are prevalent in the planning and geographic information literature with issues involving accessibility to computers and the web dominating (Al-Kodamy, 2001, Carver, Evans Kingston and Turton, 2001, Ghose, 2001 and Peng, 2001). Their research reveals the importance of several key broad principles for successful Web-based PPGIS in addition to those already outlined. These additional broad principles are affordability and sustainability. All of these broad principles are important considerations for those interested in the design and implementation of PPGIS including civil servants in

government organisations, planners, university researchers and workers and volunteers in community based organisations.

Examples of the use of GIS in attempts to legitimise planning processes or as agents of authority also appear in the literature. Notably, research by Towers (1997) reveals the extent to which some authorities will go to prepare scientific and rational arguments, backed by GIS, to legitimise infrastructure projects. In the case researched by Towers, GIS was used to overcome opposition from a local community. In "*GIS versus the community: Siting power in southern West Virginia*", government authorities including the U.S. Forest Service, the National Park Service and the U.S. Army Corps of Engineers were shown to be using GIS to rationalise the routing of power lines through vulnerable communities. The communities impacted by these "GIS" decisions appealed to the courts and were successful in halting developments based on challenges to the scientific methodologies used by the authorities to calculate areas sensitive to the power lines.

A criticism that can be levelled at these types of top-down processes is that they act as agents of development or authority controlled by vested interests, the local government or central state. Attempts to include the public can often be identified as crass legitimisation processes or as a means to placate and silence those who would challenge planning and development decisions. In the worst cases, these types of projects can be regarded as the manipulation of the public by vested interests in society and elements within government that cater to these interests. Towers suggests that GIS can become involved in contested and politicised processes and that GIS procedures are inherently subjective regardless of the claims of "objectivity" and "scientific promise" (Towers, 1997: 111). It is important to maintain a critical perspective on the use of GIS and the results obtained from GIS procedures in highly politicised processes.

3.3.3. Planning Focused Models

Lupton and Mather (1996) provide an analysis of the case of a GIS used in a highly politicised, planning department focused, top-down process. These researchers reveal how a GIS used for the purposes of local political boundary redistricting in Johannesburg, South Africa had far reaching consequences for the future of post apartheid city administrations. Although not a public participation GIS *per se*, the research looked at a

city government's use of GIS in an atmosphere of controversy. The work of Lupton and Mather is important because it demonstrates that political and social considerations can overcome the rationalistic, technical advice and recommendations derived from GIS.

In the case of Johannesburg, the GIS defined the entire discussion within which contesting political and economic claims were to be resolved. The GIS effectively removed "from the scanning field" questions that could not be demonstrated through the use of maps, spatial representations and mathematical measurements (*Ibid.* 570). Although the GIS technicians and planners were trusted by politicians and the public and acknowledged to be able to provide rational choices, the proposed GIS redistricting "choices" were rejected entirely by the decision makers. According to Lupton and Mather, "GIS was unable to depoliticise the process and an ascendancy of populist discourse won over a technocratic discourse." (*Ibid.* 577).

Other types of GIS have been developed specifically for planners. Prototypes by Pettit and Pullar (1999), Peng (2001) and Han and Peng (2003) have participatory potential, according to their designers and authors, but have met with limited success. For example, the prototypes had to overcome reluctance on the part of planners to use them and thus the assessments of their potential impacts on users were limited (Pettit and Pullar, 1999). The focus of these systems was clearly on the traditional requirements of planning, the planners and the technical hurdles that need to be overcome to allow for the integration of GIS within government offices and planning departments. Pettit and Pullar's top-down, government perspective tries to fit GIS into traditional conceptions of planning practice and theory. These traditional conceptions hold the value of GIS to planning as integral for the collection, manipulation and analysis of spatial data (Pettit and Pullar, 1999: 341). This is a limited conception of GIS, a limitation that grassroots GIS seek to remove.

An additional example of a planning focused model of GIS appearing in the literature is contained in the research of Roche and Humeau (2000). They investigate how municipal authorities used a cooperative approach and GIS to pool resources and solve regional development issues in rural France. Their focus is primarily on the cost savings associated with the sharing of GIS hardware, software, data and expertise across municipal boundaries. This type of approach is of interest to planning authorities in similar circumstances as it reveals the flexibility inherent in GIS design and implementation and

the ability of GIS to be shared across political boundaries. However, these types of municipal projects are generally technical in nature, top-down and consultant led.

The work of Casey and Pederson (2002) explores issues of inner city deprivation, struggling neighbourhoods and the use of GIS as a community advocacy tool in Philadelphia. Their approach was that of the "consultant" hired by the community to undertake a mapping and database exercise. They recognised that there was no ability to communicate the shocking degree of abandonment and "dissipation" in some neighbourhoods. Evidence of crumbling buildings, burned out and abandoned cars, trash strewn lots and streets, broken glass and graffiti was everywhere but not on the maps (Casey and Pederson, 2002: 68). As a mapping exercise and consulting project this effort proved useful. However, the links to action to affect positive change in the communities using these mapping and GIS tools have proven more elusive.

3.3.4. University Research Models

Al-Kodmany's work in several inner city areas of Chicago also looks at issues of deprivation in his development of a community GIS. His system design incorporates formal government data including digital parcel maps with property monitoring capabilities and additional community data augmented with photographs. However, he reveals GIS to have significant limitations. Al-Kodmany (2000) attempts to overcome these limitations by augmenting GIS through the integration of the five additional components listed below:

- **Multimedia**
- **3D Models**
- **Digital Sketch Boards**
- **Hands-On Participation**
- **The Internet**

Other components in Al-Kodmany's (2001) work include the incorporation of urban design elements into GIS, namely, items such as paths, nodes, edges, districts and landmarks to create "*imageability*" as pioneered by Lynch's (1960) five elements of the city in community planning. These innovative attempts to reorganise GIS to include such

components and objects proved to have limitations (Al-Kodmany, 2001: 806). Al-Kodmany considered the approach too structured as the narrow focus on urban design elements, top-down, technical planning and the incorporation of the GIS into the formal planning process limited the acceptability of the project to the public.

The project's U.S. $280,000.00 price tag allowed for many limitations to be overcome. However, this investment in resources is out of reach for many communities. As a means to overcome some of these "lack of resource" issues, Al-Kodmany proposes innovative solutions including: university-community collaborations and partnerships between "data seekers" and "data providers" (Al-Kodmany, 2000). His web-based multimedia work focused mainly on urban design issues, a narrow focus which is an inherent weakness. Al-Kodmany recognised that the system was too narrowly focused on issues with limited applicability and acceptability (Al-Kodmany, 2001). Broadly based PPGIS projects and grassroots GIS recognise this weakness and attempt to address it.

The literature reveals several examples of partnerships between planning departments and university research projects. There is a strong link between GIS developers, planning departments, university research activities and community GIS. However, the GIS establishment continues to cater specifically to what Decker calls "goal oriented users" including, "government (local, regional, state or province, national and international organisations), the private sector (consultants hired to address a specific problem) and academia (faculty locating lesson or research material and students attempting to complete lessons)." (Decker, 2001: 1). These approaches ignore the grassroots, community-oriented users, several key cases of which are covered in the next section.

3.4. COMMUNITY DEVELOPMENT AND PPGIS

The second broad classification of PPGIS models identified in the review of the literature is referred to as the community development perspective. These models are identifiable primarily in their use of GIS by CBOs. The classification is broad in nature and can be applied to many PPGIS cases that take a "bottom-up" approach, usually in conjunction with "grassroots", non-profit or community development organisations. The next sections review the cases of the use of participatory information systems by "non-traditional" users that adhere to a community development or grassroots perspective.

3.4.1. Non Traditional GIS Users: Community Based Organisations (CBOs)

In 1990 a classification of organisations likely to utilise GIS included the following: research institutions, administrative institutions, government agencies and commercial enterprises (Scholten and Stillwell, 1990: 12). The lack of "third sector" organisations such as NGOs and CBOs, and educational institutions, including schools and libraries, is an oversight. This can be partially explained by the fact that prior to 1990 GIS users in "non-traditional" segments of the economy were few. In terms of the total GIS software and consulting "market share" CBOs are still a small percentage, nevertheless, they are a fast growing area of GIS research and the target of large GIS vendors and smaller consultants alike.

The basic perspectives or principles identified in the literature that guide community GIS projects are:

- **Grassroots Activism,**
- **A Bottom-Up Approach,**
- **Community Information Tools**
- **Economic Revitalisation Strategies**

Due to the fact that much of the research conducted in Europe is generally lacking in the types of projects associated with the community development perspective, including grassroots activism, most of the cases reviewed in this section are located in the U.S. or in developing nations with U.S. institutional sponsorship.

The research undertaken by Talen (1999a) exemplifies the approaches employed by CBOs, as there is a clear emphasis on resident generated data and bottom-up initiative. However, it is clear that the principles laid out in her earlier research could not be sustained in later efforts. In "*Bottom-Up GIS: a New Tool for Individual and Group Expression in Participatory Planning*", she acknowledges that the GIS, expert facilitators (graduate students from the University of Texas at Dallas) introduce their own biases into the system's design and use and that, "it must be assumed that most residents lack the technical capabilities required to manipulate GIS for the purposes of expressing their views." (Talen, 2000: 291). This assumption can be construed as denoting a traditional

top-down approach and one that detracts from truly grassroots, bottom-up, participatory approaches.

Borelli and Fernandez (1998) try to overcome the issues of top-down bias or interference through an activist approach to the design and implementation of an "IT Visioning" in a community setting. They state, "support from local government is no longer a viable option for addressing critical issues within inner city communities." (Borelli and Fernandez, 1998: 415). This type of anti-establishment attitude can be counter productive as the needs of community IT with regards to base data, resources and support can be fully or partially met by local governments. However, the fears that some people have of "co-option" by government are justified. The context in which their " IT visioning" project was implemented may be influencing their anti-planning views as Harlem and the South Bronx are locations long associated with injustice, exploitation and planning abuse and controversy (Caro, 1975).

As a means to use GIS for visualisation, analysis and presentation, Borelli and Fernandez claim that their efforts increased resident engagement in the community visioning process. Their activist approach is apparent when they state, "It is important to remember that no one knows community better than community residents and leaders. The effectiveness of GIS at this level has to be weighed against its ability to provide new information and provide an important link to action." (Borelli and Fernandez, 1998: 422). The "link to action" is vital and reveals the potential in the use of GIS as a community tool and activist approach.

In the work of Sieber (2000), specific issues relating to GIS implementation in the "grassroots" are looked at. In her research on GIS and grassroots organisations, she studied organisations that had specifically made the decision to use GIS in their operations. These groups had obviously attached value to the technology by investing time and resources in the implementation of GIS. The cases she chose were selected because they were located in California, the U.S. state at the "forefront of environmental policy" and innovation with regards to GIS implementation, activism and data access (*Ibid.* 18). California is arguably one of the most "data rich" environments in the world for GIS implementation by grassroots organisations.

The organisations she studied were also well developed with regards to organisational capacity, resources and technical capabilities. Her research yielded valuable insights into issues such as PPGIS implementation and sustainability. The major issues with regards to organisational implementation of GIS that Sieber (2000: 16) cites are:

- **Internal Stability (staff size, tenure and budgets)**
- **Degree of centralisation and internal politics (e.g. territoriality and sabotage)**
- **Evaluation of user needs**
- **Long-term upper management commitment**
- **Sufficient allocation of resources**
- **Adequate staffing and training**
- **GIS champion**
- **Organisational communication**

In general, according to Sieber, "North American GROs exist in a wealth of resources and networks relative to GROs in the developing and third world." (*Ibid*). Her work has contributed significantly to the field of GIS and community based applications of the technology. Although the projects that she looks at in Northern California have met with varying levels of success, she concludes that GIS might be out of the reach of the more "fragile entities" studied. This conclusion has important ramifications for CBOs and those seeking to implement PPGIS. California's favourable legal framework and government policies that promote public participation in relative terms are unfortunately the exception rather than the rule. Her research highlights the differences in the regulatory and policy environments between data rich and data poor locations. Indeed many PPGIS projects are situated in data poor environments particularly those in the developing world as shown in the next section.

3.4.2. "Data Rich" and "Data Poor" Contexts

Meredith, *et al.* (2002) encountered barriers with regards to data accessibility in both "data rich" and "data poor" localities. In Canada, a relatively data rich environment, legal barriers appeared as, "Census data cannot legally be disaggregated to the level that makes it meaningful at the local level. This means that each stakeholder group works with a maximum data set that is only a subset of the total." (*Ibid.* 210). Additionally, financial

barriers to data purchase and other technical difficulties created issues of "constrained outcomes" or "arbitrary outcomes" due to limited data selection (*Ibid.* 206). Meredith *et al.* view data selection as vital to the success of any system and place an emphasis on "non-conventional" data, which needs to be codified and communicated (*Ibid.* 212). This is an acknowledgement of the importance of local knowledge and a call for its inclusion into PPGIS.

Meredith, *et al.* (2002: 206) reveal that the PPGIS process is the "product". They recognise that the benefits of the system are achieved as people use it and participate in a process. The researchers endeavored to create a "self steering sequence of events" where participation in decision making was the measure of success. To Meredith *et al.* the PPGIS implemented in Huitzilac, Mexico allowed for the "visualization of spatial nestedness". This visualisation process, "helps demonstrate connections that affect local decision making." (*Ibid.* 214). Finally Meredith *et al.* take a different perspective to many of the planning and inner city community development cases previously outlined. Their research looks at the issues of PPGIS from biodiversity, conservation, rural development and sustainable development perspectives (*Ibid.* 216). These perspectives have been broadly termed as "bioregionalism" in the literature and can be considered as activist approaches.

Kwaku Kyem (2002: 229) reports little support for PPGIS implementation from state officials even though his case project was contained within an official, collaborative forest management strategy employed by the government in the southern part of Ghana, Africa. Kwaku Kyem identified opposition from influential people within the community as detracting from the successful implementation of the PPGIS. The withdrawal of financial support and the lack of cooperation with regards to formal data acquisition also contributed to the creation of a data poor environment. Such measures are often insurmountable obstacles to PPGIS projects undertaken by CBOs in the developing and developed worlds.

Community participation and activism can be seen as serious threats to vested interests and governments within areas where potentially controversial issues exist. Issues such as natural resource conservation, sustainable development and other environmental concerns are flashpoints within many communities between landowners, developers, concerned citizens and government. PPGIS processes can represent to many unwarranted intrusion

into private and commercial interests that can attract unwanted attention to sensitive issues. The activist and environmental advocacy perspectives and approaches of CBOs often seek to address these controversial issues to the benefit of those traditionally excluded and marginalised from the process. PPGIS and grassroots GIS projects are tools that can be used for such purposes.

3.4.3. Activist Approaches

Birkeland (1999) espouses an "activist" approach with her "ecofeminist" participatory planning model. She states that these models have as their preferred reform, "system change" (*Ibid.* 114). To Birkeland, "traditional models of participation are based on abstractions of society that artificially segregate 'experts' from 'ordinary citizens' and implicitly assume that agency or wisdom resides in either professionals or citizens." (*Ibid.* 113). Her corresponding framework for decision making utilises a collaborative, team design process. This design process has the philosophical aims of community self-reliance, self-determination, justice and well being (*Ibid.* 114). In this model several additional values are incorporated into the decision making process including: inclusiveness, ethical discourse, ethics of care, redistribution of wealth, spiral reason (as opposed to linear, dualistic and hierarchical structures of reason), celebration of diversity and a design-based approach.

She sees this "ecofeminist" paradigm or approach incorporated into the planning design process in the form of open community workshops where team members represent different forms of knowledge as well as different areas of expertise. Birkeland defines this "ecodesign" model as:

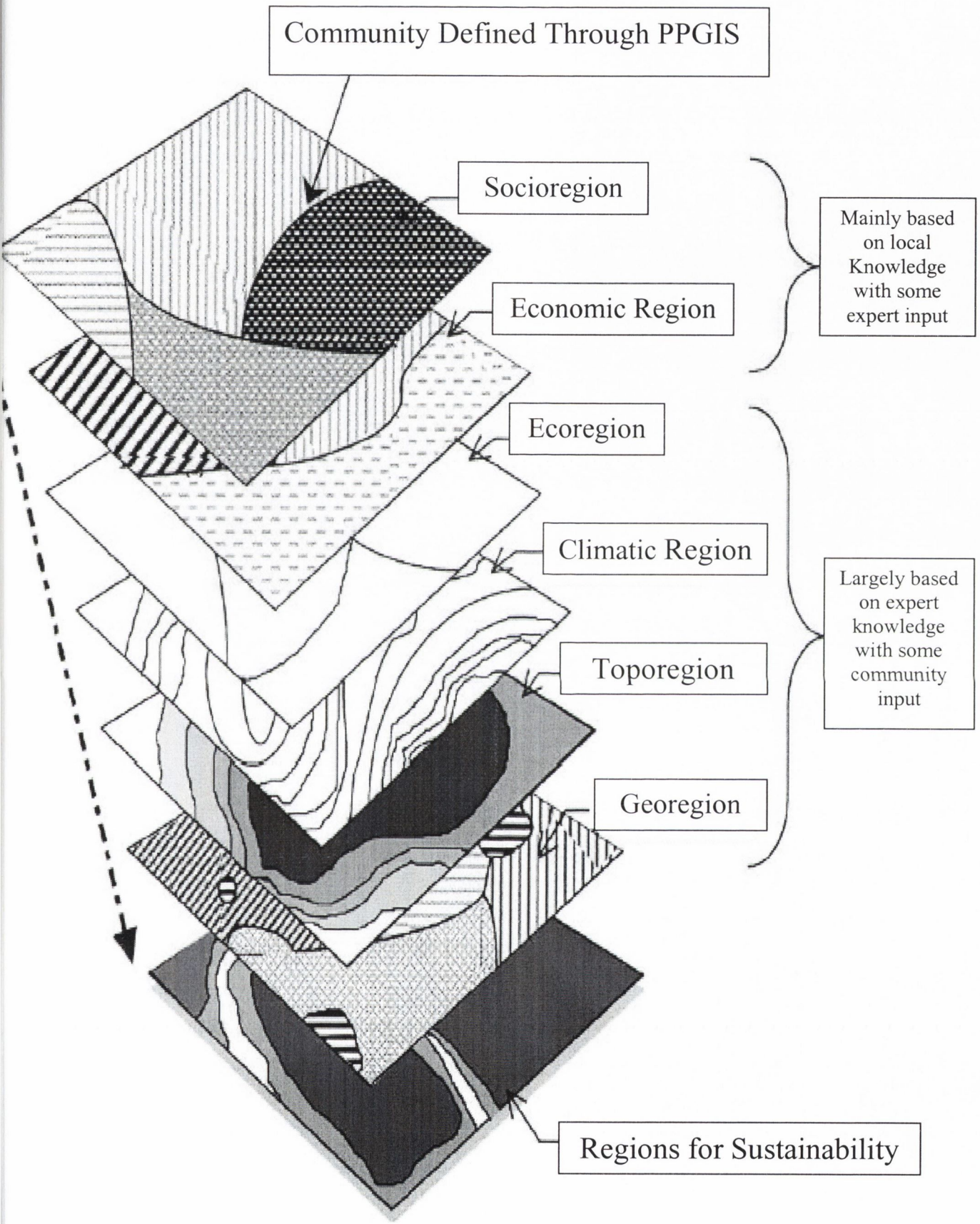
> *"Ecodesign re-examines needs, ends and means in the context of the social and ecological systems in which they function. On the physical plane, ecodesign involves rethinking the materials, industrial processes, construction methods, building forms or urban systems to 'close the loops' at both site-specific and regional levels. On the social plane, it means rethinking the end uses which products, buildings and systems serve and how these affect the community, social equity and environmental ethics. Unlike the environmental management fields, ecodesign also goes beyond the physical and social dimensions, acknowledging a spiritual dimension. This entails rethinking how built environments can affect our sense of being, belonging and place in community and nature."*
>
> (Birkeland, 1996: 13)

Her approach is process oriented and one that embeds itself within traditional planning practices such as design review. Birkeland does not consider the use of innovative new technological approaches such as PPGIS in her process. Her contribution is nonetheless valuable in that it provides an "ecofeminist" perspective to participatory planning practice and outlines new experimental processes for increasing public participation and local knowledge in the planning process.

Ball (2002) lays out the case for the importance of the use of PPGIS in various environmental sustainability activities from a "bioregionalism" perspective. He states that there is a most pressing need for a practical methodology that can bring together different information (Ball, 2002: 84). For Ball, the missing piece of the PPGIS "jigsaw" is how it can be used to enable locals to express their views to the experts (*Ibid.* 125). He recognises that there is a lack of communication between scientists, planners and stakeholders. He proposes that, "before any effective action can be taken, the landscape must be holistically mapped so that its specific nature can be known." (*Ibid.* 83). A method he puts forward to accomplish this task is called "unassisted PPGIS" (*Ibid.* 129). This includes "participant appraisal" and "PPGIS ethos" concepts as well as some not so unassisted "expert" components such as GUI (Graphical User Interface), web design and GIS system implementation.

For the most part, however, his perspective is suspicious of the uncritical use of formal data and technology. Ball refers to Goldstein (1999) who states, "Technology does not simply discount placed-based knowledge but also fosters the illusion of objectivity that facilitates the transformation of moral and political issues into technical issues." (*Ibid.* 89). Ball also states that the value of "native knowledge" should never be underestimated (*Ibid*). He calls for the development and incorporation of "socioregions" within PPGIS where, "The community defines the scope of the social landscape and other factors of local importance. This is accomplished either by group work, by a sketch artist or by direct interaction through a Virtual Reality (VR) PPGIS." (*Ibid.* 126). This concept is illustrated in Map 3.1.

Map 3.1. PPGIS Data Layers



Adapted from: Ball, (2002).

Stonich's conceptualisation of "counter mapping" within GIS is another activist approach similar in nature to those of the "Inner City" models of Craig *et al.* (2002), which take on a social activist methodology. Stonich calls the use of these systems an, "extremely political endeavour" (Stonich, 2002: 268). To Stonich, it is important to investigate the political consequences of efforts and take them into account. Her methods include the building of "resistance coalition members" to aid in the goals and objectives and to build resources and support for the particular cause (*Ibid*).

Parker and Pascual (2002) take a similar activist approach in their anti-poverty, anti-gentrification efforts in the South of Market (SOMA) district of San Francisco. They were able to implement a community GIS that in their words created a "voice for argument" against the development plans for several at risk inner city neighbourhoods. Their community GIS incorporated various formal base maps and census data with additional elements of importance to the community including housing condition, occupancy and needs maps. They termed the tool a planning support system in the form of a "living neighbourhood map" that was able to incorporate "parcel politics" and the "politics of space" (*Ibid*).

An important aspect of the research by Parker and Pascual is their use of the "base map", upon which other elements were added. Starting with formal data as the base map the researchers and community participants then added elements of importance to the community such as housing needs. This approach is shared with Decker who states, "Base maps serve as the starting point. They provide fundamental information relating to a particular data layer or theme." (Decker 2001: 6). Decker continues, "Typical base mapping items include features common to a given region such as transportation, elevation, hydrography, landcover and boundaries..." and that their "determination depends on the needs of the organisation developing data for further use." (Decker 2001: 127). Base maps are employed by a number of researchers seeking input from community members as well as a method for data collection, particularly data of a local nature.

Parker and Pascual outline how this tool was used to start conservations with policy makers that proved a, "more credible and powerful voice with which to argue in the public arena for their rights as a community." (*Ibid.* 64). According to the authors, the residents of the community were able to speak with "united voices" (*Ibid.* 56). An important

outcome of this process was that information collected for the PPGIS provided evidence that eventually altered development plans for the community to their satisfaction. The community's needs for additional and improved low and moderate-income accommodations were taken into account. Using PPGIS to affect positive change in a community is a considerable achievement, an achievement not lost to those interested in affecting change in other jurisdictions.

3.4.4. Advocacy Approaches

The importance of the fieldwork of Harris and Weiner (1995, 1998 and 2002) in South Africa is in their advocacy of popular local causes through the use of GIS. Community Integrated GIS uses, "popular participation... an attempt to locate community participation in the context of particular local configurations of power within civil society." (Harris and Weiner, 2002: 248). According to these researchers, this is in opposition to participation as legitimisation, the maintenance of top-down planning or participation for publication, "in which academics undertake research to produce books and journal articles while leaving the subject communities with little (if any) tangible benefits." (*Ibid*).

The authors point out that the enthusiastic response of many participants, even in what could be considered adverse conditions for implementing GIS, is encouraging and shows a need for such projects. Many participants were "delighted" at finally being asked what they thought about their locale, its historical geographies and their future aspirations. Additionally, the discussions of local natural resource politics and power relations seemed to be well received.

The "Community Integrated GIS", implemented by Harris and Weiner, yielded areas of agreement between "socially differentiated" community participants. This however was a top-down, government led exercise that rejected many community strategies. The fact that the South African Department of Land Affairs sponsored this PPGIS project while working in "collaboration" with the researchers and GIS technicians leaves questions as to the objectivity of the results and the amount of co-option present, if any. Harris and Weiner outline the need for a GIS implementation strategy that draws capability, support and willingness from outside the community. They identify academia and government as

sources of support, especially in communities where the, "basic necessities of life such as water, shelter food and fuel" are difficult to acquire (*Ibid.* 247).

Laituri's research in New Zealand into the incorporation of culturally significant data into GIS is important to review. The researcher identified that culturally specific information was being lost to the Maori. Using methodologies including "parcel mapping, field visits and interviews", the GIS researchers were able to collect indigenous information and include them in a GIS (Laituri, 2002: 276). With regards to issues of local knowledge Laituri states, "it is critical that the local communities make their own decisions regarding the uses, capture and storage of such information." (*Ibid.* 273). The close ties between researchers and the Maori community and efforts to protect indigenous information from commercial and government interests identifies this research as advocacy PPGIS.

Another advocacy approach is that of Kretzman and McKnight (1993), who have developed the concept of "asset mapping". This involves the production of community resource maps containing individuals, associations and institutions. The advocacy approach starts with an inventory of resident gifts, skills and capacities, which are recorded in detail on maps for use in reports and as a reference to those interested in the community. Their focus is on the positive aspects of each community as opposed to needs, deficiencies and problems that some other approaches focus on such as Stonich, (2002), Tulloch, (2002) and Borelli and Fernandez, (1998).

Although Kretzman and Mcknight acknowledge that their maps do not reflect the accurate geographic locations of the items contained on them they do recognise the value and need to implement "computer database" functionality within their "asset mapping" model. Adding database and GIS functionality to "asset mapping" and making the maps available on the Internet could prove valuable, as it would involve more people in the process, serve a wider audience and expose more local interests to the results of their work. Additionally, a PPGIS could benefit from the concepts of "asset mapping" particularly through a focus on community assets and the positive side of communities, something that the research community has not fully addressed in detail to date.

Collaborative advocacy approaches can in some respects contradict the agendas and efforts of some of the more "activist" strategies employed in inner cities and developing

countries. The previously mentioned work of Borelli and Fernandez (1998), Tulloch (2002) and particularly Stonich's "counter mapping" concepts (2002) as well as research by Aitken (2002) on "spatial story telling" using GIS are key examples of these more "activist" approaches. This literature review serves to highlight the differences between these approaches, an understanding of which is of vital importance to all those interested in the use of GIS by CBOs for community development purposes.

3.4.5. Issues: PPGIS in Community Development

Two additional issues have been identified in the literature with regards to PPGIS in community development settings that are important to expand on. Social exclusion and sustainability are explored further in the next sections as they shed light on both planning and information system models implemented in community settings. Addressing these issues is seen by many researchers to be the key requirement for future ICT and PPGIS project design and implementation success. The sustainability of PPGIS is of particular interest to researchers in the field, and needs to be addressed (Smith, 2002b).

3.4.6. Social Exclusion

Social exclusion is a term widely referred to in the community development, planning and information system literature. Van Winden (2001) links exclusion to the accessibility or lack thereof of ICTs like the Internet. Most of the PPGIS projects reviewed in the literature are sensitive to issues of exclusion, accessibility, marginalisation, equality, gender and power relations. Many projects focus on impoverished areas like inner cities and those where poverty and social exclusion are relatively high (Ghose, 2001 and Al-Kodmany, 2000). Much of the information technology, planning and community development literature identifies better access to information and the technologies that allow enhanced communication and participation, such as the Internet, as potential remedies to the problem of social exclusion in society.

There is a large body of literature on information technologies and their impacts on society. Researchers have identified several key characteristics of ICTs. Common themes throughout the literature include: the rapid and accelerating spread of ICTs, their reinforcement of the status quo and their dual natures, that is their ability to have both

positive and negative impacts. This dual nature allows for the inclusion and exclusion of portions of the population with varying degrees of intensity and in multiple contexts and settings. These characteristics and themes are now explored in greater detail with regards to the ICT literature.

Graham calls ICTs and the "cyberspace" that they have created the, "fastest diffusing medium in history." (Graham, 2002: 36). He attributes this success to the fact that ICTs extend the power of the powerful, tie together internationalist divisions of labour, allow socially affluent groups to by-pass the local scale and are culturally and economically biased towards the wider development of an "international information marketplace". He explores the myths of cyberspace as equally accessible, unifying and levelling. To Graham, the Internet is not something that has overcome the, "familiar social, economic, cultural and geographic segmentations and inequalities of the 'official urbanizing world'." (*Ibid.* 35). Graham notes that ICTs reinforce the status quo of capitalism and the realities of the modern, industrialised world that we live in, a world in which many are excluded from accessing information, participation in economic activity and acquiring the necessities of everyday life.

Castells has studied changes to society brought on by the information revolution at the national and regional levels. His areas of research include the economic and social restructuring of capitalism, globalisation, international investment, development patters, labour markets and the impacts that new information technologies have on cities (Castells, 1989, 1996ab, 1999ab). To Castells, ICTs have opened up society and are allowing for the spread of capital and information at ever increasing rates and "without territorial contiguity." This "space of flows" of which "cyberspace" is a part but which also includes the technological infrastructure of information systems, telecommunications and transportation lines, will benefit some and bypass and marginalise others, particularly those who resist (Castells, 1999a: 297).

Mitchell echoes this when he states that there is a, "great danger that these tides may quickly leave many low income communities even more isolated in the economic backwaters than they already are, with little ability to attract investment and few jobs to offer." (Mitchell, 1999: 124). He envisions a future where the reduced costs of "electronically mediated alternatives" to community out compete the less attractive cities

of today that are "crowded and jammed with traffic". He develops a new kind of urban typology spectrum, "at one end of the spectrum are completely traditional place based communities comprised entirely of physical spaces, organised around traditional types of public spaces and held together by physical circulation through streets and transport networks. At the other end of the spectrum are fully virtual communities... these, consist of randomly sheltered physical spaces held together by electronic communications." (Mitchell, 1999: 128).

The literature on ICTs and society has been referenced in this review to provide a broad perspective on the impacts and potential future of technologies related to GIS and PPGIS. GIS have like other ICTs spread rapidly through society. There is evidence to suggest that these technologies reinforce the status quo. Finally, the dual natures of the technologies, that is; their ability to have both positive and negative impacts, are well understood. These characteristics and themes are explored in greater detail with regard to theories of spatial information technologies particularly PPGIS in Chapter Four.

3.4.7. Sustainability

To Alshuwaikhat and Nkwenti, "The maxim in the planning environment today is 'sustainability'." (2002: 522). It is a concept that came into being widely in planning and environmental management in the 1990s. The World Commission on Environment and Development (WCED) defines the concept of sustainable development as, "development that meets the needs of the present without compromising the abilities of future generations to meet their own needs." (WCED, 1987). The concept of sustainable development is important for planning, community development and information system design because much of the data are environmental in nature. Additionally, public participation is greatly encouraged as the concerns and issues of sustainable development are in many cases local in nature yet they involve the future health of all in society.

Many PPGIS projects, particularly those in developing nations, have as a goal, the protection and management of environmental resources for present and future generations or "sustainability". However, for the purposes of this research the term is used in an entirely different context. The term sustainability applies to the on-going viability of PPGIS projects after their initial set-up, funding and research phases are complete. The

literature has suggested that many PPGIS projects fail once the funding sources and researchers have moved on in what has been called "research for publication" Harris and Weiner (2002: 248). Tulloch also suggests that many CBOs and their funding sources place an emphasis on starting efforts rather than sustaining them (Tulloch, 2002: 201).

Sustainability can be achieved thought the creation of a "self steering sequence of events", a term coined by Meredith, *et al.* (2002: 206), in relation to PPGIS. This is vital to the successful sustainability of PPGIS as the literature is replete with examples where research oriented or legitimisation exercises utilised PPGIS for unsustainable ends. Barndt places sustainability at the head of a list of related issues that he feels are needed for the successful design and implementation of a PPGIS (Barndt, 2002: 4). He asks the following questions:

- **Are PPGIS Sustainable?**
- **Replicateable?**
- **Efficient?**
- **Timely?**
- **Immediate?**
- **Efficient?**
- **Sophisticated?**

Barndt's work with six CBOs in Milwaukee helped create a "sustainable" Community Information System (CIS) through the pooling of resources, information sharing and with what Barndt calls a "fruit basket" of alternatives that were necessary as the system proliferated (*Ibid*: 9). However, a truly self-sustaining, "self-steering" community based PPGIS is a goal, which has eluded most researchers to date.

With regards to sustainability, Dourish (1999) points to the work of Harrison and Dourish (1996) who outline the concept of "appropriation". This is the, "extent to which the technology lends itself to be taken over by the participants and turned to their own uses, so that they can structure the space around their own needs and activities and make the technology their own." (Dourish, 1999: 27). To Harrison and Dourish it is not the technology and not the "space" that it creates, but the "creative peopling" of that space that turn it into a place where people do things that are important (*Ibid*). New models of

PPGIS attempt to create sustainability through the "creative peopling" of the spatial information space.

3.4.8. Conclusions: Community Development and PPGIS

The literature review of PPGIS and its implications for CBOs and the community development process has proven useful as it reveals issues and weaknesses in the existing PPGIS models. The development of a new PPGIS model in many ways seeks to address the critiques that have come out of this research literature. The classifications, broad themes and issues identified in the literature review provide an important source of guidance in the design, implementation and sustainability of PPGIS in local settings. The next section reviews the PPGIS literature from the perspectives of those who develop and implement the spatial information systems, namely the GIS research community.

3.5. GEOGRAPHIC INFORMATION SYSTEMS PERSPECIVES

The final classification of PPGIS models is that of the Geographic Information Systems perspective. Researchers studying the design and implementation of PPGIS within organisations working in environmental, planning and community development areas have recognised the potential of GIS in participatory settings. Recently, a large amount of literature in this area has come out of the URISA Journal and the Journals of Computers Environment and Urban Systems and Cartography and Geographic Information Systems. The next sections review these and other literatures completing this in-depth review of the PPGIS literature.

3.5.1. Geographic Information System Critiques

There have been critiques of GIS and related technologies, including digital cartography, CAD (Computer Aided Design) and PPGIS since their initial development. These critiques follow closely those that other ICTs, such as the computer, computer software, hardware and the Internet have received upon their introductions into society. A review of the literature on the development and introduction of GIS technologies is relevant as issues of access, power and abuse of the technology are found throughout. The major focus of

this section is spatial information technologies, GIS and PPGIS specifically and their impacts on the organisations and communities that choose to implement them.

3.5.2. Geographic Information System Critiques: Local Control

The work of Shaw and Shaw (1999) and Ferreira (1999), in Schon, D. Sanyal, B. and Mitchell, W. eds. "*High Technology and Low-Income Communities: Prospects for the Positive Use of Advanced Information Technology*" provide case studies of various initiatives for computer and information access for communities. Although not GIS *per-se*, both studies include digital spatial data including transport routes and landuse data, respectively. Their works implement information technologies in local communities to solve particular problems. Both research projects are lavishly funded from the top-down and have incorporated little community ownership, an issue that bodes ill for the long-term sustainability of the projects regardless of the sophistication of the technology used. These weaknesses have been identified previously and can reflect a lack of trust or parochial attitude on the part of the authorities and researchers towards local residents.

Similarly, Peng refers to most people as not "spatially aware; some of them even have difficulty in understanding maps, let alone highly specialised analysis models." (Peng, 2001: 903). Elitist, top-down, technical attitudes and perspectives do not normally promote the inclusion of participatory elements in system design or implementation. Peng does concede, however that, "efforts need to be made to encourage the public to use the system." (*Ibid.* 903). There are additional examples in the planning and GIS literature that document the difficulties encountered with expert driven, top-down approaches, see Maune (1998) for example. New GIS/2 and PPGIS models seek to counter top-down and researcher or technician led approaches that currently dominate GIS, planning and community development practice.

Kellogg highlights how difficult GIS data entry can be for community based organisations. He recognised that a historic GIS parcel mapping exercise for the purposes of predicting lead contamination in a low income Cleveland neighbourhood, "proved very time consuming and would not likely be done by a CBO without additional assistance." (Kellogg, 1999: 21). Kellogg also states that GIS is not as appropriate as some traditional methods for communicating information, "for some information, such as values and

perceptions residents hold about the neighborhood, other means for communicating information, such as models, posters, photo essays, or hand-drawn maps might be more appropriate and needed." (*Ibid.* 24). Kellogg concludes that:

> *"GIS can be a powerful tool to help CBOs understand conditions in the neighborhood to the extent that data about the neighborhood can be collected and mapped by the CBO or obtained from government or non-governmental data providers. Perhaps the most meaningful information generated through use of GIS is that which places the neighborhood as a small area of territory in its city-wide or regional context, allowing neighborhoods to understand how broader environmental conditions contribute to conditions in their neighborhood."*
>
> (*Ibid.* 24).

Kellogg recognises the power of GIS, the importance of appropriate data for a GIS and the linkages that need to be formed within "city-wide or regional contexts" to broaden a neighbourhood's perspective. Through the inclusion of a variety of data the perspective of the GIS and of the community residents and participants in PPGIS projects can be broadened.

3.5.3. Geographic Information System Critiques: The Use of Scale

Aitken in "*Public participation technological discourses and the scale of GIS*" takes a technical mapping view of "scale" as a means to broaden the perspective of his GIS model (Aitken, 2002). He looks at the use of scale critically, particularly its ability to "limit to the local" (*Ibid.* 357). Aitken sees the false restrictions of scale as a barrier to incorporating outside resources and assistance into community GIS. Using scale more appropriately can "legitimise local issues" allowing for the more effective use of GIS (*Ibid.* 357). Aitken is also critical of the "modernist development paradigm" associated with GIS and its top-down, technicist and elitist nature as identified in the work of Harris and Weiner (1998) whom he cites (*Ibid.* 358).

Aitken also explores "spatial story telling" using GIS technology. This concept closely resembles the "counter mapping" strategies of Stonich (2002) and the "inner city" activist approaches used by Borelli and Fernandez (1998). Aitken claims that, "To be effective the maps and language of PPGIS must communicate spatial stories that clarify and ultimately politicise the issues about which local people feel concern." (Aitken, 2002: 364). To

Aiken, the "most poignant example of PPGIS raising a strong public that enables local issues to jump scale revolves around activism and research that outlines concerns of environmentalism." (*Ibid.* 363). Aitken, clearly a strong supporter of the use of GIS technology in local contexts sees qualitative data and quantitative spatial analysis, used at the appropriate scale, as having an ability to empower community decision making (*Ibid*).

3.5.4. Geographic Information System Critiques: Data

Data have been recognised as valuable for community groups by a number of researchers including Elwood and Leitner (1998) and Sawicki and Burke (2002). Housing data, property values, zoning and population statistics including: race, age, income, household type and length of residence have been incorporated into community GIS systems. Additionally, transport, traffic volume and patterns, bus routes, bike routes, physical and social infrastructure, environment, crime, toxic emissions, public health, economic development, existing businesses and available employment have all been identified as important for the understanding of communities (Elwood and Leitner, 1998: 82).

Incorporating these data and other "public" databases into GIS and providing them to communities is a valuable tool in grassroots community planning and development initiatives (Dufour and Haughey, 1998). Craig and Elwood attribute much of the success of GIS projects to be "based on easy access to public records. Where this is not the case, success may be much harder to find and community groups may be less successful in meeting the needs of their constituents." (Craig and Elwood, 1998: 103). These types of grassroots PPGIS projects and the data that are incorporated into them allow for smaller, community based types of organisations to tell their stories and focus attention on particular issues and concerns that are of importance to the community.

Sawicki and Burke (2002: 89) also recognise the importance of data and the tensions between technical versus participatory types of GIS. The researchers set up a PPGIS project in Atlanta, Georgia utilising graduate students who assisted in the incorporation of formal data including landuse, crime, tax delinquency, housing code enforcements, Community Development Block Grants (CDBG), investments and institutional assets (*Ibid.* 92). The researchers took on the role of "data intermediaries" between government and citizen users and created a PPGIS system that could be queried by community groups

and the public for analysis purposes. They state that, "citizens should be more than consumers of information." (*Ibid.* 90). For the authors, however, the analytic capabilities of the PPGIS were only part of the key to successful implementation. They also recognised the importance of, "community building and organizing that resulted in a consolidated and sustained effort to change the system." (*Ibid.* 95).

Criticisms of the use of GIS data in planning departments began soon after their introduction and use. These early critiques focused primarily on the scientific rationalist characteristics of the GIS data models, the abuses associated with the uneven power relations within these systems and the lack of participation and input from the very people that were often affected most by the data analysis. The previously explored forces promoting the uptake of GIS and data analysis, namely, ease of use, lower costs and better access to information technologies are generally portrayed as and assumed to be positive. There are, however, questions and negative implications attached to these assumptions, which demonstrate the dual nature of the technology.

3.5.5. The Dual Nature of GIS Technology

Many researchers have contributed to the debate on the pros and cons of information technologies. This "doubled edged sword" concept has been widely outlined in the GIS literature. The basic premise to the argument of the dual nature of the technologies is that they, under certain circumstances, can be of great benefit to organisations and individuals and at the same time have discernable negative impacts (Shiffer, 1998). Elwood also supports this seemingly contradictory assertion. "Some neighborhood actors have experienced distributive, procedural, or capacity-building forms of empowerment, whereas other actors in the neighborhood have experienced disempowerment." (Elwood, 2002a: 919). These characteristics are shared by many new technologies only adding to the confusion as to their true natures. In the preface to Schon *et al.* "*High Technology and Low-Income Communities: Prospects for the Positive Use of Advanced Information Technology*" the authors acknowledge and support the argument that information technology acts as a great leveller, giving opportunity, while at the same time amplifying inequality (Schon, *et al.* 3).

With regards to GIS, many optimistic beginnings to GIS implementations in the grassroots are soon tested once the reality of the systems and their capabilities and limitations come to be understood. Many such projects end unsuccessfully or without the desired uptake by users such as in the case of the Canadian fishing community found in Macnab (2002). Barndt postulates that there has been an overstatement of the opportunities for GIS tools to overcome the limitations caused by "limited resources, small local organisations with non-professional staff and boards, a 'distance' between grassroots organisations and the government and business sectors and fundamental political differences among many players." (Barndt, 2002: 346).

Barndt asserts that the creation of community asset maps requires complex cartographic skills lacking in many communities (*Ibid.* 351). Barndt discounts the ability of CBOs to use GIS. He states that for those who use GIS in these situations the ready availability of community statistics and maps, in programs like the U.S. Department of Housing and Urban Development's (HUD) "2020", can limit the flexibility of community users. Barndt calls for the increased role of training and, "informal education to help organisations become better consumers of information, empowering staff to conduct analysis themselves." (*Ibid.* 354). Barndt is saying that with better training and education there will be better users of GIS technology, better analysis of community problems and better solutions. This attitude is similar to the technological determinism of Shiffer, who focuses on the technology rather than the users and their abilities.

3.5.6. Technological Determinism and GIS

One of the broad themes or perspectives running through the geographic information system literature is one of technological determinism. This holds that the GIS technology is seen as good, "in of itself". For researchers and practitioners who adhere to this perspective, it is "self evident" that employing GIS has obvious advantages as a planning tool and as a powerful instrument for the dissemination of information. Many prescribe to this vision particularly those categorised as having planning and GIS backgrounds or perspectives (Talen, 2000, Shiffer, 2002 and Dangermond, 2002)

Van Winden (2001: 863) refers to "techno-optimism" that in recent years "can be observed, related to the new possibilities of ICT to fight social exclusion." He sees the

possibility of ICTs contributing to social inclusion in three dimensions: the social, political and economic. These optimistic "technological deterministic" contributions are described by Van Winden as:

- **ICT is depicted as a catalyst for social cohesion: it enables people to engage in social networks in new ways.**
- **ICT is seen as an instrument to enhance or renew civil participation in local decisions and policy making.**
- **ICT is regarded as a means of getting unemployed people back into the labour market**

These optimistic characterisations of ICT are common. Others have referred to these pronouncements as "techno-idealism". For example Munro, *et al.* (1999: 238), identify a "very enthusiastic expression" of the phenomenon by some in that "digital networks have instituted no less that a new 'social environment'". The grassroots GIS in community development contexts conversely takes a more critical approach to the implementation of GIS in community settings.

3.5.7. Scientific Rationality and GIS

Linked to the concept of technological determinism is that of scientific rationality. It can be considered diametrically opposed to "local knowledge" as identified in the literature and defined and discussed previously. The rational, scientific approach to problem solving holds that scientists can derive solutions from an analysis of the facts. The rational approach holds that the application of the scientific method and appropriately tried and tested technologies and solutions will solve societal problems. Scientific rationality is a mainstay of the field of GIS as many researchers derive solutions through the spatial analysis of problems using GIS and digital data obtained from scientific sources.

Curry states that the image many have of formal data is that they come from the laboratory. Scientists devise hypotheses, then a means to test them through hardware. They then collect data and run experiments and analysis conducted under controlled conditions. To Curry, however, "In Geography this is an ideal that few of us can achieve, but it remains as a model, where there is at work a kind of distance decay function; the further we are away from the source of the data, the more suspicious we are." (Curry,

1998: 135). He goes on to state that the more formalised and mechanised the data collection process is the more comfortable we are with those data (*Ibid*). These processes and preconceived notions value scientific rationalist forms of information over all others in our society.

The value of the scientific and the rational is not limited to the GIS profession or pure science, however. Geographers, environmental scientists, planners, sociologists (particularly those of the "Chicago School" of urban sociology) and many other researches employ and have come to rely on scientific rationality in the search for the answers to questions about the world around us. Hall identifies why this approach might become a problem. In his writings on Le Corbusier, the famous Swiss Architect and urban planner, Hall quotes Le Corbusier's who stated,

> *"The harmonious city must first be planned by experts who understand the science of urbanism. They must work out their plans in total freedom from partisan pressures and special interests; once their plans are formulated, they must be implemented without opposition."*
>
> (Le Corbusier cited in Hall, 1998: 210).

In the field of planning Healey describes the "rational planning process" as involving a "review of the issues (survey), sorting through findings (analysis), exploring impacts in relation to values (evaluation), inventing and developing new ideas (choice and strategy) and continuous review (monitoring)." (Healey, 1997: 282). Healey calls for these rational approaches or the "epistemology of positivism and deductive / inductive logic of the natural sciences and of economics" to be "put into context and combined with other ways of knowing and valuing through a hermeneutic attitude, which aims to explore how peoples' interests and claims for public attention are both actively constituted and framed by socio-cultural systems of meaning and acting." (*Ibid*). To Healey these "strategy making activities" involve active discursive work by the participants where the technical language of scientific rationalism is treated as one of many languages. Her techniques and reasoning go beyond instrumental rationality and include moral and emotive dimensions where technical analysis is combined with "feelings towards" issues. (*Ibid*).

New models of PPGIS attempt to dispel some of the preconceptions with regards to scientific rationality, technological determinism and the "epistemology of positivism and

deductive / inductive logic of the natural sciences" with regards to the use of information technologies in community settings. Many of the negative implications, issues and concerns regarding the use of information technologies in community settings centre on rational scientific approaches and their failure to take account of the knowledge, opinions and feeling of local residents. GIS and PPGIS are socially constructed technologies. Failure to take account of social and political considerations can reduce project effectiveness and lead to outright failures in certain situations.

3.6. THE LITERATURE REVIEW: CONCLUSIONS

This chapter has provided a thorough review of the literature on PPGIS. This literature review aids all those wishing to understand the broad themes and major issues and perspectives that consistently appear as GIS technologies are introduced into community settings. The classification and reorganisation of the PPGIS models found in the literature into a more appropriate three category construct has also helped to provide a better understanding of the subject matter. The Planning and Participation, Community Development and Geographic Information Systems perspectives comprise this new construct. These classifications and the specific issues associated with each, as identified in the literature, provide an important source of reference and guidance for this research and aid in the construction of a critical theoretical framework.

"*Nam et ipsa scientia potestas est.*" or "*knowledge itself is power.*"

(Francis Bacon, 1597)

4.1. INTRODUCTION

The theories of local, "grassroots" GIS are undeveloped by the research community. This chapter explores the theoretical foundations of Public Participation Geographic Information Systems (PPGIS) and develops a new "critical theory" framework for the topic. Theories of planning, participation, community development and GIS are well developed in their respective fields. In this chapter these theories are explored in new ways, specifically as they relate to the development of a new community based PPGIS model. This new critical theoretical framework will contribute to the fields of planning, community development and GIS and aid in the design and implementation of a variety ICT projects and expand our understanding of PPGIS in community settings.

The literature review revealed that geographers and urban planners as well as researchers and practitioners in other fields have implemented GIS in numerous settings and for a variety of purposes. Many different theories have informed these projects, which are discernable in the strategies and techniques employed during the design and implementation of the variety of PPGIS models. However, the strategies and practices implemented to date have failed to take a truly "bottom-up" approach to PPGIS in local settings. Government agencies and research institutions sponsor and control the majority of PPGIS implementations, which raises questions with regards to their legitimacy and sustainability. The theories of community development, planning and GIS are explored in this chapter to the extent that they contribute to a new theory of grassroots GIS, one that incorporates multiple perspectives, from different fields of study and that has a truly bottom-up approach.

The development and use of a "critical theory" framework of grassroots GIS is important. In Forester's (1980) introduction to a critical theory for use in planning contexts, he argues that, "theory" can be practical in many respects. He states, "Critical theory may help us

anticipate and correct for (a) undeserved resentment and mistrust of planners, (b) obstacles to effective design review and democratic planning processes, and (c) unintentionally counterproductive technical planning practice." (Forester, 1980: 275). His theoretical constructs for planning lend to the construction of a theoretical framework for grassroots GIS by providing valuable insights to their designers.

The construction of a critical theoretical framework for grassroots GIS also has several practical considerations. Firstly, a theoretical framework helps anticipate and correct for "resentment and mistrust" of computers, spatial technologies and those who operate them. This consideration can identify and removes obstacles to effective public participation in PPGIS and other participatory planning processes. Additionally, a critical theoretical framework can aid in the elimination of the "unintentionally counterproductive" and "technical practice" of PPGIS including the over reliance on formal data and exclusionary language and technologies.

The categories of PPGIS as organised in the literature review, Planning, Community Development and Geographic Information System Perspectives provide the basis upon which this framework is constructed. The next section introduces three broad theoretical "schools of thought" on the topic of PPGIS. Sections 4.2, 4.3, and 4.4 of this chapter explore each in detail, providing a firm critical framework for the research undertaken in this dissertation. Section 4.5 develops a new critical theory for the design and implementation of PPGIS in local community settings, providing new understanding and contributing to the research on this important topic.

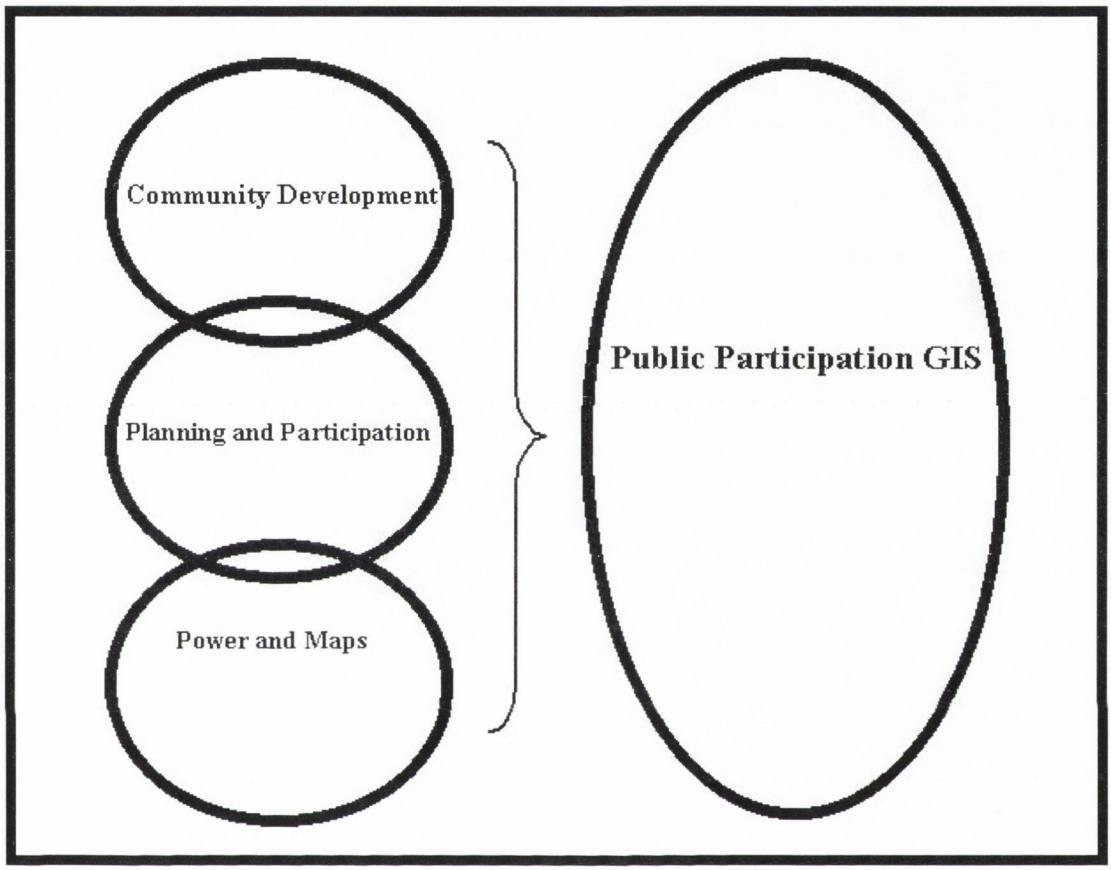
4.1.1. Theoretical Schools of thought

The theories behind the perspectives or models of PPGIS implementation in grassroots settings can be broadly organised or classified into three schools of thought. For the purposes of this research framework, the major schools of thought are identified as:

- **Planning and Participation**
- **The Power of Geographic Information**
- **Community Development**

Figure 4.1 provides a graphical representation or schema of the theories and perspectives that are drawn from the research literature. This framework has contributed to the design and implementation of the Tallaght grassroots GIS.

Figure 4.1. Broad Theoretical Perspectives of PPGIS



The schematic in Figure 4.1 greatly simplifies the various perspectives contributing to PPGIS. As can be seen in the schematic the theoretical constructs overlap in that they have influence on one another. The perspectives also contain complex concepts, each with their own issues and potential influences on PPGIS. Many of these issues and interactions serve to reinforce one another while others are contradictory in nature. This reflects characteristics of information and communications technologies (ICTs) themselves, namely their dual natures and contradictory tendencies. These contradictory characteristics and tendencies are not ignored or downplayed for the sake of ease of use and successful PPGIS design and implementation. Rather, the dual natures of GIS and ICTs are acknowledged and explored in detail in this research.

4.2. PLANNING AND PUBLIC PARTICIPATION THEORY

There are close linkages between the practices and theories of planning and public participation. Within planning theory and practice, the concept of public participation is widely developed. There are many well-established practices and concepts that elicit public input and participation in plan development. These include formal hearings and forums as well as less structured roundtables and surveys designed specifically to support public participation in planning processes. Vindasius compiled a list of commonly used methodologies in "*Public Participation Techniques and Methodologies: A Resume*", (Vindasius, 1974). He lists:

- **Public Opinion Polls and Citizen Surveys**
- **Referenda**
- **The Ballot Box**
- **Public Hearings**
- **Advocacy Planning**
- **Letters to the Editor or Public Officials**
- **Public Meetings**
- **Workshops and Seminars**
- **Task Forces**
- **Court Action**
- **Presentations of Pressure Groups**
- **Protests and Demonstrations**

Many of these techniques are still widely used today to elicit public participation. More recently, a wide variety of additional participation techniques in planning have been identified and outlined in the literature. These include both "traditional" techniques, similar to those listed above and others dealing with the utilisation of new information and communications technologies. These other techniques include: design charrets, interactive groups, and dialectic groups, as reviewed by Talen (2000), and more formal methods such as citizen panels, citizen juries, (Kenyon, *et al.* 2001), and contingency valuation (consumer preferences), and consensus conferences (Niemeyer and Spash, 2001).

These types of approaches to participation and deliberation are "advanced as being more contextual and sensitive to multiple and incommensurable values" while "mainstream economic approaches advocate formal procedure based upon free-market political structures." (Environment and Planning C: Editorial Board: 2001). Niemeyer and Spash

criticise approaches using these free-market, "neoclassical frameworks" because they reduce all choice to the "mechanical act of selecting optional bundles of goods and services." (Niemeyer and Spash, 2001: 569). In fact, these processes offer no real choice at all, as they are limited in many respects by the process itself, lack of information and real decision making power.

For Niemeyer and Spash, deliberative processes should include not only information but also the "corresponding discourses outlining the reasons for different options." (*Ibid.* 573). PPGIS are often used in conjunction with participatory techniques, contributing to various projects as information input and storage devices. They also have the potential to trace the reasons for different options and choices, for example "*gIBIS*" (Graphic Issues-Based Information Systems) and "*Arguemaps*", as developed by Conklin and Bergeman (1988) and Rinner (1999) respectively, in Laurini (2001: 167-173). These practices also adhere to the theories of progressive planning and participation that inform the work of Niemeyer and Spash.

It has been recognised, however, that since the early 1970s there has been a growing dissatisfaction with the existing means of public participation in planning processes and that the "dramatic increase in the number of pressure groups seeking to influence planning and policy making" is a result of this dissatisfaction (Sewell and Coppock, 1977). Sewell and Coppock state,

> *"This pressure for an expanded role for the public in planning is rooted in both philosophical and practical considerations. The former is related primarily to the general belief in democratic societies that the individual has the right to be informed and consulted and to express his views on matters, which affect him personally... Pragmatic considerations cover chiefly the failure of plans or decisions to identify public preferences correctly, and it is in these circumstances that the questions of the present system have been particularly intense."*
>
> (*Ibid*).

A critical challenge has been made to the concept of planning in general. Arising in the late 1960s and early 1970s and continuing to this day, the challenge takes the form of a question, namely, "How to accommodate a mounting demand for a greater degree of public participation?" (Sewell and Coppock, (1977: 1). Many have attempted to answer this question. The literature review revealed numerous cases where innovative

technologies including PPGIS were used in conjunction with planning techniques and methodologies to accommodate demands for increased public participation. The PPGIS model developed by Kingston's *et al.* (2000) in a "Planning for Real" (PFR) exercise in Slaithwaite, the U.K., is a prime example of this practice. For these new technological tools to be used successfully, it is important that they incorporate and consider issues and concepts identified by planning theory.

The concepts and issues in the theories of planning identified for the purposes of the development of a theoretical framework fall under the following broad categories:

- **Civil Society**
- **Consultation and Informing**
- **Tokenism**
- **Parochialism**
- **Conservatism**
- **Placation**

These broad categories and issues are explored in the next sections in relation to planning theory and public participation.

4.2.1. Planning Theory

In Roman times, the formalised design and planning of cities evolved to meet the needs of the military typified by the many empire garrison towns and their grid layouts. In modern western democracies, planning developed as a means to guide and control the growth of urban areas and to impose an order and stability in the large industrialising cities of the 18th and 19th centuries. This was accomplished through the provision of physical infrastructure, such as, sewers and roads initially and thereafter other urban social necessities. Healey states that, "The planning system and ideas about planning settlements emerged in Britain in the nineteenth century out of concerns about public health, social order and housing questions raised by rapid urban growth in a highly unequal society." (Healey, 1998b: 8).

As cities grew and became more complex, the need for and the role of planners increased. Leading the wave of modern urban planning concepts and practices was the United States. The development of city centre office and service land uses, the expansion and promotion

of the automobile and the infrastructure they required as well as the birth of the suburbs and bedroom communities all heralded in the golden age of the planner. The modern planning professional was born as planners became institutionalised within city government bureaucracy. Planners found themselves with increasing powers and status, a trend that continued until the middle of the 20th century.

Early planning theorists viewed the planner as the holder of knowledge and his (there were few women planners) actions to be those of a professional, rational practitioner with the skills and power to make decisions for the betterment of the community. Until recently, this *"rationalism"* was the leading tradition in planning. It is characterised by a rationalistic approach or focus on decision making with regards to specific social choices "usually about the proper allocation of resources" to arrive at a single "best" answer to a stated problem (Friedmann and Hudson, 1974: 3). This planning tradition along with that of *"empiricism"*, with its decision variables, rigid theoretical models and centralised planning concepts (*Ibid*), would soon have to be reconsidered as changes in society beset planning and government in general with increased demands for accountability and public participation.

The changes to this traditional, normative order in planning began to occur in the late 1960s and early 1970s, "a time when America saw itself in the throes of a cultural revolution marked by a crisis of engagement in an unpopular war in Indochina and violence within the previously hallowed university community." (Friedmann and Hudson, 1974: 5). Many planners "endeavoured to refocus planning on a central concern with humanistic values in which existential knowledge, the life of dialogue, and self-actualizing groups would become the bearers of regenerative forces in society." (*Ibid.* 6). A move away from the rationalistic and empiricist approaches to planning was underway.

One of the earliest leaders to emerge in the new "liberal" approaches to planning was Davidoff. He states, "The prospect for future planning is that of a practice which openly invites political and social values to be examined and debated." (Davidoff, 1965: 331). His promotion of the concepts of *"Advocacy Planning"* and pluralism in planning went against the traditional concepts of rational and empiricist planning, which predominated up to that point in time. To Davidoff, "the solutions to questions about the share of wealth

and other social commodities that should go to different classes cannot be technically derived; they must arise from social attitudes." (*Ibid*).

Davidoff asserts that values are inescapable elements of any rational decision making process and that the right course of action is always a matter of choice, never of fact. He calls for "plural plans" to be presented to the public rather than single agency plans and for the politicising of the planning process. This in effect is a call for increased public participation in planning and for power to be dispersed in the development of plans and thus decision making. These new concepts in planning would soon move to the fore of the planning and society debates taking place in the United States at that time, debates that continue to this day.

The importance of participatory democracy and of participation in planning have also been long recognised in the U.K. The 1968 Town and County Planning Act stated that local authorities should undertake participation exercises. Thornley calls the 1968 Act the beginnings of a new dimension to planning (Thornley, 1977: 3). Arising out of the historical developments, issues and concerns that created an urge to move away from the "expert" planner, increased participation, in of itself, was considered the solution to many of the problems occurring in society. A full exploration of the theories of participation in planning and society follow in the next sections.

4.2.2. Participation Theory: The Skeffington Report

The concept and importance of participation was introduced previously and although there is no precise definition of public participation many have contributed to the development and understanding of participatory practice in planning. The importance of participation was recognised in Great Britain by the influential Lord Skeffington Report, "*People and Planning: Report of the Committee on Public Participation in Planning.*" The authors of this report understood public participation to be, "the act of sharing in the formulation of policies and proposals." (Great Britain, Committee on Public Participation in Planning, 1969: 1). However, Lord Skeffington acknowledges "limitations to this concept" and placed responsibility for planning firmly in the hands of local planning authorities and their professional planners. The Skeffington report states that, "the completion of plans – the setting into statutory form proposals and decisions – is a task demanding the highest

standards of professional skill and must be undertaken by the professional staff in the local planning authority." (*Ibid*).

A milestone in the modern planning system in Great Britain the Lord Skeffington Report looked at planning as a prime example of the need for participation "for it affects everyone" (*Ibid.* 3). The Skeffington report viewed the new Town and County Planning Act of 1968 as important because it, "provides the citizen with a statutory guarantee that he must be given information about a given situation and an opportunity to make his views known to his local planning authority and the authority must then consider them." (*Ibid*). Skeffington continues, "The process of participation is dependent upon the adequate supply of information to the public." (*Ibid.* 19).

To Skeffington, participation, as well as giving the individual the chance to say how his town or village should develop, "offers him the opportunity of serving the community and thereby becoming involved in its life, contributing to its well-being and enriching its relationships. Nor are the benefits just to the individual; many groups attract people whose local knowledge and skill will often produce new and valuable ideas." (*Ibid*). Written in 1968 this description of participation is still apt and can be considered a suitable means to describe participatory information systems in that they offer residents opportunities to serve and be involved and contribute local knowledge and skill to community initiatives.

The Skeffington report recognised the importance of bringing groups together in a "community forum" for discussions, "so that there might be a cross-fertilisation of ideas and a wider realisation of the problems of an area as a whole and of the differing needs for which an authority must cater." (*Ibid.* 13). The community forum could also provide a two-way flow of information between the local planning authority and the public. The Skeffington report stated, "Currently the machinery does not exist for the return of views to the authority but that a community forum could fill this gap." (*Ibid.* 13).

Skeffington recommended using the technologies of the day to communicate the professional plans of the planners to the public. The technologies cited included exhibitions, mobile exhibitions, films, the press, radio, television and publications. The report stated that other kinds of material and equipment could be used to illustrate planning

matters such as 35mm slide projectors and overhead projectors. The report stated that because techniques in this field were developing fairly quickly, "any detailed advice that we might give would be quickly out of date. These methods do however, provide useful aids in the communication of facts and ideas." (*Ibid.* 30). The extent of the development of the techniques in the field and of computer and multimedia technology in general could have hardly been realised at that time.

4.2.3. Participation Theory: British Planning Post Skeffington Report

Since the Skeffington report in Great Britain, however, the proposed progressive changes to the planning system, including the use of innovative technologies, have been slow to take effect. Berkeley *et al.* (1995) state that today it is surprising to find major consultation exercises being undertaken, "given the minimum of legislation enforcing local authorities to consult over planning matters..." and that the degree to which people are involved, "will largely depend upon the local authorities' commitment to public consultation." (*Ibid*). This commitment is variable with some authorities enacting progressive technological solutions, others traditional techniques and some failing altogether to include participatory exercises.

With regards to the use of consultation techniques, many planning exercises still rely on methods pioneered decades ago. As late as 1995, for example, Berkeley *et al.* refer to the Skeffington report, which describes consultation methods including:

- **Ward meetings to test views of local residents**
- **Essay competitions on local economic development and suggested solutions**
- **Exhibitions to illustrate survey data and draft proposals**
- **Obtaining the views of new voters**

The authors employed these techniques in Hillfields, Coventry for the development of a local community plan. The techniques described above incorporate no new technologies or innovative methods. Additionally, it appears that the techniques are only useful for drawing out negative aspects of communities, further reinforcing negative images and stereotypes. This can lead to stigmatisation of entire communities. These negative revelations are exemplified by the work of Berkeley *et al.* in Coventry in the following statement:

> *"These exercises served to confirm the view that, 'Hillfields is one of the most deprived areas in the city'. This is particularly witnessed in: high levels of unemployment, low skill levels, barriers to training; high levels of crime and the fear of crime; high levels of insecurity; and the poor quality of the environment evidenced by a perceived lack of open space, poor housing and a run-down shopping area. However, the consultation exercise revealed a number of other concerns; low access to community facilities; a high incidence of health problems; traffic problems; and a poor overall image of the area, with a concentration of this problem around the high-rise housing development."*
>
> (Berkeley, *et al*: 195).

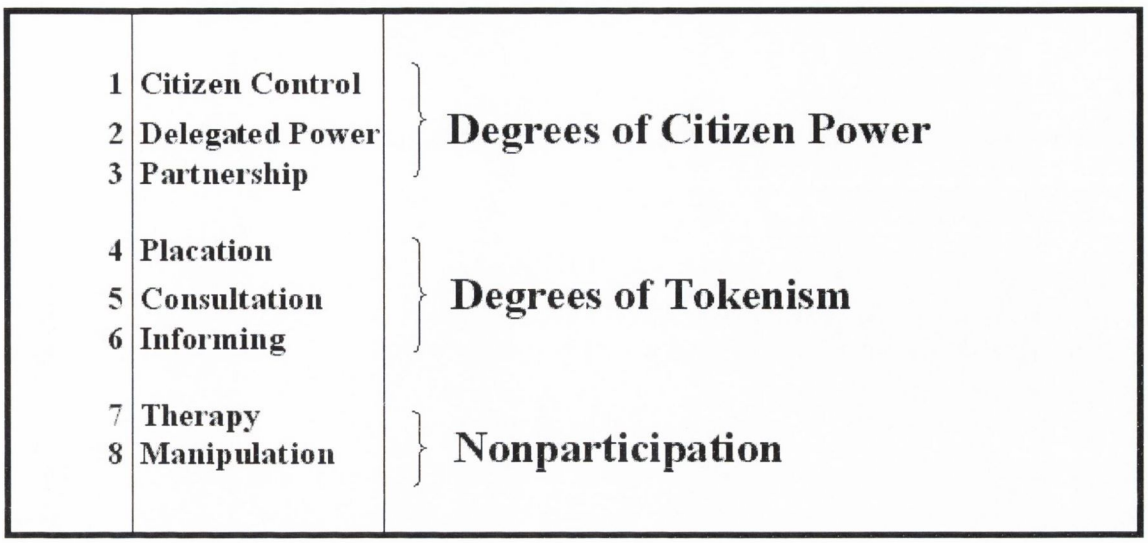
These characteristics can be found in inner city areas in many nations. To continually present them to area residents serves the purpose of reinforcing these negative perceptions among local residents, planners, politicians and other citizens. The emphasis should be placed on community assets, positive programs and innovation. Graham recognises this when he states, "The challenge to planners and local policy-makers is to try to construct the meaningful, accessible and public local virtual cities which support the positive urban vision of trying to reconnect the often fragmented elements of cities together." (Graham, 1995: 201).

4.2.4. Participation Theory: Arnstein's Ladder of Public Participation

At the same time as the Skeffington Report was influencing British planning practice similar events were influencing U.S. planning theory. In the U.S. Arnstein, published her seminal work, "*A Ladder for Citizen Participation*" which took a more "activist" approach to participation than the current norms. She conceptualised participation as a ladder or continuum from "nonparticipation" to "citizen control", (see Figure 4.2.). The first two rungs on Arnstein's ladder, "manipulation" and "therapy", are identified as "nonparticipation" in the planning process. Informing is the third rung and the first step above "nonparticipation" on the ladder in a "chronological" progression towards "citizen control". "Informing" is identified as a "degree of tokenism" along with the next two rungs "Consultation" and "Placation".

The top three rungs on Arnstein's ladder are identified as "degrees of citizen power". These top rungs are "partnership", "delegated power" and "citizen control", respectively.

Figure 4.2. Arnstein's Ladder of Participation



Source: Arnstein (1969).

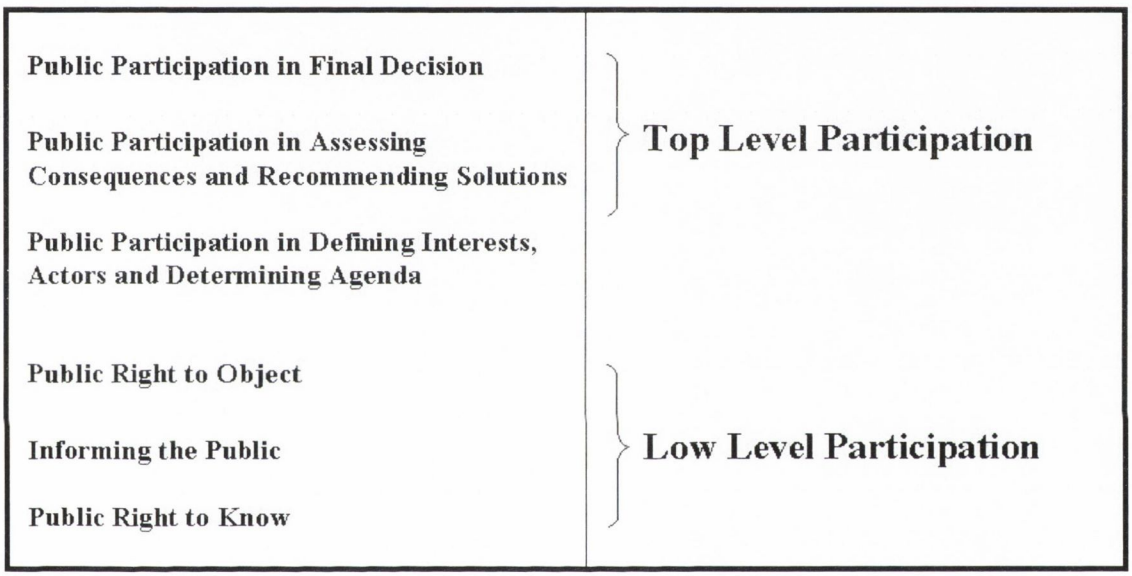
Arnstein's conceptualisation goes beyond the participatory ideals put forth in the works of other planning theorists. This can be seen in the top two rungs of her ladder. The top rung of the ladder "citizen control" is clearly an activist approach. This was something new to the planning profession and the establishment, for it challenged the holders of power in planning and government to relinquish it to citizens. This was a challenge of great significance to planning and one that was virtually unheard of up until that time.

Arnstein's ladder is a progression towards citizen control, each rung one step closer to the ideal in participatory democracies, namely "citizen power". Her top rung, "citizen control" is synonymous with citizen power and, "It is a strategy by which the have-nots join in determining how information is shared, goals and policies are set...." (Arnstein, 1969, 216). This "joining in" of citizens in the planning process is participation. She calls the roadblocks to genuine participation "inadequacies of the poor community's political socio-economic infrastructure and knowledgebase, plus difficulties of organizing a representative and accountable citizens' group in the face of futility, alienation, and distrust." (*Ibid.* 217). In theory, PPGIS has the potential to address issues of information inadequacies as they relate to a community's "knowledgebase" through the collection, storage and retrieval of local information.

A more recent information technology perspective on Arnstein's ladder is contained in Kingston's (1998) modified ladder. He views "informing the public" as the second rung

above "public right to know", which is the first step in his six-step progression from "low level participation" to "top level participation". Kingston *et al.* argue that new Internet-based technologies, "are a useful means of informing and engaging the public and can potentially bring the public closer to a participatory planning system." (Kingston *et al.* 2000, 109). Notably, informing the public and participation in the process and final decisions are emphasised by Kingston *et al.* as opposed to the citizen control and power noted in Arnstein's ladder above. Nevertheless, informing is the key concept common to both conceptualisations of participation.

Figure 4.3. Kingston's Public Participation Ladder



Based on: Kingston (1998).

4.2.5. Information Provision and Participation in Planning

Coppock recognises the importance of information provision in the planning process. With regards to information he states,

> *"Information is of critical importance, whether about the very existence of an issue, its nature and seriousness, about the courses of action that are feasible or about the likely consequences...of course no information may exist, a frequent occurrence in environmental problems; no one may have thought of collecting it or it may be too difficult or costly to obtain. Alternatively, information may exist, but, is not used because no one outside the agency responsible is aware of its existence, or it is not in a suitable form, or it is regarded as too confidential, or too technical to comprehend,*

or officials are unwilling to release it for a variety of reasons associated with their views of their roles and of the public's."

(Coppock, 1977: 205)

Coppock also states that information may be deliberatively withheld or provided too late for it to be of value in order to limit the effectiveness of public protest, possibly because those who control it see themselves threatened (*Ibid*). A lack of information provision can have a negative impact on public participation.

Hanna (2000) views participation in planning as having an important information provision function. She identifies additional functions of information provision and lists: education, public relations, getting through projects, and sometimes lending credibility, legitimacy or window dressing to decisions that have already been made. To Hanna, there is a "paradox of participation". She states that, "Participation is ideally broad, overt, and accessible. It has the capacity to encompass all affected stakeholders and ensure that their concerns are incorporated into a final decision or planning product." (Hanna, 2000: 400). The problem is that it can be limiting because of questions as to who can participate, what interests do they represent and to what extent do they reflect plurality to planners and policy practitioners. Finally, according to Hanna, even the most well developed participation programs cannot ensure that they will significantly influence decisions.

To Hanna even though participation is viewed as essential to planning process success it may not be significant as there are hidden "information systems" specifically those limited to institutional stakeholders (*Ibid*). She asserts that consensus building among government agencies and NGOs requires broad access to information (*Ibid.* 398). Hanna asks critical questions about the relationship between participation and information. To Hanna, their relationship is synergistic as participation not only facilitates the addition of new information and new interpretations of existing data, it also helps diffuse knowledge to those who may be peripheral players in the process (agency or non-agency actors). Information to Hanna has a "transformative" function that can alter perceptions and mindsets in advance of a decision phase (*Ibid*).

4.2.6. Healey and Collaborative Planning Theory

Healey who has written extensively on the history of planning, spatial planning concepts, planning in practice in the U.K., environmental sustainability and "place making" in planning is widely cited in planning theory research. She summarises contemporary planners' criticisms of the modern planners, "their conceptions of social life around male-centred family and the homogeneous society, their ideas of building form and its significance, their lack of understanding of economic dynamics, and their conceptions of environment as a landscape backcloth and amenity for the working man and his family." (Healey, 1998b: 8). Her conceptualisation of "*Collaborative Planning in a Stakeholder Society*" attempts, "to weave together economic, social, environmental and physical dimensions of what makes up a place... presenting images of what places in their 'settings' could be like, both in their spatial and institutional dimensions." (Healey, 1998b). Healey states,

> *"Planning approaches with their emphasis on knowledgeability and interrelationship between activities in places and on the relation between short and long term actions and effects, have much to offer collaborative governance. But traditionally they have been associated with technocratic 'representative' governance where experts are separated from interested parties or corporatist practices where only a few powerful interests are included in the collaboration. This produces too narrow a base of social and intellectual capital for the challenges most urban regions face."*
>
> (Healey, 1997: 243)

According to Healey, participatory approaches to planning seek a more systematic method to include members of political communities and offers a style of reasoning which brings into play the range of ways of knowing and valuing within a political community and among stakeholders (Healey, 1997: 239). Her focus more recently has been in the development and implementation of these theories through the practice of collaborative planning.

Collaborative planning is a recent evolution of the concept of pluralism and participation in planning. To Healey, the articulation of public policies to and between the multiple stakeholders in society should be held as the ideal for planners. Participation through collaboration in plan making is the strategy she has promoted for solving planning problems. However, in ascribing to the central role of planners and the "plan", Healey,

can be shown to support a top-down, institutionalised view of planning, a view heavily criticised in the past and one this research strives to break from.

This focus on the formal frameworks and structures of the "plan" as a means to affect collaboration and participation has been criticised by many. Mazziotti (1974: 46) makes the argument that planning theory, "fails to suggest new strategies to confront persistent social problems, continues to assume the necessity for gradualist or reform-oriented solutions and implies that the prime criteria for effectiveness must be the existing institutional setting." More recently Tewdwr-Jones and Allmendiger (1998: 1972) state that there is too much emphasis on the plan as a vehicle for "ideal speech." The next section explores some of these criticisms of current "liberal" planning theory and practice in more detail.

4.2.7. Criticisms of Liberal Planning Theory

Liberal planning theory promotes advocacy, pluralism, participation and collaboration in planning practice and is a reaction against the rationalistic and empiricist approaches to planning that predominated the profession prior to the 1970s. Many theorists and planning practitioners have studied and implemented liberal planning ideas. Understanding and exploring the criticisms levelled against liberal planning theory and practice helps broaden the theoretical perspectives of this research and contributes to the design of participatory techniques and technologies.

Mazziotti considers the shortcomings of liberal planning, collaborative approaches to planning, advocacy, "pluralist plans" and pluralism in planning in his, "*The Underlying Assumptions of Advocacy Planning: Pluralism and Reform*" (Mazziotti, 1974). He calls pluralism the "*modus operandi*" of all planning activities in the United States (*Ibid:* 38). He criticises the assumptions of advocacy and pluralism in a capitalist political economy as myths, that in order to be effective must, "ultimately embrace the status quo or the liberal-reformist approach to solving complex social problems, and adopt a set of tactical strategies which emulate existing professions so as to preserve centers of power and frustrate the notion of participatory democracy." (Mazziotti, 1974: 46). To Mazziotti, "liberal-reformists" planning protects the status quo, planning's "existing professions" and "centers of power" in government.

Thornley also makes criticisms of participation in planning and traditional government planning practices and policies. He recognises the problem in the need to balance representative and participatory aspects of democracy. He raises issues of efficiency versus public involvement and the problems associated with power, conflict and public confusion. He reveals the "myth of democracy" as conceived by Almond and Verba (1965) and states how it is important that, "people have to believe that they could participate if they needed to, but not actually do so." (Thornley, 1977: 16).

Thornley develops the concept of Almond and Verba's "civic culture" which is a composite of the following three elements; "*Parochial Culture*; a lack of attitudes to the political system because of a lack of knowledge. Traditional attitudes and behaviour predominate. *Subject Culture*; although knowledge about the political system exists there is no expectation of taking an active role. A deferent and passive attitude. *Participant Culture*; an expectation that it is possible to play a part in political activities." (Thornley, 1977: 15). To Thornley and Almond and Verba, the balance between the three is the key to system stability.

Another important contribution of Thornley's to the theory of planning and participation is his description of the three broad perspectives; *conservative, liberal* and *radical*, behind which the assumptions that inform many policy makers rest. The *conservative* perspective maintains the status quo with regards to existing social relations, is hierarchical in nature and supports the dominance of planning through laws and plans. The *liberal* perspective recognises that existing social relations suppress human potential and seeks to change the status quo through policy adjustments, institutional reforms and marginal improvements. Finally, the *radical* perspective is developed from a "total view" of problems and seeks structural change in the capitalist state and power relations. The radical perspective is also, "oriented towards groups striving to change their social conditions through providing information based on practical experiences within a comprehensive perspective." (Thornley, 1977: 4).

4.2.8. Conclusions on Planning and Participation Theory

In conclusion, it is the conservative and liberal perspectives, which predominate in current planning practice. To some theorists, participatory planning exercises as they are currently

implemented can be described as token gestures aimed at the placation of citizens rather than the true sharing of decision making control and power. Many planners and stakeholders view participation as a consultative process, which is considered a "degree of tokenism" by Arnstein (1969) as indicated on her "ladder of participation". The parochial nature of the relationship between many local governments and grassroots organisations and citizens, especially in certain jurisdictions, further exacerbates this situation.

The theories and practices of planning and participation contribute to a critical theoretical framework for successful PPGIS initiatives in the grassroots. Familiarisation with these processes helps create a foundation on which PPGIS models can be designed and implemented. It is important to understand that the planning process still provides a mechanism whereby individuals and organisations can affect positive change in their communities. Advocacy and grassroots GIS are not designed to replace or undermine planners and established participatory practices. Grassroots GIS have the potential to augment communications flows between individuals, organisations and planners through the innovative use of spatial information technologies. There are additional theoretical perspectives to the design and implementation of PPGIS in community settings. The next section explores the theoretical issues associated with the power of maps, digital spatial information and GIS.

4.3. THE POWER OF MAPS AND DIGITAL SPATIAL INFORMATION

The theoretical perspective of the power of maps and spatial information incorporates the research findings of several disciplines. Cartography, information system and geography theorists and their well-developed constructs on the power of maps and information are covered in this section. PPGIS design and implementations draw from these theoretical perspectives as they employ the spatial representations of the map and combine them with the power of information technologies and GIS. Used for the purposes of planning and community advocacy, GIS and digital spatial information can be powerful tools.

Miller and Han (2001: 3) state that, "Similar to many research and application fields, Geography has moved from a data-poor and computation poor to a data-rich and computation rich environment. The scope, coverage and allure of digital geographic datasets are growing rapidly. Public and private sector organisations are creating,

processing and disseminating digital data on landuse, socio-economic, variables and infrastructure at very detailed levels of geographic resolution." (Miller and Han, 2001: 3). It is in this new and evolving environment that the theories of the power of maps and digital data in PPGIS projects are explored.

The concepts and theories of the power of maps and spatial information can be summed up under the following broad categories:

- **Top-Down in Nature**
- **Informing and Communicative**
- **Technologically Deterministic**
- **Potentially Abusive and Manipulative**

An exploration of the above concepts in relation to the power of information, cartography and maps forms the basis of a greater understanding of grassroots GIS and helps frame the subject theoretically.

4.3.1. The Power of Information in Planning

The topic of information in planning was introduced and defined previously along with the concepts of formal and informal data and local knowledge. A greater understanding of these concepts, perspectives and theories is revealed through the work of several geography and planning theorists who have conducted research in these areas. The provision of information to citizenry is central to the concepts of planning healthy communities and of participatory democracy as a whole. Many theorists writing at the dawn of the "information age" and before the development of the personal computer and the spread of ICTs could not have foreseen the changes in society that were to occur. Changes that would begin to place even greater importance, significance and power on information and its control.

It is important that citizens have access to and are able to disseminate information in the planning process. From the earliest participatory approaches and "community planning" exercises (Jacobs, 1961 and Arnstein, 1969), the access to and dissemination of relevant and up-to-date information, is held as vital. Many hold that providing citizens with the

information necessary for them to make informed decisions about the communities in which they live is an issue of vital importance in areas relating to quality of life, social equity and increased citizen participation in governance (Rybaczuk, 2002).

4.3.2. Forester and the Power of Information in Planning

John Forester's (1982) seminal work "*Planning in the Face of Power*" opens with the sentence, "Information is a source of power in the planning process." His research on planners and the planning process reveals information as a complex source of power. He takes an in-depth look at the types of distortions and misinformation that are inherent in the planning process and the impact that these have on the legitimacy of planning. To Forester adequate information provision, from planner to citizen, should be held as a fundamental component necessary for the planning process to be considered legitimate.

Forester looks at the role of the analysts and technicians in a critical way. Referring to them as deeply political, he identifies their informal communications networks as being more important than the information technologies that they use (*Ibid.* 17). According to Forester, the technical "experts" shape attention; they are "coalition builders" as well as information accumulators. They have to shape the attention as well as the expectations of elected officials, residents, developers and all others involved in the planning process. Therefore, because of this role, they cannot render detached distinct analysis. They shape attentions selectively to certain options and inevitably neglect others (*Ibid*).

Forester refers to the technicians as "gatekeepers", who as actors in the planning process have specialised knowledge or technical expertise. They become a source of influence as they often acquire a monopoly on organisational and politically relevant information. He calls information "both a political and technical resource". These gatekeepers have the ability to stress some issues and downplay others, to clarify some opportunities and obscure others (*Ibid.* 19). These concepts and perspectives are directly applicable to GIS as they are currently developed and implemented in planning departments and local government administrations worldwide. GIS technicians are the "gatekeepers" of vast stores of "formal" spatial information. With this power comes the potential to manipulate information to meet ones own political ends or those of others.

Forester does not identify all planners as being manipulative and overtly political, however. Beauregard (1990: 9) calls Forester a progressive planning theorist, opposed to the indignities and inequities imposed by capitalism and the capitalist state and dedicated to a participatory democracy that engenders public debate about planning proposals. "This political understanding is central to his portrayal of organisations and institutions as inherently undemocratic and biased against truthful and undistorted communications. It also establishes his call for a critical planning practice that resists concentrated power and conveys his own political leanings." Beauregard (1990: 8). To both Forester and Beauregard, it is not the planners who are the problem but the system that promotes the distortion of information for the purposes of the powerful.

Forester's arguments state that it is the professional and ethical duty for planners and technicians to release information to those who need it. Lack of information and distortions are unnecessarily harmful to the poor, the unorganised and the powerless. They stand to benefit the most from information and can be hurt the most by lack of awareness of information. To Forester, "what flows in the analyst-other interaction is not simply information but responsibility-and the ability to respond as well." (Forester, 1982: 17). He states, "In a democratic society citizens should be able not only to find out about the issues affecting their lives, but also to communicate meaningfully with other citizens about problems, social needs and alternative policy options." (*Ibid.* 22).

Forester also suggests power building both outside and within mediated negotiations, again a top-down, planner-centred approach. To meet the needs of "progressive planners" to counteract misinformation, he states that planners already have a repertoire of practical responses namely, "commonplace acts of checking, double checking, testing, consulting experts, seeking third-party counsel, clarifying issues, exposing assumptions, reviewing and citing the record, appealing to precedent, invoking traditional values (democratic participation, for example), spreading questions about unexplored possibilities, spotlighting jargon and revealing meaning, negotiating for clearly specified outcomes and values, working through informal networks to get information, bargaining for information, holding others to public commitments and so on." (*Ibid.* 41).

Forester suggests that "new progressive social-technologies" are not crucial to planning and that there are no purely technical answers to the questions of how neighbourhoods

should be represented, especially weakly organised ones (*Ibid.* 101). Grassroots GIS in community settings seek to enhance citizen-citizen, citizen-planner types of communications. New PPGIS models do not purport to replace the planner. They can, however, assist residents and planners with community information gathering, dissemination and network building. Additional issues such as record keeping, clarifying issues and increasing public participation, which are some of the planning "responses", that Forester has demonstrated as crucial, can also be assisted by PPGIS and grassroots GIS.

4.3.3. Forester and Communicative Planning Practice

Forester's research highlights the importance of communication between citizens and planners and the need for mechanisms to be employed by planners to enhance them. Forester, like Healey, turns away from technical planning solutions and new technologies to achieve the goals of improved communication and increased participation in planning. He focuses primarily on the role of the planners in the process and their importance as wielders of power. This can be considered top-down and therapeutic in nature as it maintains the status quo. Planners and government agencies still control information and decision making processes. Citizens are given a forum for debate but no real power is transferred. This approach fails to take into account the fact that communities today can develop their own information networks, creating, controlling and utilising information for their own decision making purposes in the form of community ICTs and PPGIS and grassroots GIS.

Forester supports a move in planning from "technical to communicative" practice and states that,

> *"Problems will be solved not by one expert, but by pooling expertise and non-professional contributions as well; not by formal procedure alone, but by informal consultation and involvement; not predominantly by strict reliance on data bases, but by careful use of trusted 'resources,' 'contacts', 'friends'; not through formal rational management procedures, but by internal politics and the development of a working consensus; not by solving an engineering equation, but by complementing technical performance with political sophistication, support building, liaison work, and, finally, intuition and luck."*
>
> (Forester, 1980: 280)

These concepts and methods for the incorporation of local knowledge and non-technical solutions into planning practice can be key concerns and important constructs for those developing PPGIS.

In his section on "Communicative Ethics: Practical Action and Political Vision" Forester asks the question "How should analysts do such work?" He calls for an exploration of the various processes of participatory design and policy criticism and dialogue as a means to organise effective participation. Forester feels that planners, technicians and analysts, the "gatekeepers" of information, need not work towards fully open communications, as that is impossible, but the correction of "needless distortions" some systematic and some not, that disable, mystify, distort and mislead others. In other words, according to Forrester, to work towards a "democratisation of daily communications" (*Ibid.* 21). The importance of undistorted communications in planning is well understood by theorists as well as practitioners.

Forester is highly critical of "technical planning" and offers instead the following "practical methodologies" for achieving a merger of technical and communicative planning practice. These goals are summarised in his table "Communicative Strategies Complementing Planners' Technical Work" (Forester, 1980: 282). He states that planners can:

- **"Cultivate community networks of liaisons and contacts, rather than depending on the power of documents, both to provide and disseminate information;**
- **Listen carefully to gauge the concerns and interests of all participants in the planning process to anticipate likely political obstacles, struggles, and opportunities;**
- **Notify less-organised interests early in any planning process affecting them (the more organised groups whose business it is to have such information won't need the same attention);**
- **Educate citizens and community organisations about the planning process and the "rules of the game";**
- **Supply technical and political information to citizens to enable informed, effective political participation;**
- **Work to see that community and neighborhood, non-professional organisations have ready access to public planning information, local codes, plans, and notices**

of relevant meetings, and consultations with agency contacts and "specialists" supplementing their own "in-house" expertise;

- **Encourage community-based groups to press for open, full information about proposed projects and design possibilities;**

- **Develop skills to work with groups and conflict situations rather than expecting progress to stem mainly from isolated technical work;**

- **Emphasize to community interests the importance of effective participation in informal processes of project review, and take steps to make such design-change negotiation meetings equitable to professionally unsophisticated groups;**

- **Encourage independent, community based project reviews and investigations;**

- **Anticipate external political-economic pressures shaping design decisions and compensate for them-soliciting "pressure we can use" (e.g., countering vested anti-public interests) rather than minimizing external pressure altogether."** (*Ibid*)

Forester calls these "actions" for planners. They are elements of organising practices, "practically mobilizing concerned and affected persons, in addition to technically calculating problem solutions." (*Ibid.* 282). In theory, PPGIS can present technical solutions to problems as well as act as "practical mobilising" tools for communities. PPGIS project designers and researches can gain much from the theories and practices of Forester's "*Planning in the Face of Power*".

4.3.4. The Power of "Place" and the "Local" in Planning

Although there is no one standard definition of "place" or of the "local" they are often synonymous with a geographically defined area or community. Geographic communities can be comprised of several neighbourhoods which have been defined as, "geographic areas whose boundaries coincide with observable changes in prevailing land uses, physical features, occupant characteristics, and economic influences" (UVM, 1998), and which have a population under 25,000 (U.S. Department of Housing and Urban Development, HUD, 2002). For the purposes of this research "place" and the "local" are defined much more broadly and are not necessarily restricted to geographically delineated areas or neighbourhoods alone. According to O'Carroll, a "community" can consist of a shared image or sense of a place and a, "sense of belonging to a large social group of like minded people..." which, "imparts a needed feeling of security." (O'Carroll, 1987: 77).

Planning researchers have explored the importance of "place" and the "local". The work of Forester examined the importance of power, information and technical expert, citizen, and politician relationships in local planning controversies. Another planning theorist who has looked critically at the issues of power relations, technical expertise and information in participatory and collaborative planning is Healey. She is critical of traditional planning expressed through "neo-liberal political philosophy and rational choice theory" which dismiss "place" making as irrelevant to the needs and concerns of today's communities. Healey is one of many planning theorists (Forester, Davidoff, Mazziotti and Thornley) who criticise the influence of "experts" and technicians, their "professional" conceptions of "place" and their assumptions that, "the state had the power and resources to build the planners' imagined places." (Healey, 1998b: 9).

Like Forester, Healey has a less than favourable outlook with regards to technological innovations and planning (Healey, 1998b: 14). She states that only the technical experts understand the strategy delivered in strategic planning. This is a clear denunciation of both strategic planning exercises in the U.K. and of technical experts. In her research into the impacts of technologies on planning, cities and local quality of life issues for citizens, she raises serious questions about, "the extent to which technological innovation can come to the aid of city economies and quality of life." (Healey *et al.* 1995b: 150).

In her focus on "*Telematics*", Healey asserts that as they are currently deployed, the new technologies appear to be reinforcing the concentration of opportunity and power in the hands of the most dynamic companies, cities and regions. She concludes, "If the democratic promise of the new technologies is to be realised, the creation of institutional structures and processes, with the capacity to direct technology to the service of cities, their companies and citizens, needs to be given a central place in the discussion of innovation." (*Ibid.* 151). The "democratic promise" of innovative technologies and ICTs is clearly recognised by Healey, however, several issues remain unexplored.

Healey's emphasis is not on the technologies themselves but on the way they are used to reinforce the importance of the institutional dimensions of planning in society. With regards to the tendencies for new forms of spatially and socially uneven infrastructure development and provision in society, which have also been referred to as marginalisation and exclusion, Healey recognises the capacity of technology to create an "even playing

field". New ICTs, "appear to open up the possibility of universal access to information... it therefore has the capacity to reintegrate the fragments of our society and to contribute to the project of social cohesion." (*Ibid.* 148).

To Healey, it is vital to weave together the economic, social, environmental and physical dimensions of what makes up a place to improve the quality of life and manage change. Social cohesion is an important result of this process. As a means to achieve this, Healey highlights the "enduring emphasis" of the role of the "plan" to manage spatial changes at the regional, settlement and neighbourhood level and the re-emergence or reassertion of "plan led" place making and consensus building in the 1990's.

To Healey, the form and characteristics of collaborative planning are local initiatives, with horizontal linkages and interactive qualities, "People and agencies... drawn into new activities in new ways... a wide universe of those with a 'stake' in a place." (*Ibid*). To her, and others, "geography matters", as the local is of vital importance to promoting quality of life. She states that, "even though our individual 'places of being' might be 'despatialised' with fluid community like the phone and the web, particular places are still important." (Healey. 1998b: 1532).

Healey acknowledges that planners are criticised for "reifying" place and for attempting to acquire too much control over place making activities. However, in her opinion, there is a need for such practices and an emphasis on place. The need to move away from the, "sectoralised and centralised approach, to enable connections to be made to other areas of policy activity", is clear to Healey (1998b: 3). This is a call for new approaches to planning, decentralised and connected to multiple areas of "policy activity", something the "plan" and ICTs like PPGIS are well suited to accomplish.

Healey's "plan" based approach is a theme running through her research. Her focus on the plan as the framework and structure for "place making" can be viewed as top-down, institutional and structural in nature. Other theorists including Tewdwr-Jones and Allmendiger disagree with Healey's theory and have criticised approaches that ascribe to the overly central role of planners and the plan. They state that there is too much emphasis on the plan as a vehicle for "ideal speech" (Tewdwr-Jones and Allmendiger, 1998: 1972).

To Healey, the collaborative approach is the solution to the planner-citizen conflicts. The use of symbolic language rather than the technical data is vital. She cites the stories and metaphors of the community as important in the development of 'place based' collaborative approaches. A proponent of the importance of local knowledge, she sets forth the, "collective social construction of strategic organising ideas, stories, images and so forth" in a plan as a key component in the process of "place making" or "collaborative planning" (Healey, 1998: 1). The plan is a means to, "present images of what places in their settings could be like, both their spatial and institutional dimensions." (*Ibid*).

The concepts behind PPGIS are similar in theory to the spatial planning, plan-based approaches characterised in Healey's research. PPGIS do present images, both the spatial and institutional dimensions, of what communities look like or can look like. The incorporation of these collaborative approaches and theories into the development of a grassroots GIS is vital to realising a truly participatory tool for the collection, storage, retrieval and dissemination of information. Additionally, the community building and networking potentials, the "weaving together" of the economic, social, environmental and physical dimensions of what makes up a place, can also be seen as important to PPGIS theory.

Healey's work expands the concepts and importance of "place making" in planning from the U.K. perspective, contributing to a greater understanding of the subject. To Healey, geography and place and the local are important. Geography matters, the local matters and both play a prominent role in addressing social issues. Many planners, geographers and social theorists recognise the importance of the local and thusly place an emphasis on the representations of these local places. Plans can accomplish this through the use of tools such as the map, GIS and PPGIS.

4.3.5. The Power of Visual Representation: The Map

The power of the map is well understood by geographers. The spatial representation of the earth's surface in a readily accessible, understandable and transportable form has been a tool of powerful forces in society for generations. The map is used for innumerable purposes, by government, industry and individuals. National defence, the exploitation of natural resources, and the delineation of property boundaries are just a few of the uses of

maps in our society today. An exploration of the evolution of the map and the theories of the power of visualisation through their use aids in the development of a theoretical framework for the design and implementation of grassroots GIS.

Wood explores the methods used by ancient civilisations, including Mesopotamia, to order their societies through mapping and cartography (Wood, 1992: 151). He states that in Mesopotamia the early Sumerian ideograms were indications of a society, "driven by the need to keep records" and that, "early cartographic sign making probably developed in conjunction with early linguistic sign making... and the first phase of urbanism." (*Ibid*). Wood closely links the development of cartography and mapmaking with changes in civilisation that would transform the main economic and social realms from those centred on agrarian activities to those of the emerging towns and cities.

The power of the map in western society originates with the explosion of science, learning and technology that heralded the onset of the Enlightenment. Ptolemy, Descartes and Bacon are all names synonymous with the advance of science, rational thought and technology. Geographic understanding, through the new methods of cartography, pioneered by Ptolemy and Descartes, was to usher in a new age of knowledge, understanding and enlightenment. Thus was born the "Western" tradition and the foundations for the feudal, colonial, industrial, modern and information societies that would follow. The map has been used as a tool by governments to reinforce state control and power throughout these changes in civilisation.

Wood states, "In any important sense the map *requires* and *justifies* as it *records* and *demonstrates* transformations in control over the land, its appropriation in the name of science and civilisation, the state and human progress." (Wood, 1992: 7). To Wood, mapmaking societies reach out to "subsume", with the "cartographic enterprise as an essential and committed partner", other cultures and economies. This is accomplished through "conquest, appropriation and seduction" that help ensure economic growth and development. Wood has researched in great detail the contributions of the map towards the purpose of state control and expansion, calling cartography, "an activity required for the stability and longevity of the state." (*Ibid.* 46).

The evolution of the "state" and the patterns of use of new technologies, including cartography, to maintain and advance power and the powerful are important theoretical considerations for those designing and implementing ICTs. Questions need to be asked regarding who benefits and how through the use of these technologies and innovations. These considerations and the transformations in society made possible through cartographic power are covered in detail in the next sections.

4.3.6. From Agrarian Societies to Nation States: Maps in Early Modern Europe

Maps are seen as having contributed to the "enlightenment", scientific rationality, and the rise of the nation state. It was not until the rise of the nation state in Europe that mapping and cartographic power reached their full economic, social and political power potentials. Buisseret describes the new cartographic technologies as imposing an, "inscription on the landscape of an abstract system of organisation." (Buisseret, 1992: 61). This abstract, spatial system of organisation was exported throughout the world, bringing great wealth to the originating nations and enslavement and exploitation to others.

Europe was at the centre of this "abstract system of organisation" as most of the world was soon partitioned and parcelled off amongst competing European powers. This system of control known as colonialism, was aided by cartographic practice and knowledge developed in Europe. Although largely dismantled, the colonial system leaves residual traces in the boundaries of nations and their economies even today. Many see recent economic globalisation efforts as a new colonialism, where the profit maximisation imperatives of capitalism have taken the place of colonial exploitation (Castells, 1996b and Harvey, 2001).

The importance of maps as agents of state control in Europe is recognised widely (Harley, 1988, Barber, 1992 Buisseret, 1992 and Wood, 1992). According to Barber, the power of the new tools of cartography were recognised, by 1550 when maps were enrolled into the service of English government becoming a fully integrated aid in the formulation of policy and an instrument of administration (Barber, 1992: 45). Notably, according to Barber, "The crown's greatest cartographic achievement in the second half of the 16th century is to be found in Ireland." (*Ibid.* 61).

Barber states that in 1510 ministers in London knew little beyond the Dublin Pale, but by the year 1610 the they had initiated and supervised the mapping of the entire country including the detailed mapping of Elizabethan plantation estates and defence mapping for use against a possible Spanish invasion. Eventually, "officially sponsored mapping activity helped to bring about conditions of relative stability necessary for the survival of the plantations." (Barber, 1992: 62). The colonisation of Ireland and the subjugation of her people were complete by 1700 with the aid of large scale mapping exercises.

The emergence of the use of cartography to reinforce government and maintain the status quo is recognised by Buisseret, who also sees cartography as a powerful tool in the imposition of central authority on the "recalcitrant periphery" (Buisseret, 1992: 4). He traces the development of cartography in early modern Europe to Ptolemy's "Geography". By the end of the 1400s the age of enlightenment was emerging which, was ushered in along with a scientific revolution and a new way of "seeing" the world through mathematical coordinates, quantification, measurement and description (Buisseret, 1992: 1).

Harley, in his "*Maps, Knowledge and Power*" (1988: 285) traces the role that maps played in major historical and social changes that occurred in Europe as feudal economies converted to capitalist ones. He states that maps helped spread capitalist forms of agriculture and facilitated the division of labour needed for the new economy to expand. In concurrence with this theory are those of Wood, who in "*The Power of Maps*" (1992) states that, "Mapmaking emerges to facilitate the control of spatial processes in rapidly expanding societies." (Wood, 1992: 148). These processes aided by the map would eventually spell the end of feudalism and usher in the industrial and capitalist economy.

To Harley, maps also tend to "desocialise" the territories they represent (*Ibid.* 303). This is an important concept that needs to be explored further. Maps are filled with the technical, scientific, economic and other formal data used by government and commercial interests for the exploitation of natural and human resources. "Desocialisation" occurs when the human context and cultural artefacts are lost. It can be argued that this practice of the under representation of the human element in maps has carried over to modern cartographic techniques and that this shortcoming is made even more acute by GIS, remote sensing and information technology (IT) practices. The related concepts of the

misrepresentation of natural and human elements and the outright manipulation of the map for propaganda and exploitation purposes are also important theoretical issues.

4.3.7. Map Misrepresentations: Wood and the Power of Maps

The use of maps for propaganda purposes and their manipulation through the selection of projection, scale, type, sign, size, colour, emotive, layout, feature selection and other elements and procedures are well understood by Harley (1988: 287), Monmonier (1991) and Wood (1992). These types of manipulations have not changed with the evolution of cartographic technology, which now incorporates the use of computerised hardware, software, digital datasets and GIS. Monmonier postulates that the ease of use of new powerful personal computers and "user-friendly" mapping software makes map authorship too easy with the result that unintentional "cartographic self-deception" is inevitable (Monmonier, 1991: 123). Monmonier looks closely at both unintentional and intentional misrepresentations in maps and how they are perpetrated. He believes that knowledge of these honest mistakes, unethical practices, procedures, purposeful lies and propaganda will make them easier to detect in the future.

Wood also recognises the potential of the map to be used for unscrupulous purposes. He attempts to reveal the hidden and not so hidden influences within all maps so that all those who use them will be aware of their potential to mislead. About cartographers, Wood asks, "Do cartographers really believe anything they do is apolitical, that mapping is anything less than a form of empowerment, or that cartography lacks social and political consequences?" (Wood, 1992: 148). This statement can be applied to all geographers, planners, GIS specialists and technicians who create and use maps.

In digital form, the map becomes even more powerful than the hard copy, paper versions studied by Wood. The ability to create replicate, store, transmit as well as analyse maps and the information that is stored within them is greatly increased once the map moves from paper to digital form. There are great advantages for those with the power to create, access, control and modify maps. For those with the ability and knowledge to manipulate maps in their new digital formats, even greater advantages incur. However, for Wood, "it doesn't matter whether we make these maps with a marker or a personal computer." (Wood, 1992: 193), or "whether we commit what we know about a location to paper or a

computer screen." (*Ibid*: 228). The map tool, whether computer assisted or traditional in nature, is of great value.

To Wood, "It is this ability to link a territory with what comes with it that has made maps so valuable to so many for so long. Maps link the territory with taxes, with military service or a certain rate of precipitation, with the likelihood that an earthquake will strike or a flood will rise, with this or that type of soil or engineering geology, with crime rates or the dates of first frost, with parcel post rates or area codes, with road networks or the stars visible on a certain date." (Wood, 1992: 10). Therefore, to Wood, the value of the map varies depending on what territory it links to and the uses to which the map is put.

Wood states that it is better simply, "*to admit it that knowledge of the map is knowledge of the world from which it emerges*...that the knowledge that it embodies was socially *constructed*, not tripped over and no more than...*reproduced*." (Wood, 1992: 18). Edney in his review of Wood's "*The Power of Maps*" revels the importance of his research as a means to, "guide the reader past the rhetorical mask to expose the map's powers so that they may understand how it is that maps work." (Edney, 1994: 220). "Armed with this intellectual tool, readers can then use maps to further their own interests, to become "mappers" rather than remaining the mapped." (*Ibid*. 220). Former map-readers and users have the potential to become the GIS specialists of the future, with the aid of grassroots GIS and ICTs.

The map in its basic form is an information storage device. It has many functions and can come in a variety of forms, both traditional and digital. A map can contain information on property boundaries, growing seasons, crop yields, mineral wealth, economic and social conditions, classified national defence items, transportation infrastructure and many other topics. The map contains this information in a readily available, easily storable and readable format. There are great advantages for those with the power to create, access, control and modify maps and the data contained within them. To Wood, "Anyone who thinks any of this will change when the map leaves the paper for the "virtual environment" hasn't understood a thing." (Wood, 1992: 228).

Wood, although cognisant of the potential of the "virtual environment", overlooks the changes and enhancements to the map that digitisation offers. Many new improvements to

the map are the direct result of the digitisation process and the transfer from paper to the "virtual environment". Wood's "*The Power of Maps*" published in 1992, before the widespread adoption of desktop GIS packages, fails to address the evolution of the map from paper to digital formats, a failure that is understandable given the speed at which mapping and cartography changed during that short period. However, this failure is one that needs to be addressed.

Paper maps once digitised are enhanced through the power of computer technology. They are more easily created, stored, retrieved, replicated and edited in digital formats. Maps can be communicated instantaneously through computer networks and on to wider audiences over the Internet. Additionally, the computational and analytical powers of computer chips and software applications make analysis of maps, particularly spatial analysis and modelling, more accessible than traditional techniques have allowed. These changes have enhanced the power of the map. They have also enhanced the power of the data contained within maps and the sophistication and thus value of the analysis of these data.

4.3.8. Innes and The Power of Data

The theories, concepts and importance of data in planning are widely explored in the research literature. With regards to data, Innes, a leading planning theorist, states that the combination of generating, publicising and discussing them can have a pervasive effect on the planning process (Innes, 1988: 275). The vital importance of data is in aiding the creation of an informed, responsible and responsive system for planning and in becoming part of the users "thinking" (*Ibid*, 277). In other words, data are a means to expand and change the thinking of those who use them.

To Innes, "The professionals' roles in creating data and their ability to interpret data help make them legitimate and authoritative in the eyes of citizens and policymakers." (*Ibid.* 276). She states, however, that it would be an error to assume that data are primarily to function in cognitive ways, linked to identifiable decisions and that their only uses are to answer questions, to solve problems and weigh alternatives (*Ibid.* 275). Innes' research shows that data change the rules of planning in three major ways. Firstly, they help establish a forum for public participation. Secondly, they point out who is legitimate and

who is affected. Thirdly, they create norms for arguments, for example, arguments that can not run counter to the evidence in the data (*Ibid.* 277).

According to Innes, requiring organisations to, "collect and submit data to public scrutiny can be powerful tools for the implementation of policy. As early as the 1970s, the release of digital U.S. Census data and the establishment of data and reporting requirements for the U.S. Federal Community Development Block Grants (CDBG) program meant that at least some staff in planning departments became skilled at finding and manipulating data." (*Ibid*). Combined with other requirements such as Environmental Impact Reporting (EIR), which contain "generic" environmental data as well as updates of basic population, traffic and economic statistics, data have become a powerful tool in the U.S. as well as setting organisational learning into motion.

Innes sets forth a theory of the power of "data requirements" in the planning process (Innes, 1988). Data requirements for Innes generally refer to guidelines, rules, regulations and laws that control and enforce the collection, storage and dissemination of data in governmental agencies. Data help frame the process in crucial ways ensuring that public agencies implement policy objectives. The most significant characteristics of these data requirements in Innes' theory are:

- **They increase and maintain expertise and accessibility of data resources in an agency and political process. Increased technical capacity occurs as personnel are hired and trained.**

- **Through a variety of mechanisms they empower certain viewpoints relative to others.**

- **They change the terms of planning debates by shaping agendas and norms of discourse and by influencing which values become the "taken for granted" basis for choice.**

- **They give citizens and public interest groups a place at the bargaining table when officials are making decisions.**

- **They change the content and structure of the discourse out of which actions and decisions emerge and change rules about who can participate, what are legitimate topics of discussion, how the discussion must be constructed, the assumptions that are taken for granted and the ones participants will have to justify.**

- **The requirements to generate and publicly present data assure that organisation and political attention goes to the issues the data represent.**

- **They require officials, planners, managers and elected officials to learn about data because they are accountable not only for accuracy and interpretation but consistency between policies and data.** (*Ibid*).

Innes' view is that data are the key to undistorted communications and that without data no explicit debate can occur on a whole range of issues. Statements like "there is a housing need" or "rising unemployment is a problem" or that, "high levels of pollution make a project undesirable" are examples of explicit debate that cannot occur without data or data requirements (*Ibid* 277). Innes sees data creating norms for argument, norms that cannot run counter to the evidence presented in the data. Innes states, "The data affect policy not so much because of the facts they reveal, but because the concepts implicit in them become implicit in the discussion." (*Ibid*).

Innes' research into the power of data requirements in planning departments, government agencies and other large and complex organisations sheds light on the importance of data and the effect that they have on the planning and decision making process. She provides valuable insights to planners, technicians, managers and others who use data including those who use spatial data in GIS. However, her research fails to look at the usefulness of data and their application within small organisations and institutions, although she does call for research into data, information and types of knowledge and functions that are "in play" in the planning process (Innes, 1998: 60). Research on grassroots GIS fills this gap as it develops theories and practices of data, information and knowledge use by NGOs, CBOs and individuals in new and innovative ways and settings.

4.3.9. The Power of Information Technology

Historians, sociologists, geographers, anthropologists and others have studied technological changes and innovations for many years. The major innovations of the modern world such as the automobile, telephone and electricity are continually analysed, assessed, and revisited as to their impact on society and the organisations and individuals using them. Arising out of the flood of innovations occurring during the industrial revolution, many of these technological tools would became the centrepieces of modernity. Identified as thoroughly modern, high technology has infused our planet with communication networks, opening borders and many closed societies and changing our world forever.

In the 1960s and early 1970s, computer scientists and others began to consider the impact that the computer was having on the organisations using them and on society in general. For more than two decades, coinciding with the development and popularisation of the personal computer, GIS and other types of information systems have contributed to societal change in important and substantial ways. Several authors and proponents of information technologies, including GIS, state that they herald a new age of enlightenment with untold benefits to society including the ability to empower the poor and disenfranchised and that they have the potential to rectify past wrongs, (Harris *et al.* 1995, Sawicki and Craig, 1996, Holderness, 1998, Shaw and Shaw, 1999, and Laituri, 2002). This research focuses primarily on information technologies as they relate to planning and community development processes.

Laurini's research in his "*Information Systems for Urban Planners: [A hypermedia co-operative approach].*" looks at a variety of technologies, including GIS and the Internet and their impacts on the planning process. Laurini makes an important contribution towards the practical and theoretical links between information system design and implementation and planning theory. He briefly alludes to planning theories like Arnstein's "Ladder of Citizen Participation" and subsequent efforts within the information system and GIS communities to incorporate planning theory, collaborative efforts and public participation into systems design (Laurini, 2001: 245). Laurini's research is mostly descriptive in nature and although useful it fails to explore in detail community development and planning theories. These theories can more fully aid in the development of information systems and PPGIS in community settings.

Laurini also pays only limited attention to smaller, non-governmental organisations in his research. He states that these systems are, "difficult to implement because lay users generally do no know what they want especially when dealing with new technology." (Laurini, 2001: 136). Laurini also states that when designing collaborative GIS systems, "it is also assumed that even the simplest GIS functions are still too complex for the average business executive." With this attitude towards the design of GIS systems for the business world, where users are likely highly educated and trained in the use of computers, it is no wonder that vendors and academics have paid little attention to the needs of members of non-profits and NGOs. It is this type of "technicist", top-down outlook that

the research contained in this dissertation and the work of others namely, Harris, *et al.* (1995) and Talen (2000) seek to address.

In the U.K., Southern states that there is a lack of evidence base available to show that ICTs can address social exclusion and regenerate deprived communities (Southern, 2002: 697). He goes on to state that the application of ICTs to support regeneration depends almost entirely on the, "vibrancy of local actors, their effort, commitment and opportunity to shape development", and thusly the focus should be not on the technology but on the, "aims, aspirations and choices made by those involved in regeneration and development." (*Ibid*). Those working with PPGIS should focus on these same issues, namely, the aims, aspirations and choices of the community based organisations using the technology.

4.3.10. The Power of GIS

GIS was introduced and defined previously. There is a large and growing body of theory on the societal implications of GIS. The following section explores these theories and expands on them in relation to GIS as it impacts on the communities, organisations and individuals implementing the technology. The theories relating to the introduction of spatial information and GIS technologies into planning departments, (Innes and Simpson, 1993 and Budic, 1994) and of society in general (Aitken and Michel, 1995, Pickles, 1995 and Craig *et al.* 2002) are also explored in this section. Critically assessing the power of GIS as they are currently implemented, contributes a valuable perspective to the construction of a theoretical framework for grassroots GIS.

Much of the criticism of GIS has occurred since the mid 1980s as the technologies that comprise spatial information technologies, computers and digital cartography, became more and more widespread in the planning departments of large cities. Studies by Innes and Simpson, (1993), Budic, (1994), Lupton and Mather, (1996), Kent and Klosterman (2000) all critically speak to the issues that occur as GIS technologies are adopted. They reveal that GIS are "socially constructed" technologies in that they adapt and are modified to fit the needs and uses that their users demand. They can be a force for empowerment and inclusiveness or one of exploitation, manipulation and marginalisation.

Innes and Simpson (1993) see GIS as an "extraordinary opportunity for planning". To Innes and Simpson, the power of GIS is in its ability to, "store, interrelate, analyze, and

display an enormous range of spatially referenced information." (*Ibid*). Consisting of both human and technical systems, a GIS is a "socially constructed" technology "including not just hardware and software but also the practices, laws, organisational arrangements, and knowledge that are necessary for its use." (Innes and Simpson, 1993: 230). Many planners give little thought to these considerations and fail to take advantage of the "new more powerful approaches to planning" that GIS can offer. Instead planners, "see such techniques as little more than ways to accelerate business at the zoning desk or to economize on producing maps for public display." (*Ibid.* 231). These uses of GIS are merely a more effective fulfilment of traditional planning responsibilities, something to which GIS is suited, but not limited to. PPGIS has the potential to create "new and more powerful approaches to planning".

To Lupton and Mather, it is precisely in the exercise of the traditional responsibilities of planning where GIS has the most power and influence. Their research indicates that GIS, like planners, are trusted in their abilities to "plan rationally" (Lupton and Mather, 1996: 570). However, they recognise the power in GIS as being derived from their ability to, "define the entire discourse within which contesting political and economic claims were to be resolved." (*Ibid*). This effectively removed from the "scanning field" questions that could not be resolved through the use of maps, spatial representations and mathematical measurements. The ability to remove from and include items in the planning "scanning field" represents great power.

Many recognise this power as being inherent in GIS and maps. The lesson to be learned from Lupton and Mather, however, is that political power can overcome technical, rational, scientific, GIS and map-based power, as was shown in Johannesburg, South Africa. If the politicians don't like the results of the "analysis" and they have the political power and the will to override or ignore it, then all the arguments backed by technical, rational and scientific evidence are meaningless. This is a point that all those involved in the design and implementation of PPGIS should be aware of.

Kent and Klosterman (2000) see maps and GIS as essential tools for planners in the analysis of current conditions, preparing plans and proposals, and presenting their ideas to decision makers and others. They state that the ease of use of GIS in "producing professional looking maps" has made them even more prominent in planning offices. This has meant that. "Individuals with little or no cartographic knowledge are routinely producing maps for planning purposes" and that all too often many fail to understand the

purpose the map is intended to serve (*Ibid.* 189). They see the power of the map, in traditional, digital and GIS formats, in three distinct functions:

- **As reference tools for storing and conveying geographically-referenced information**
- **As analytical tools for uncovering and exploring the spatial dimensions-and interrelationships between-phenomena and activities located in space**
- **As illustrations in books, journals, newspapers, planning reports and public presentations. (*Ibid*).**

Their research reveals for the planning profession and others the power of maps and GIS. The authors provide techniques to test the communicative effectiveness of planning maps including the showing of maps for review and feedback to others outside of planning offices and areas of professional competence (*Ibid.* 196). This is a valuable technique for those designing and implementing PPGIS.

Budic's research into the implementation of GIS in planning departments in four southeastern U.S. states reveals that only a few activities use GIS. It also reveals that many planning tasks are still accomplished in traditional ways and that they require data that are not contained in GIS databases (Budic, 1994: 257). However, the users of GIS surveyed by Budic did report initial benefits in data accessibility, quality, quantity, the communication of information and the confidence in analyses performed with a GIS. The survey did not report reduced time for data collection, the time needed to make decisions and the identification of conflicts, however (*Ibid*). These somewhat mixed results reflect the inherent dual nature of GIS implementation in that GIS has the ability to affect change in both positive and negative ways.

Budic concludes that generally, the benefits of GIS implementation in planning departments were much higher than would have been expected from the findings of previous research into computerisation of similar organisations. This is attributed to, "the capability of GIS technology to store, manipulate, and display spatial data which has opened up a wide range of possible applications particularly suited to the planning functions of local government." (*Ibid*). Again, this research reveals that even for planning

departments and local governments not all of the effects of GIS implementation are beneficial.

4.3.11. The Societal Implications of GIS

Planning departments were the focus of much of the early research into GIS. Recently researchers have begun to seriously explore, in a critical way, GIS and its wider societal implications. In Pickles ed. (1995), contributors critically deconstruct the use of GIS more widely in society. Goss (1995) reveals GIS as a powerful marketing tool for business through the use of "geodemographic information systems" which have serious consequences for the privacy of individuals whose personal details are included in them. Aitken and Michel (1995) refer to personal data regarding individuals in GIS or computer databases as "*metrics*".

Their research is also critical of the "complex technical process and rhetoric" and the use of GIS to "bolster a rational-instrumental discourse in planning." (Aitken and Michel, 1995: 17). Their focus is on the social, cultural and political contexts of the technology. The work of Harris *et al.* (1995, 1998 and 2002) explores the related concepts of "empowerment", "marginalisation" and the pursuit of social goals through the use of GIS technology. These critical theoretical considerations are of importance to the designers of grassroots GIS who seek to use the technology to "bolster" their own discourses in community development and planning.

Other researchers have actively pursued community and social goals through the use of GIS. In Talen (1999a and 2000), the concept of "bottom-up", resident generated GIS is explored. She sees the primary benefit of GIS, constructed by neighbourhood residents as opposed to technical experts, in their ability to, "facilitate neighborhood interaction by exposing the inner cognitive views of a neighborhood in a highly visual format." (Talen, 1999a: 534). To Talen the societal implications of GIS are that they can be used by a variety of groups and individuals for the betterment of their own communities.

To Talen, these types of systems aid in, "communicating ideas about neighborhood problems, opportunities and expectations" which encourage, "neighborhood participation in planning policy-making and resolution, in turn having an effect on local resident empowerment." (*Ibid*). Similarly, community empowerment through the use of spatial information technologies to construct "social networks" and support grassroots activism can be seen in the research of Borelli and Fernandez (1998). PPGIS can also take a

bottom-up, social network and activist approach to exposing the inner cognitive views of neighbourhoods in a highly visual format.

4.3.12. GIS and Organisations

Campbell and Masser (1995) examine the effects of GIS implementation on large governmental organisations with perspectives and theories gleaned from the world of business management. They explore the uptake of GIS in large organisations and outline three broad perspectives that guide the design and implementing of GIS in that context. These perspectives are:

- **Technological Determinism**
- **Managerial Rationalism**
- **Social Interactionism**

The technological determinism perspective on GIS implementation holds that the benefits of the new technology are so transparent that there is little need to question the uptake of GIS. The managerial rationalism perspective relies on management techniques and reorganisation rather than purely technical considerations to ensure the successful deployment of GIS. The social interactionist perspective sees implementation in organisations as highly problematic with success depending on the context that the technology is introduced into and the personal considerations of individuals and groups within the organisation (Campbell and Masser, 1995: 7). These are valuable insights to those implementing PPGIS with the perspective of social interactionism being the most prevalent and applicable for the use of GIS and PPGIS in the local community context.

Campbell and Masser also explore the power of GIS technology and state that this power has been envisaged as, "contributing to organisational effectiveness through the provision of basic data as well as stimulating more complex analysis which would enhance decision making capabilities at operational, managerial and strategic levels." (*Ibid.* 2). The ability of GIS to integrate information from a wide variety of sources, reduce duplication, facilitate data access and sharing and create a greater availability of data are all recognised as important benefits of the technology. Therefore to Campbell and Masser, GIS in organisations have the potential to better inform decision making, which can lead to improved decisions. They state, in a somewhat "utopian" or "informational deterministic" view, as per their construct, that the, "greater availability of information would result in a

democratisation of decision making and improvements to the quality of life of society." (*Ibid*).

The contributions of Campbell and Masser to the theories of GIS implementation in large organisations are valuable. They highlight the fact that technologies become embedded in organisational contexts and that an important perspective for successful implementation is a social interactionist one. This perspective identifies the importance of the needs of individual users and places the emphasis on the development of simple applications and systems that can cope with change. They also view information in terms of its social and political dimensions, dimensions that are not value neutral (*Ibid.* 160). The perspectives and considerations of the local context and the issues associated with value-laden information are some of the key considerations of PPGIS design and implementation.

4.3.13. GIS and Scientific Rationality Critiques

In Towers (1997) "*GIS versus the community: Siting power in southern West Virginia*", government authorities were shown to use GIS to rationalise their routing of power lines through vulnerable communities. The attempted use of GIS, high quality, colour coded computer maps and sophisticated analysis to overcome resistance by communities along the proposed routes of new power lines was documented by Towers. The scientific, rational arguments put forth by scientists, planners, technicians and the "experts" in combination with GIS, high quality computer generated maps and statistics proved a difficult obstacle for many communities to overcome. In this case, however, questions regarding methodological issues and the conclusions that were reached as a result of GIS analysis were raised. Complex calculations of habitat loss and environmental impacts for the siting of power transmission lines were challenged successfully, shedding light on the shortcomings of the GIS and mapping technologies and the "experts" themselves.

Harvey is one of the most prominent geographers to critique scientific rationality in his examination of the related concept of what he calls, "bureaucratic-technocratic rationality". In his research into the emergence of the environmental movement he states that,

> *"The translation of the environmental problem into the domain of expert discourses permits the internalisation of environmental politics and regulatory activity largely within the embrace of the state apparatus or,*

> *more loosely, under the influence of corporate finance of research and development. It becomes and application of bureaucratic-technocratic rationality under the dual influence of the state and corporations..."*
>
> (Harvey, 1995: 73)

Harvey criticises the influence of corporations on the state and their co-opting or bypassing of democratic politics and the environmental movement, which are generally viewed by the establishment or dominant forms of political-economic power as, "getting in the way of proper, rational and sensible regulatory activities." (*Ibid*). This "standard view" of human economic activity and the environment sees problems negotiated and resolved between the state and private sector actors only. Additionally, Harvey notes that the rights of private property and profit maximisation as well as "economic efficiency, continuous growth and capital accumulation" predominate over environmental justice and the views of those outside the establishment. It is in these rational and scientific discourses that the economic imperatives of capitalism arguments have flourished by avoiding debate regarding the true costs of economic growth and pollution.

These types of criticisms of scientific rationality and the "standard view" of the relationship between man and the environment are common. With regards to the uses of GIS, specifically, these discourses are commonly used to promote economic growth imperatives. For example, in Roche and Humeau (2000), GIS use by municipalities in France was studied in detail. The planners of several small rural French municipalities implemented GIS to address increasing demand for public infrastructure. Hailed as a success of "inter-municipal" cooperation, the GIS allowed for the sharing of resources, including data and expertise, which reduced costs and increased effectiveness. GIS was viewed as a tool, a rational and technological means to efficiently plan for, control and ease the spread of growth in rural France.

However, in these cases there was little room for alternatives to the growth promotion strategies recognised and promoted by the participants in the process. GIS was used as an agent of economic growth; mapping and analysing the potential and need for new transport, infrastructure and development activities. The power of GIS rests in the context into which it is embedded. In the case of these rural French municipalities, the context of GIS use was in the service of state power, in support of growth strategies advanced by private interests. GIS was therefore acting as an agent of development, embedded in the

standard view of capitalist economic imperatives. The authors did not criticise the use of GIS in this manner as their focus was on the technology and its efficiency.

GIS can be used for planning, growth promotion and economic development as well as the empowerment of local communities, environmental protection and sustainable development. GIS, like all technologies, are "socially constructed". It can be argued that the full potential and power of GIS can only be recognised through the participation of all the stakeholders in a community, including dominant and lesser holders of political and economic power in society. Socially constructed, socially empowering technologies are the end result of the process of public participation by all the stakeholders in a community. The theories of the power of PPGIS are contained in the next section.

4.3.14. The Power of PPGIS: Positive and Negative Aspects of PPGIS

PPGIS were introduced and defined previously. A review of a number and variety of PPGIS cases, their development and contribution to this research area was conducted in the Literature Review. It is important to consider some of the theoretical foundation of the power of PPGIS, how these differ from traditional GIS theories and the potential impacts they have on the organisations that are currently implemented them.

Table 4.1 summarises the benefits and potential drawbacks of PPGIS. The related concepts of a web presence and cyber community implementation and their benefits and drawbacks are contained in Tables 4.2 and 4.3, respectively.

Table 4.1. Theoretical Benefits and Drawbacks of PPGIS

Potential Benefits	Potential Drawbacks
PPGIS	**PPGIS**
• Useful tool for the collection, storage and dissemination of information.	• Subject matter highly specialised. Sympathetic but narrow audience (Shiffer, 1998).
• Perception: Funding sources, members, staff and clients perceive the organisation to be on the cutting edge. Adds prestige and credibility. (Craig and Elwood, 1998).	• Critical mass: difficult to sustain users without it. Vicious cycle, low users=low participation, and the more localised the data the less users there are (Shiffer, 1998).
• Can eliminate time and place constraints. People with incompatible schedules can discuss issues of common interest (Shiffer, 1998).	• System development does not mean that people who can address the issues will get the message or act (Shiffer, 1998).
• Crude filtering so that like minds can share ideas (Shiffer, 1998).	• Cost and sustainability: development and maintenance draw resources from other areas.
• Rapid progress reports for updating projects progress (Shiffer, 1998).	• May contain information that is not value neutral. Can be use to misrepresent (Shiffer, 1998).
• Conversational or rhetorical aid especially for physical or spatial landmarks (Shiffer, 1998).	• Information overload: The more info, clutter, din, etc. (Shiffer, 1998), the less effective PPGIS.
• Provides basic data, which can contribute to any organisation's effectiveness (Campbell and Masser, 1995).	• Social/intellectual barriers for users.
• Democratisation of decision making (Campbell and Masser 1995).	• Competitive nature of funding may place groups without GIS at a disadvantage (Elwood, 2003).

Related to the theoretical benefits and drawbacks of PPGIS described in Table 4.1 are those concerning a presence on the World Wide Web. The use of the Internet for the dissemination of information on local issues and causes is becoming an increasingly popular method of communication. An understanding of these issues is important for those designing and implementing PPGIS with web capabilities in local settings. Table 4.2 summarises these issues.

Table 4.2. Theoretical Benefits and Drawbacks of a Web Presence

Potential Benefits	Potential Drawbacks
Web Presence	**Web Presence**
• Web access to information, funding sources, and government agencies, etc.	• Additional efforts and costs. The technology does not replace traditional methods.
• Draws support from people, resources outside of spatial community.	• Critical mass difficult (Al-Kodmany, 2001)
• Better than GIS for the use of images (Al-Kodmany, 2001).	• Not representative of general public, access restricted to privileged in society.
• People do not need to attend meetings to communicate, suitable for dispersed populations (Kingston, 2000).	• Training, support, update and maintenance required.

In addition to the issues of a web presence, the theoretical benefits and drawbacks of the implementation of cyber communities are of interest. Table 4.3 summarises these issues.

Table 4.3. Theoretical Benefits and Drawbacks of Cyber Communities

Potential Benefits	Potential Drawbacks
Cyber Communities	**Cyber Communities**
• Combats local parochialism by establishing individuals as members in a diverse range of community associations and social movements.	• Virtual communities filter nuance, warmth and contextuality; there is no face-to-face communication.
• Empowers isolated or marginalised groups.	• Selective: marginalised groups may be the ones that are excluded.

Understanding theoretical benefits and potential drawbacks of various PPGIS and ICT related activities in the local setting provide a basis for the development of more effective, empowering and sustainable information systems.

4.3.15. Conclusions: The Power of Maps and Digital Spatial Information

The theoretical perspective on the power of maps and digital spatial information has incorporated the research findings of several disciplines. The well developed constructs on the power of maps and digital spatial data belonging to planning, information system, cartography and geography theorists have been explored and expanded in this section. PPGIS design and implementation can draw from these theoretical perspectives. Those who implement new models of PPGIS need to acknowledge the power of the map. They also need recognise that maps, when combined with the power of information technologies

and GIS, can serve as valuable planning and community development tools. The focus of the next section is on the theories of community development that lend to and complete the construction of a broad theoretical framework for PPGIS.

4.4. COMMUNITY DEVELOPMENT THEORY

Community development and community organising theories can provide valuable insights into the design and implementation of PPGIS. There is a rich body of theories and perspectives in the community development literature to draw upon which heretofore have been largely ignored by information system researchers. These theories and perspectives can add to and enhance the applicability of participatory information systems, improve legitimacy in planning and allow for the creation of grassroots, bottom-up and sustainable PPGIS. The following sections explore these theories and shed light on how PPGIS can affect communities and in turn be affected by them.

4.4.1. Defining Community

The conceptions of what a community is have fascinated mankind since the birth of civilisation itself. Aristotle's "*koinonia politiké*" ("Civil Society"), identifies five related dimensions to community. They are:

- **Free and uncoerced participation;**
- **Common (or shared) purpose whether major or minor;**
- **Long-term or short-term; common holdings (such as a fund or held resources ... or a repertory of shared actions);**
- **Participation involving *philia* (a sense of mutuality, often inadequately translated as 'friendship');**
- **Social relations characterized by *dikaion* (fairness or justice).** (Schroder, 1999: 44)

In modern society the term "community" has many definitions. Voogd (2001: 87) rightly refers to the term community as "not unambiguous". He states, "Traditionally, the term refers to a set of people living in the same locality in which at least some resources are shared. Yet today communities can range geographically from neighbourhoods to small

rural hamlets to regional or even global scales." (*Ibid*). To Voogd, "The term also represents other definitions of an abstract nature in which physical boundaries are no longer implied (for example the 'internet community')." (*Ibid*). He goes on to state, "In our mobile societies it is possible to share resources with many different people in different places and thus be a member of many communities. 'Community', therefore, has become a loose concept; it is no longer a self-contained entity which can be easily defined." (*Ibid*).

In the context of the community development literature, "community" is mainly defined in the traditional sense, that is, as a group of people living in the same locality that share resources, interests and activities. However, Tovey, reminds us of the work of Dennis in his "*The popularity of the Neighborhood Idea*" (1968) who stated that, "People seem to find it extraordinarily difficult to realize that mere living together in the same locality can result in a conglomeration of very little sociological importance." (Dennis, 1968: 75). In Ireland territory and the local are still important concepts. Understanding the nature of what some have termed the "communal culture" of Ireland is important.

4.4.2. Conceptions of Community: Irish Community and Place

O'Carroll (1985) makes some pertinent points with regards to Irish communities in general. He states that a sizable minority of individuals studied often make it clear that their attachment to a locality is minimal. In one public housing development he recognised a small proportion of local residents, "who all expressed a wish to get away from the locality altogether." (*Ibid*: 146). He makes the assumption that "problem" areas, where non-profit and community based agencies focus their concerns, have less resident identification with locality. To O'Carroll the moral of the story is, "don't assume that there is a community conterminous with whatever locality you choose or that any community you choose embraces all the people in the locality." (*Ibid*).

On these points regarding Irish communities and the organisations working in them, specifically disadvantaged areas in Ireland, O'Carroll makes some additional observations. He recognises that frustration and disappointment for activists is created when other forms of community such as, personal rather than physical communities, outside networks and work relationships take precedence. Additionally, there are many residents who simply

just don't want to get involved or participate in community building exercises (O'Carroll, 1985). This should be recognised by Irish community development activists and by the developers of participatory information systems.

With regards to community leaders who purport to represent some excluded minority, O'Carroll has harsh criticism. He states,

> *"In fact, many of these representatives owe their status to membership of a complex structure involving the state and voluntary organisations. The later are often set up at the instigation of the state, grant aided and otherwise controlled by statutory organisations. Such community representatives represent the extension of the arm of the state into local areas. They should not, therefore, be automatically seen as evidence of the presence of a community."*
>
> (O'Carroll, 1985: 147)

O'Carroll refers to this authoritarianism in community development as a "licensing process" in communities whereby, "authorities can exclude opponents from representation". The groups that are generally excluded are the poor who cannot afford membership and, "those voluntary organisations which see the authorities as ineffectual and discredited." The latter may self-exclude, as do those who have become passive to the goings on in their own communities, many of whom are suspicious of the avenues of participation and empowerment that are open to them. O'Carroll also recognises that these problems of exclusion from the political process are widespread in Europe generally. He attributes the rise, of what he calls the "new social movements" to these problems and issues (*Ibid).*

4.4.3. Alinsky and the Theory of Community Organising and Activism

One of the pre-eminent theorists on community organising and activism in the U.S. was Saul Alinsky. "*Rules for Radicals: A Practical Primer for Realistic Radicals* (1972) ushered in the organising principles, methodologies and theories that he pioneered as an organised labour activist in the U.S. in the 1940s and 1950s. Tried and tested in some of organised labour's most challenging years in the U.S., Alinsky became known as the original American radical after the publication of his first book "*Revelry for Radicals*" (1945). In the turbulent 1960s, his methods and theories became the "handbook" for activists across the U.S. and the world. They are still used by community organisers, in

particular by the Pacific Institute of Community Organising (PICO) and All Congregations Together (ACT), operating in the western and southern U.S. states, respectively.

Alinsky's anti-establishment credentials are clearly seen when he states, "I don't want to be just a piece of data to be fed into a computer or a statistic in a public opinion pole, just a voter carrying a credit card." Writing in 1972 as computers and information technologies were just beginning to enter the scene as forces of power and influence for the establishment, his work predicts and forewarns of changes in society that were becoming evident at that time. His theories and practices are pertinent to community development initiatives to this day and as such are of value to the design and implementation of PPGIS in community settings.

Alinsky criticises other community activist approaches used in the 1960s stating, "spouting quotes form Mao, Castro and Che Guevara, are as germane to our highly technological, computerised, cybernetic, nuclear powered, mass media society as a stage coach sitting on a jet runway at Kennedy Airport." (Alinsky, 1972: XXI). As is evident with this quote, Alinsky sees humour as essential to organising a community. Additionally, he recognises the skill of listening and even of silence as being assets in these matters (*Ibid.* XIX). This more personal way of organising a community focuses on simple and specific issues such as, in Alinsky's words, "the immorality of this slum where these people suffer." (*Ibid.* 97). He also states that community organisation and mobilisation must be based on many issues (*Ibid.* 120). These theories are useful to PPGIS designers in obvious ways. The incorporation of multiple, simple and specific issues are core requirements of the grassroots GIS designed and implemented in this research.

Alinsky's views on community and citizen participation in the context of community organising, development and activism are also important. He looks at communities of "interests" as being more important than physical communities with the notable exception of "ethnic ghettoes" (*Ibid.* 120). He notes that if people have the power to act, in the long run they will, most of the time, reach the right decisions (*Ibid.* 11). To Alinsky, the key to this power is citizen participation which he describes as the culminating spirit and force in a society predicated on voluntarism. He states that, "It is a grave situation when a citizen can't participate for, that citizen sinks further into apathy, anonymity and

depersonalisation. The result is that he comes to depend on public authority and a state of civil sclerosis sets in." (*Ibid.* XXVI).

Alinsky, a student of the writings of Tocqueville and his examination of the early United States, takes heed of his warning that unless individual citizens were regularly involved in the action of governing themselves, self government would pass from the scene (*Ibid.* XXV). Alinsky states that the, "denial of the opportunity for participation is the denial of human dignity and democracy." (*Ibid.* 123). His principles for promoting participation in the organisation of a community can be summed up under the following broad categories:

- **Agitate**
- **Aggravate**
- **Educate**
- **Organise**

Agitation and aggravation are used to create disenchantment and discontent with current conditions and values. Education and organisation follow and are used to gain popular local support for community causes in battles against threats, particularly those posed by the "establishment" and modern society. With regards to education, Alinsky likens it to a two-way street. The community learns organising techniques and Alinsky and community organisers learn from, "local legends, anecdotes, values, ideas and even small talk" (*Ibid.* 70), in other words a two-way learning and communications flow is created.

The importance of two-way communications flow is not lost on Voogd (2001). He states, "Information distribution alone does not qualify as communicating with the public, for it is merely a one-way flow. Communication involves two-way relations in which both sides can share the facts and voice views. In this light, extra steps must be taken in order to create the means for allowing citizens to communicate." (Voogd, 2001: 85). He cites the concepts of "*transactive*" planning as developed by Friedmann (1973), which supports, "dialogue, mutual discovery, acceptance of conflict, shared interests and commitment, as well as reciprocity and mutual obligation." (*Ibid*). These are important theories of community development that can lend valuable insights to PPGIS design and implementation.

4.4.4. The Importance of Local Initiatives

Two-way communication flows, connections, collaborations and partnership approaches as well as other innovative concepts such as quasi-community organisations, including local training schemes supported by government, are looked at by Cebulla, Berry and McGreal (2000) in Northern Ireland. The URBAN Program and local partnerships are examples of these strategies in operation in the Republic of Ireland, several in the Dublin area. These steps are a move towards the more active representative and strategic involvement of local residents and communities in urban policy making and are an important concept in community development theory.

Community development theory has much to yield with regards to participation, inclusion and access to recourses and information in local settings. Jeffres and Dobos (1984), writing before the widespread adoption of the Internet and the development of PPGIS, look at the importance of grassroots newspapers. These local sources of community information are indications of organisation and development activity, which usually include more "mobilisation information" than the traditional metropolitan press (Jeffres and Dobos, 1984: 98). These are communication networks that tie people together and attract local support for causes. The link between local activism, mobilisation, development activity and community newspapers identified in their research is a strong one; the lessons of which should not be lost on the developers of PPGIS, community activists and planners.

Jeffres and Dobos (1984: 100) state, "Residents who are committed to their neighborhood are likely to seek out information that allows them to monitor their environment." Neighbourhood newspapers offer one such source of information as they offer a "traditional surveillance function" and grassroots journalism increases people's awareness of local groups (*Ibid.* 109). However, they conclude that neighbourhood newspaper use is not related to measures of participation. PPGIS has the potential to be a source of local information and increase participation in community groups as well as the planning process.

4.4.5. The Concept of Local Knowledge

Local knowledge is an important component of PPGIS in grassroots settings. Including local knowledge in PPGIS as an integral component fulfils important considerations outlined by many planning and community development theorists. Closely related to the concept of including local knowledge in PPGIS is "civic science and stakeholder involvement", as developed by Ball in his, "*Towards a methodology for mapping 'regions for sustainability' using PPGIS*" (Ball, 2002: 84). He states that the scientific process contains an, "overriding value of efficiency while other humanistic-values such as equity, legitimacy and especially beauty are largely excluded." (*Ibid*). To Ball,

> *"If environmental management is best performed at the scale of the landscape or region, and landscape ecology perforce includes the human residents, then consensus can only be achieved by the involvement of the human communities to represent their association with the landscape in question."*
>
> (*Ibid.* 85)

Although Ball's approach concerns environmental management strategies, they do have as their objective, "place-specified scientific consensus founded on the values of the people that are most affected by local policy and planning decisions." (*Ibid*). This type of dual approach acknowledges both the scientific facts based consensus building and the more subjective value judgement based approach of "civic science and stakeholder involvement". The recognition of the importance of local perceptions and values as well as scientific ones are considerations that PPGIS in community settings takes account of.

4.4.6. Including Local Knowledge Through Participatory Learning and Action

Participatory Learning and Action (PLA) is a label given to a growing family of participatory approaches and methods, which emphasise local knowledge and enable local people to make their own appraisals, analysis and plans (Chambers, 1992). The PLA approaches use group exercises to facilitate information sharing, analysis and action among stakeholders. These methods are similar in nature to Participatory Rapid Appraisal (PRA), Participatory Rural Appraisal (PRA) and Participatory Urban Appraisal (PUA) techniques used by researchers for the data collection phases of numerous research projects.

The main objectives of PLA approaches have traditionally been to enable development practitioners, government officials and local people to work together to plan context appropriate programs. A series of open meetings generally frame the sequence of activities that structure public participation through the use of semi-structured interviews, focus group decisions, preference ranking, mapping and modelling, historical diagramming and local graphical representations (Chambers, 1992). This process allows for the formulisation of community knowledge through participation. The main tenants of the PLA approach can be described as:

- **Communication and transfer of knowledge**
- **Empowerment of local communities**
- **Respect for local people's culture**
- **Localisation of representations**
- **Enjoyment of the process**
- **Inclusiveness in the process**

According to the concepts of PLA the empowerment of local communities is accomplished through participation in the process itself, which aids in the communication and sharing of information that is owned by local people. Additionally, new local confidence is generated or reinforced, local knowledge validated and external knowledge assimilated. The legitimisation of local knowledge in this process is empowering to local participants, as the "professional monopoly" of information use in planning and management decision making is broken (Chambers, 1992).

The researcher's role in the process is an important one as it transforms him into a learner and listener who respects local intellectual and analytical capabilities according to Chambers. The researcher as the respectful, "humble, learning outsider" is put forth as a means of gaining access to, acceptance from and understanding of local people's context and culture. The focus on the local or the "localization" of the process, "avoids imposing external representational conventions" (*Ibid*). This makes, in theory, for a more enjoyable, fun, and inclusive process where marginal and vulnerable groups, women, children and the aged can participate and contribute.

Some of the recognised dangers and potential drawbacks to the PLA process include:

- **Hijacking of the agenda**
- **Formalism and exploitation**
- **Disappointment through raised expectations**

In some instances the PLA process is susceptible to "hijacking". This occurs when a strong local group is over represented in the process, which gives it the ability to set the entire agenda. Additionally, if the PLA process or agenda is "externally driven" it may be used for the creation of legitimacy for certain projects, agencies or NGOs. Formalism and exploitation occur when "PRA hit teams" arrive in a local community to conduct "abrupt" project-based research, meet deadlines, finish training courses and then move on. If nothing tangible emerges the local community participants may see the process as a "transient external development phenomenon" and feel disappointed and exploited.

The theoretical considerations of the PLA process explored in the previous section are of particular interest to this research. PLA theories and practices draw from a substantial body of research in the fields of community development and planning. The inclusion of strategies such as sequencing, listing, comparing, counting, linking and mapping issues and concerns are useful methods of soliciting, analysing and communicating participant views and local knowledge. PLA and PRA processes as elucidated above have the potential to contribute substantially to public participation in plan development and community development activities as well as PPGIS design and implementation.

4.4.7. Community and PPGIS

It is important to discuss the concept of community in the context of the development of PPGIS. For the purposes of this PPGIS research the concept of community is inclusive particularly in that it is not limited by social or physical boundaries. Inclusivity is important to the extent that outside assistance and resources are attracted to support local goals at the behest of local residents. This concept is not unfamiliar to the theories and strategies of the community development profession.

The concepts and theories of community development research aim to take many of the current processes and institutional frameworks of community development out of

hierarchical constructs allowing for more grassroots development. These concepts and theories can be summed up under the following broad categories:

- **Citizen Power**
- **Citizen Control**
- **Delegated Power**
- **Advocacy**
- **Bottom-Up**

Borrowed from community development and community organising theories and methodologies, these are widely recognised, "tried and tested" concepts. These same concepts can be applied to the development of community information technologies and grassroots PPGIS capacity.

4.4.8. Conclusions: Community Development Theory

The developers of ICTs, including GIS, have heretofore largely ignored many of the theories and perspectives of the field of community development. This is a shortcoming as many current and potential applications of new information technologies are community based or have strong local impacts. PLA approaches have failed to take on board new digital multimedia capabilities for the collection, storage and communication of local data. The inclusion of local knowledge in GIS and mapping exercises has the potential to empower local activists working to protect and enhance their communities. The theories and practices of community development can add to and enhance the applicability of participatory information systems, improve legitimacy in planning and allow for the creation of grassroots, bottom-up and sustainable PPGIS. Community development and community organising theories can provide valuable insights into the design and implementation of PPGIS.

4.5. The Theoretical Framework

The examination of the theoretical perspectives of planning, participation and community development and the power of maps and information revealed important considerations for the design and implementation of PPGIS in the grassroots. These theories and

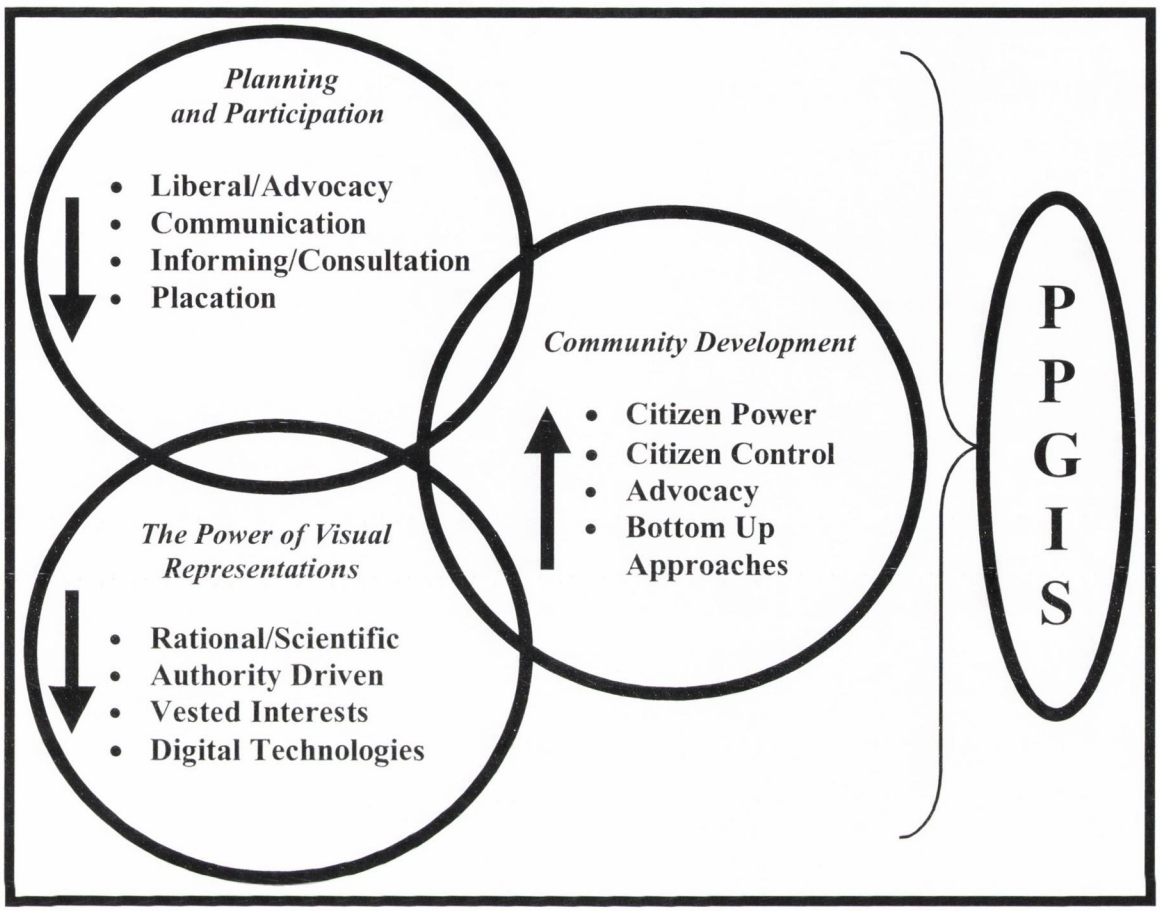
perspectives contribute to the development of a new theoretical framework of grassroots GIS. This framework incorporates the various perspectives and insights covered in the previous sections in a more explanatory construct specific to PPGIS and lays the foundation for a new more explanatory framework within which PPGIS can be understood and improved.

PPGIS are imbedded in the processes of community development, planning and participation and the power of maps and information. A weakness in PPGIS, as they are currently designed and implemented, is that they do not take a holistic approach as recognised by much of the current theory. The majority of system implementations take either the perspective of planning, community development or mapping and information systems and are easily identified and classified as such. This serves to narrow and weaken the approaches of most PPGIS as they are currently implemented. The results of these implementations are predictably narrow, limited and unsustainable.

For example, PPGIS planning and participation approaches are generally government led, top-down, and conservative in nature. This leads to a failure of sustainability in most cases as the end of the participatory components funded by government removes the purpose of the project. Those systems that rely on technology and the power of the information and maps to affect change and empower residents fail on issues of legitimacy. Criticisms include "research for publications" in that the project is created for the purposes of scientific publications (Harris and Weiner, 2002: 248) or "technologically deterministic" projects designed to explore a new technological innovation, which is thought of as "good in of itself". Finally many PPGIS with community development perspectives fail due to lack of resources and the development of practical applications and results; characteristics that are the mainstay of formal planning processes and information system implementations respectively.

As revealed in theory, these shortcomings in PPGIS model design and implementation are attributable to approaches that fail to utilise the various theories and lessons learned from other perspectives and disciplines. By combining the "successful" system theories and perspectives, a new construct, model and theoretical framework is developed. Figure 4.4 contains a schema for the theoretical construct of PPGIS.

Figure 4.4. The Theoretical Construct of PPGIS

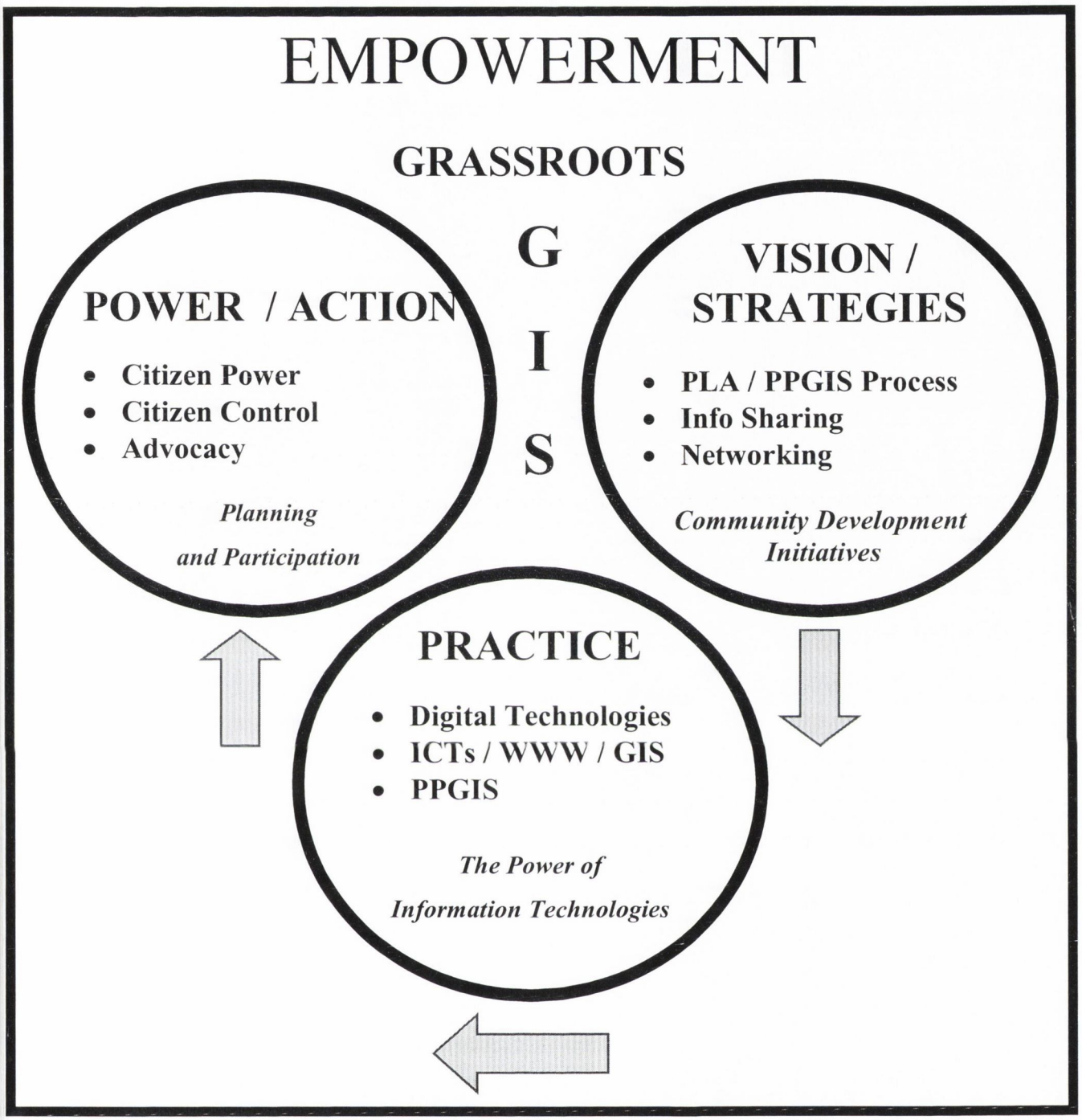


The circles represent the broad theoretical perspectives, which inform the new theoretical framework developed in the next section. Contained within the circles are the issues and concerns applicable to each theoretical perspective which impact on PPGIS in community settings. The arrows contained within the circles represent the direction that power flows within each construct. The theoretical perspectives overlap, influencing one another as well as PPGIS, in multi-dimensional and complex interactions. An understanding of these interactions is aided by the development of this "critical theory" framework.

4.5.1. A New Theoretical Framework of Grassroots GIS

The schematic in Figure 4.5 graphically represents the theories and perspectives that contribute to a better understanding of grassroots GIS.

Figure 4.5. New Explanatory Theoretical Framework for Grassroots GIS



As can be seen in the schematic the theoretical constructs overlap. They also contain complex concepts, each with their own issues and potential influences on grassroots GIS as they are designed and implemented. Many of these issues and interactions serve to reinforce one another while others are contradictory in nature and cancel each other out. This reflects characteristics of information and communications technologies themselves,

namely, their dual and sometimes contradictory natures, which can have both positive and negative influences.

Revolving clockwise from the upper right of the schematic around the grassroots GIS and represented by the arrows is the evolution of grassroots GIS. The process begins with a grassroots community development initiative interested and willing to invest in representing a vision of community. The strategies employed for the collection of local knowledge can include established practices such as PLA, PRA and group meetings with the intention of sharing information and establishing a community network of participants. ICTs are introduced at this point in the evolution of the grassroots GIS to enhance the communication of information and enable CBOs to collect and communicate information. The building of consensus and decision making on issues leads to organised group action, which can be introduced into planning and formal participatory processes. These decisions and organised actions when implemented are linked to citizen control, which leads to the empowerment of participants.

4.5.2. The Research Problem and Grassroots GIS

As previously discussed in section 1.3, the fundamental research problem to be addressed in this thesis is the poor communication, and limited nature, of information available for actors involved in community development initiatives in the Tallaght area. The literature in the fields of GIS, Planning and Community Development have identified the potentiality of ICTs to enhance information flows in development and planning processes and participatory governance. ICTs, including GIS and PPGIS may also enhance the efforts of CBOs, engaged in community development activities, to actually generate contextually relevant information. The use of the Internet, GIS and PPGIS technologies and associated data, particularly spatial data, may then potentially address limits and restrictions currently impeding the "two-way" flow of information in the Tallaght area.

This research sets out to implement a new grassroots model of GIS with the aim of empowering participants through the "two-way" flow of information in the processes set out in Figure 4.5, "The Theoretical Framework for Grassroots GIS". In the case of the participating Tallaght CBOs, spatial information technologies including GIS, multimedia and ICTs, are used to collect and store local knowledge provided by citizens for use by

other citizens and community development workers. Additionally, GIS and ICTs are used to facilitate the exchange of information between citizens and community development workers in the local community; to effectively generate the contextually relevant information necessary to begin moving towards empowerment identified above. This research provides an ideal opportunity to put the theories of Grassroots GIS into practice extending the existing body of literature in the fields of GIS, Planning and Community Development.

The literature review identified shortcomings in the current body of Planning, Community Development and GIS research including PPGIS case study implementations that failed to engage consistently with issues of genuine grassroots participation and subsequently empowerment. Attempts at more participatory and empowering types of GIS, particularly Talen's "*Bottom-Up GIS: A New Tool for Individual and Group Expression in Participatory Planning*", (Talen, 2000), Borelli and Fernandez's, "*Community Visioning with IT and GIS in Harlem and the South Bronx*", (Borelli and Fernandez , 1998) and Dufour and Haughey's, "*Using ArcView 3.0 GIS, Multi-Media Databases and the Internet in Resident-Based Planning Initiatives*", (1998), employed top-down strategies that failed to truly "empower" participants.

The research to date in these fields reveals many demonstration projects, consulting and sponsored research works where GIS and PPGIS are implemented in community settings. The problem as it is currently stands with many of these works is that they are "one off" consulting or "research for publication" projects as identified by Harris and Weiner (2002: 248). The Tallaght Grassroots GIS implementation presents a challenge to the research community to examine the true characteristics of PPGIS project implementations. For example, the literature to date has not described the option of "non-implementation" of GIS or PPGIS by CBOs or NGOs as a recommended or possible course of action, (Campbell, 2004). This is a legitimate decision when one considers the potential negative implications of ICTs, GIS and PPGIS as elucidated in sections 2.3.4, 3.5.5, and 4.3.14 respectfully.

The research in Tallaght implements a new model of GIS, a grassroots GIS where local initiative, effort and resources are used to build a GIS from the ground up and where control, direction and impetus to empower are derived from the community itself. This is

a more innovative approach to PPGIS implementation, an approach where the option "not to implement" GIS is a viable one and where the project is not "top-down" or consultant driven. It is this approach that provides for extended grassroots participation in the consideration of PPGIS.

4.6. THE THEORETICAL FRAMEWORK: CONCLUSIONS

This chapter has explored the theoretical foundations of PPGIS and developed a new "critical theory" framework of grassroots GIS. The theories of planning, participation, community development and GIS, explored in new ways, have contributed to the development of this theoretical construct of community based, grassroots GIS. This critical theoretical framework contributes to the fields of GIS, planning and community development and expands our understanding of PPGIS in community settings.

The employment of a truly "bottom-up" approach to PPGIS is something, which has yet to attempted by the research community. The funding and control of PPGIS projects by research institutions, government agencies and their proxies has yielded impressive technology demonstration projects and participatory systems. However, questions remain regarding the legitimacy and sustainability of such PPGIS implementations. It is only through the design and implementation of grassroots GIS that these concerns can be addressed. The new "critical theory" framework of grassroots GIS in local community settings provides new understanding and contributes to the body of research and our understanding of this important topic.

5.1. INTRODUCTION

This chapter describes the fieldwork methods used to explore grassroots GIS in the local setting and answer the research questions. The fieldwork consisted of the creation and application of a grassroots GIS in the West Tallaght community of Dublin Ireland. This research was a longitudinal study of the design and implementation of a new grassroots model of PPGIS. The fieldwork spanned three years of regular observations of local residents and workers for grassroots organisations engaged in various community development activities and initiatives. This research observed ten different organisations and more than sixty individuals interacting with the GIS technology and PPGIS process. The following sections describe the methodology used to answer the research questions in detail.

5.1.1. QUALITATIVE RESEARCH

The methodology undertaken in this research is qualitative in nature and is based on a case study approach. This research can be described as a case study on the design and implementation of a grassroots GIS in the West Tallaght community of Dublin, Ireland. A large body of case studies have been conducted on PPGIS projects; many of which were examined in Chapter Three. The preferred methodologies used in these cases primarily consisted of participant observations in longitudinal or long-term studies of individual project implementations, for an example see Sieber (1994, 2000 and 2002). In addition, Craig *et al.* offer a wide variety of these types of case studies in "*Community Participation and Geographic Information Systems*" (2002).

5.1.2. The Case Study Approach

The "case study" is an important methodology for researchers in Geography and many other fields. For those trying to appreciate the complexity of organisational phenomenon, Yin states, "the case study may be the most appropriate research method." (Yin, 1994: XV). Yin goes on to state that the case study, "contributes uniquely to our knowledge of individual, organisational, social, and political phenomena. Not surprisingly, the case

study has been a common research strategy in psychology, sociology, political science, business, social work, and planning." (Yin, 1983). Additionally, in the areas of public participation in planning, GIS, environmental management and others, the case study is widely used.

Smith's (2001: 74), states, "A case study approach allows the detail and context of situations to be studied, especially where the researcher has little control over events. Case studies also present a rapid means of collecting a lot of insightful and well structured information in a relatively short time scale." (Cited from Yin, 1984). The appropriateness of the case study approach in the area of public participation is also supported by Beierle and Konisky who state that, "Case studies have dominated the public participation literature..." (Beierle and Konisky, 2001: 517). It is clear from the research literature that a case study methodology is the most appropriate for PPGIS research.

5.2. Research Fieldwork: The Design and Implementation of a Grassroots GIS

The fieldwork for this research involved sustained contacts with community organisations and residents, data collection, interviews and the development of a grassroots GIS. The fieldwork also consisted of semi-structured interviews, and participant observations during the design and implementation of the grassroots GIS in the form of the GIS Tallaght or GIST. The next sections describe the design of the grassroots GIS.

5.2.1. The Objectives of the Grassroots GIS

The three main objectives of the fieldwork were:

- **To utilise innovative GIS and multimedia technologies to obtain and store local knowledge from citizens for use by other citizens and community development workers through PPGIS "process meetings"**
- **To undertake a Participatory Learning and Action (PLA) process to facilitate the collection of local knowledge and issues of importance from community participants**
- **To test and evaluate the grassroots GIS and PPGIS process and its ability to facilitate the exchange of information between citizens and community workers in CBOs**

- **To initiate and observe an "organic" and sustainable community based PPGIS process**

The fieldwork explored the feasibility of these innovative PPGIS concepts in the local community setting through six main PPGIS "process meetings" and two of the more structured PLA sessions. The fieldwork allowed for the collection of data to address research questions one through five. The step-by-step methods used for the design and implementation of the grassroots GIS is described in the next sections.

5.2.2. The Step-by-step PPGIS Process

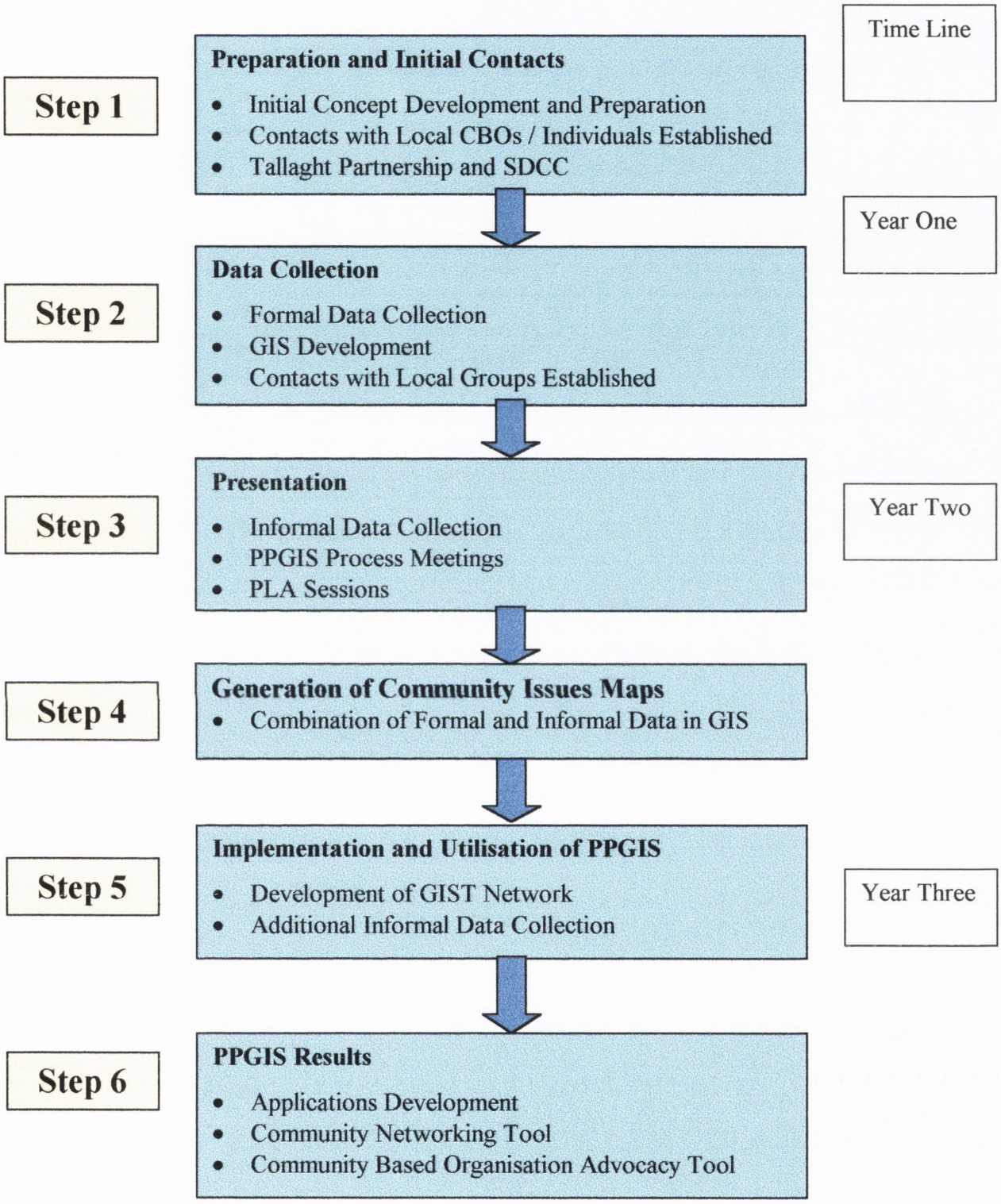
It is useful to outline the step-by-step PPGIS process in a schematic. The schematic in Figure 5.3 contains the step-by-step PPGIS process.

5.2.3. The New PPGIS Model: Initial Preparations and GIS Development

The first step of the process for the design of the new model of PPIS was the initial concept development, preparations and contacts with local CBO including the Tallaght Partnership as well as the local government, namely, South Dublin County Council (SDCC). Community development workers with the Tallaght Partnership organised several information meetings at which the concept of grassroots GIS was presented. Those in attendance were asked if they would like to participate in the PPGIS research and/or if they knew of any other organisations or individuals who would be interested. Over the course of the next several months other individuals and groups were contacted and "signed on" to the PPGIS project.

The second step was the collection, assessment and storage of the relevant formal data for the area. Digital spatial data were obtained from SDCC and used as a digital "base map" upon which other layers and types of data were added. The importance of the "base map" for data collection and the addition of other layers or themes is recognised in the review of the literature. These data layers included census data, socio-economic surveys, citizen surveys, housing, land use, zoning maps, transportation and infrastructure, recreation resources, pollution, environmental issues such as local industry, black spots and poor conditions and other quality of life issues.

Figure 5.3. The PPGIS Fieldwork:



These formal data are diverse and numerous. Brought together for the first time for the purposes of community development in Ireland, the diversity of data sources, types and varying scales included in the GIST provide an interesting case study. The data were originally received in several forms including databases, paper maps, digital maps, photographs, text data and a video clip. These data were then digitised and integrated into one unified spatial database, which became the basis of the PPGIS. Figure 2.2 contains a listing of the digital data themes or layers incorporated into the GIST.

5.2.4. The PPGIS Process Meetings

The third step involved the collection of local knowledge with the aid of a GIS. This unified spatial database was presented to the local community during public presentations or PPGIS process meetings organised by local community workers at the Tallaght Partnership. The Community Coordination Team of the Tallaght Partnership and others were instrumental in organising these meetings. The data were presented using the integration of a variety of multimedia tools including computer screens, laptops and projectors. Following the presentation of the more formal data, additional data and comments were solicited from those present. Small group discussions were used to facilitate further public input to the PPGIS. These PPGIS process meetings allowed for the collection of community-oriented data, both general and specific in nature, relating to themes and topics of interest to the participants.

Public comments, opinions and suggestions were recorded by at least two facilitators during the PPGIS process meetings, in most instances this researcher and a community worker from the Tallaght Partnership. When the group setting was deemed inappropriate for the collection of data, for instance when topics were regarded as too time consuming or overly sensitive, a semi-structured interview approach was used to collect the data.

Appendix C contains a semi-structured interview sheet. This sheet contains a basic structure for each interview and sets out general questions and themes that the interviewer followed. The interviews were primarily conducted with key informers in the Tallaght community, including local residents, community development workers with the Tallaght Partnership and local CBOs. Interviewees were selected based on their knowledge of the local community and willingness to participate in the PPGIS research.

5.2.5. The PLA Sessions

In addition to the data collected during the six PPGIS process meetings the GIS technician also integrated the data collected from the more structured PLA sessions into the grassroots GIS. The PLA sessions were deemed an appropriate methodology to introduce the concept of the PPGIS to local actors and to collect local knowledge. The objective of the PLA sessions was to form the basis of more "structured" community input into the grassroots GIS. This approach created truly "bottom-up", community based data for the grassroots GIS, something that has remained largely unexplored in the fields of planning, GIS and community development. The PLA sessions as well as the PPGIS process meetings took a community led approach as much as possible with the researcher acting as facilitator and observer.

There were two PLA sessions held in Tallaght in October of 2001 conducted over two half days each. In addition to their data contributions to the PPGIS, PLA sessions can also serve to:

- **Aid the researchers in learning about the community from direct sources**
- **Aid rapid and progressive learning about the community**
- **Helped to offset bias by:**

    A. Being relaxed and not rushed
    B. Listening to not lecturing the participants
    C. Probing not passing subjects
    D. Being unimposing instead of important (Chambers, 1992)

The researcher and the community development workers assisting behaved as active listeners and observers. The PLA sessions used strategies and PRA tools such as maps, sketches, diagrams and ranking boards described in the literature based on the work of Chambers (1992). The PPGIS and maps were not the central focus of the sessions. Efforts were instead focused on the collection of local knowledge for inclusion in the grassroots GIS. Additionally, the PLA sessions allowed for the discussion, analysis and ranking of community issues and needs by local actors.

The PLA sessions also included training for the participants in participatory consensus building techniques. This training and the facilitation of the PLA were provided by Orlaith McCaul based at the Development Studies Centre, Holy Ghost College, Kimmage Manor, Dublin. Both sessions were conducted in October of 2001. A total of 36 individuals participated in the PLA sessions representing approximately 14 separate organisations. Appendix B lists the PLA participants and their organisations. The results of the PLA sessions are described in the fieldwork chapter.

5.2.6. The Generation of Community Issues Maps

Step four involved converting both general and specific local citizen data into digital form and then transferring them to the base map. This process involved standard cartographic data entry and hardcopy to digital conversion techniques conducted by the GIS technician. More specifically, topics of discussion and interest that had physical locations were first located on digital maps with the aid of computer screens, projected maps or hardcopy maps. Important topics, conditions and opinions discussed by the participants were then pinpointed on the maps and used to further discussions or referenced for later use. These initial local data were converted into "citizen maps" and incorporated into the grassroots GIS. In addition to the citizen maps a video clip of the community was created, photographs were collected and scanned and citizen stories and experiences were entered into the grassroots GIS. To summarise the data collected were:

- **Community Digital Spatial Video Clip (windscreen survey)**
- **Citizen Photographs**
- **Citizen Stories, Experiences and other Contributions**

5.2.7. Citizen Led Revision, Refinement and Evaluation

The final steps involve the utilisation and implementation of the grassroots GIS. This involved the collection of additional local data using small group meetings and citizen-led field trips run in conjunction with local community development workers. These data are comprised of photographs of the area and additional documents collected by the participants. Appendix D contains a sample of these data. Data selected by the participants were then combined with the formal SDCC and PPGIS data already available

to produce a multimedia representation of the local community. This multimedia representation also takes the form of a website designed and implemented by local participants. This grassroots GIS website is available as a resource base for members of participating CBOs, community development workers and others. The data collected both formal and informal reside on computers in the Tallaght Partnership and West Tallaght Resource Centre.

A "bottom up" approach was taken with regards to the collection of data, their incorporation in the grassroots GIS and the development of applications and the website at all times. The community participants led the process with the researcher acting as a GIS technician and facilitator. This methodology is similar to numerous cases covered in the literature review and is supported by theory which calls for the inclusion of both formal data and local knowledge in participatory exercises. This method facilitates the leadership role of the local community in the PPGIS process.

5.2.8. Evaluating the Grassroots GIS

Although the PPGIS process was designed to be as inclusive a process as possible, it was nevertheless necessary to set fundamental criteria for the selection of participating organisations. After groups of public actors were identified and considered for their willingness to participate, the following criteria were applied for participant selection:

- **The organisations and individuals must be identifiable and willing to participate**
- **The organisations and individuals must have the Tallaght area as their focus**
- **The organisations and individuals must be willing to contribute resources and time in the exploration of the PPGIS technology**
- **The organisations and individuals must have an existing community based project**

No previous experience in computer technology, hardware or software skills were required from the individuals participating. Additionally, the organisations participating did not require computer access. However, computers were required for those organisations that decided to adopt the technology for their own needs. The evaluation of the grassroots GIS

was primarily accomplished thought semi-structured interviews and participant observations conducted during the PPGIS process meetings and PLA sessions.

5.2.9. Fieldwork Methods: Interview Design.

A fieldwork method used throughout the research was the semi-structured interview. This qualitative research technique is used in many fields and is particularly prevalent in the social sciences. With regards to the semi-structured nature of the interview design, Smith's description is apt,

> "*The interview schedule was "semi-structured" because it sets out broad topics that can be departed from if the interviewee mentions something important or of interest. Despite the large volumes of information interviews generate, this approach is appropriate because it allows the researcher to be flexible in terms of the line of questioning and more responsive to the interview circumstances, such as running short of time. It can also be more accurate than techniques such as questionnaires because the flexibility allows a researcher to ask for clarification, follow interesting paths of information and adapt questions to suit particular audiences as circumstances become apparent.*"
>
> (Smith, 2001: 74-75).

Additionally, it has been claimed (Chambers, 1992) that questionnaire methods to collect data, such as public opinion surveys, are flawed because they, "are often designed by professionals external to the situations they are studying which means the likelihood is that the real issues will not find their way into the questionnaire... that rigid structures of closed questions in questionnaires (that are required for coding and assessment procedures) ensure that the public cannot say what they feel. As a result of this, it is suggested that only the 'convenient truth' is generated." (Lawlor, 1996: 91). Lawlor also states that practitioners of PRA believe that questionnaires are "ultimately harmful as the primary concern with these methods is less with the people and more with the answers they provide." (*Ibid*). Alternative methods are put forth such as PRAs that, "enhance knowledge, increase competence and an ability to make demands and sustain action." (*Ibid*).

During these open-ended interviews broad topics were set out relating to the research questions. The interviewees were then directed towards more specific points and topics. The questions were prepared so as not to intimidate participants with information overload

or exclusionary technological talk. There were variations in the questions posed within each organisation and also among individuals depending on their roles and familiarity with the GIS technology. Responses to the semi-structured interviews were recorded on sheets, which outlined basic themes and topics of discussion (Appendix C).

In addition to the data recorded using the basic format of the semi-structured interview sheet, interviewees, in this case the key local actors, were asked questions to provide context details such as their employment, organisational affiliation and residence. Additionally, participants were specifically asked if they used computers and if they had any particular skills such as experience working with data, spatial data, maps and web design. The researcher asked questions, took notes, observed, and commented on GIS usage when appropriate.

The recording process involved the taking of hand written notes. Notes were compiled and stored in a lab book categorised by organisation and topic. All hand written notes were subsequently typed into Microsoft Word document files, stored on the hard drive of a computer and burned to a CD ROM for backup purposes at appropriate intervals. The original notes were stored in a secure location for reference purposes. These interview notes and transcripts comprise the case study "database" (Yin, 1994:33) helping to ensure the reliability of the research results.

5.2.10. Fieldwork Methods: Participant Observations.

Participant observations were conducted throughout the fieldwork. Desk space and computer facilities were provided for the purposes of the PPGIS research including observations of participants in locations where the grassroots GIS was implemented and at other locations during its design. These locations and facilities are listed in Table 5.3.

Table 5.1. Participant Observation Locations and Facilities

Organisation	**Facilities**	**Web Access**
The Tallaght Partnership	Desk and Computer	Internet access
The Brookfield Enterprise	Desk and Laptop Computer	Internet access
The West Tallaght Resource Centre	Desk and Computer	Email only
Fettercairn Community Centre	Meeting hall	None

The proximity of the researcher to community development workers was an important aspect to the data collection, both for participant observations and interviews. This proximity allowed for the researcher to be included in meetings and accepted as part of the community development efforts. Participation in these processes allowed the researcher to become familiar with the inner workings, issues and concerns of the organisations and individuals working and living in the study area. Although the focus was primarily on information technology usage, particularly GIS, the researcher was exposed to other contextual issues, which helped inform the research.

The proximity of the researcher to the case also allowed the researcher to access other data sources including: internal documents, council documents, reports, plans, surveys, statistics, photos, discussions, and additional contacts and informants. The document sources were collected and copied or accessed when needed with the explicit permission of the participating organisations. These additional sources of information allowed for triangulation of data during the analysis and provided important context for the research. Triangulation of data is another important component of the research analysis helping to ensure the reliability of the results (Yin, 1994).

Finally, the collection and analysis of all relevant, available and sufficiently detailed data held by the local authority, non-governmental organisations, other bodies and individuals were facilitated through close contact with the lead individuals in the organisations utilising the grassroots GIS. The utilisation of detailed and context specific data are an advantage in the study of PPGIS in community settings as the multidimensional nature of the design and implementation of the technology cannot be addressed in other ways.

5.2.11. Constructing the Final Model of the GIST

The Geographic Information System Tallaght (GIST) project was used to implement the grassroots GIS in Tallaght. The method used to accomplish this follows:

- **The identification and establishment of a network of key actors**

In consultation with local community development workers and members of local CBOs several key actors in the community were identified as possible participants in the construction of the GIST.

- **The process of informing community groups and residents in the area about the project was expanded**

The community development workers at the Tallaght Partnership informed local participants using the established information channels in the area. An information brochure with contact information was created and passed out to interested parties. Additionally, two radio interviews were conducted on Tallaght FM the local community radio station and a GIST website was created and "launched" containing information about the project and appeals for contributors.

- **Formation of the GIST user committee or working group**

At presentations, individuals were encouraged to identify others who would be willing to participate in the GIST working group. The purpose of the user committee was to discuss what kind of information should be collected and who would collect it. In addition the committee acted to direct and monitor the process.

- **Combine Process Meetings and PLA Sessions**

A digital base map with the initial local data collected by the community and the formal data collected by the researcher was produced. The GIS technician in consultation with local participants created this map using ArcView GIS version 3.2. This formed a base map for the GIST project, providing a common frame of reference and a means to improve the exchange of information. This map was also used to inform other groups who were missed for various reasons in the first round of consultations.

5.2.12. Constructing the Website

Local participants determined that it would be useful to construct a GIST website containing a variety of the maps created during the PPGIS process. Again a bottom-up, grassroots approach was used during the development of the website as the participants were self-selecting with each individual contributing his own resources and skills according to ability. The GIS researcher acted as advisor and technician with regards to

the digital maps contained on the website with all other development controlled by local participants. All the data collected were made available for inclusion in the website.

5.3. CONCLUSIONS

This research is a case study on the design and implementation of a grassroots GIS in the Tallaght community of Dublin. The case study method, a widely used approach in the fields of planning, GIS and community development has particular utility when public participation issues are involved, as they are in this research. The methodology was designed to answer the research questions on this particular case of PPGIS use in the community context.

The specific methodologies used in the fieldwork for this research are primarily participant observations and semi-structured interviews in a longitudinal study of the design and implementation of a grassroots GIS. The fieldwork spanned three years of regular observations of local residents and workers for organisations engaged in various community development activities and initiatives. This research observed many different organisations and individuals interacting with the GIS technology. This chapter discussed in detail these methodologies, which were used to answer the five research questions regarding PPGIS use in community settings through the creation and implementation of a grassroots GIS, namely, the Geographic Information System Tallaght (GIST).

CHAPTER 6: THE RESULTS: GRASSROOTS GIS AND THE TALLAGHT COMMUNITY

"In a democratic society citizens should be able not only to find out about the issues affecting their lives, but also to communicate meaningfully with other citizens about problems, social needs and alternative policy options."

(Forester, 1982: 17).

6.1. INTRODUCTION

This chapter will examine the results of how GIS was introduced into the Tallaght community and how it was adopted, populated and sustained by the community in an organic, bottom-up and grassroots process. The first half of the fieldwork involved the collection of formal government data by the researcher as well as community data gathering using the PPGIS and PLA meetings. The results of the first half of the fieldwork served as the basis for the creation of the Geographic Information System Tallaght (GIST) a collaborative, community based, grassroots GIS project. The results of the implementation and use of the GIST are examined in the second half of this chapter through case studies of three Tallaght CBOs, namely, Tallaght Intercultural Action (TIA), the Fettercairn Youth Horse Project (FYHP) and the Disability Action Research Training Outreach organisation (DART). The results of the fieldwork are examined in the following sections.

6.1.1. Fieldwork: Objectives

The objectives of the fieldwork are:

- **To test of the feasibility of a local community based grassroots GIS**
- **The collection and storage of a wide variety of local knowledge and formal data in digital form**
- **The prioritising of community needs and opinions through the use of grassroots GIS**
- **Establishing a wide variety of contacts and a network of data contributors and project supporters within the community**

6.1.2. Fieldwork: Components

The fieldwork consisted of four components:

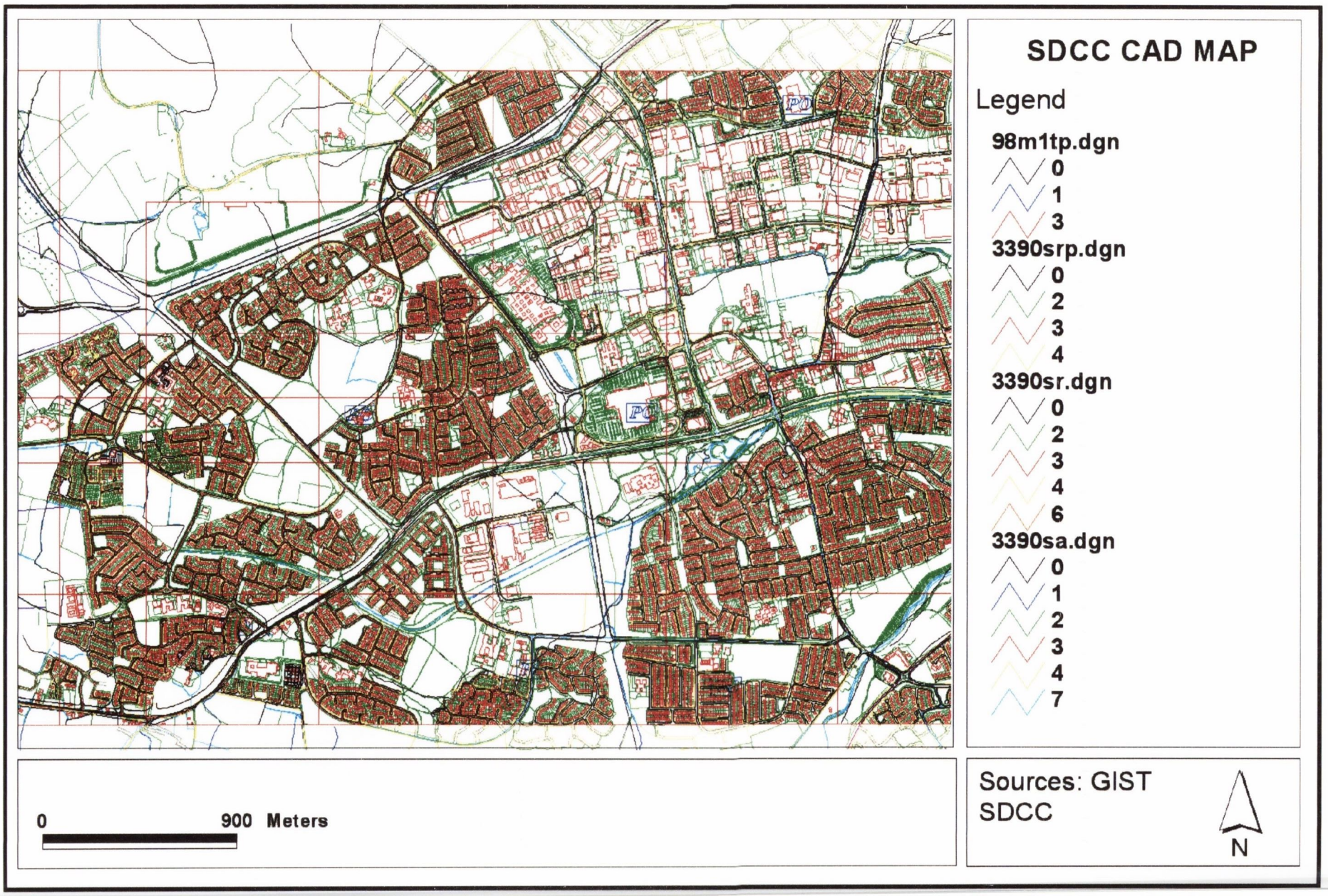
- **Site selection, initial contacts and the collection and storage of formal Data**
- **The PPGIS "process meetings" or small group forums**
- **The Participatory Learning and Action (PLA) sessions**
- **The Implementation of the GIST project**

The first component of the fieldwork was the selection of a suitable study area and the collection, conversion and storage of formal data using GIS by the researcher. The site was selected due to the large number and variety of community development projects occurring in the Tallaght area. Additionally, a previous research project had explored GIS and community development activities in the area in relation to environmental issues as discussed in Rybaczuk, (2001). However, as this study was not in depth it was deemed suitable by the researchers to expand these initial efforts to take advantage of the local contacts.

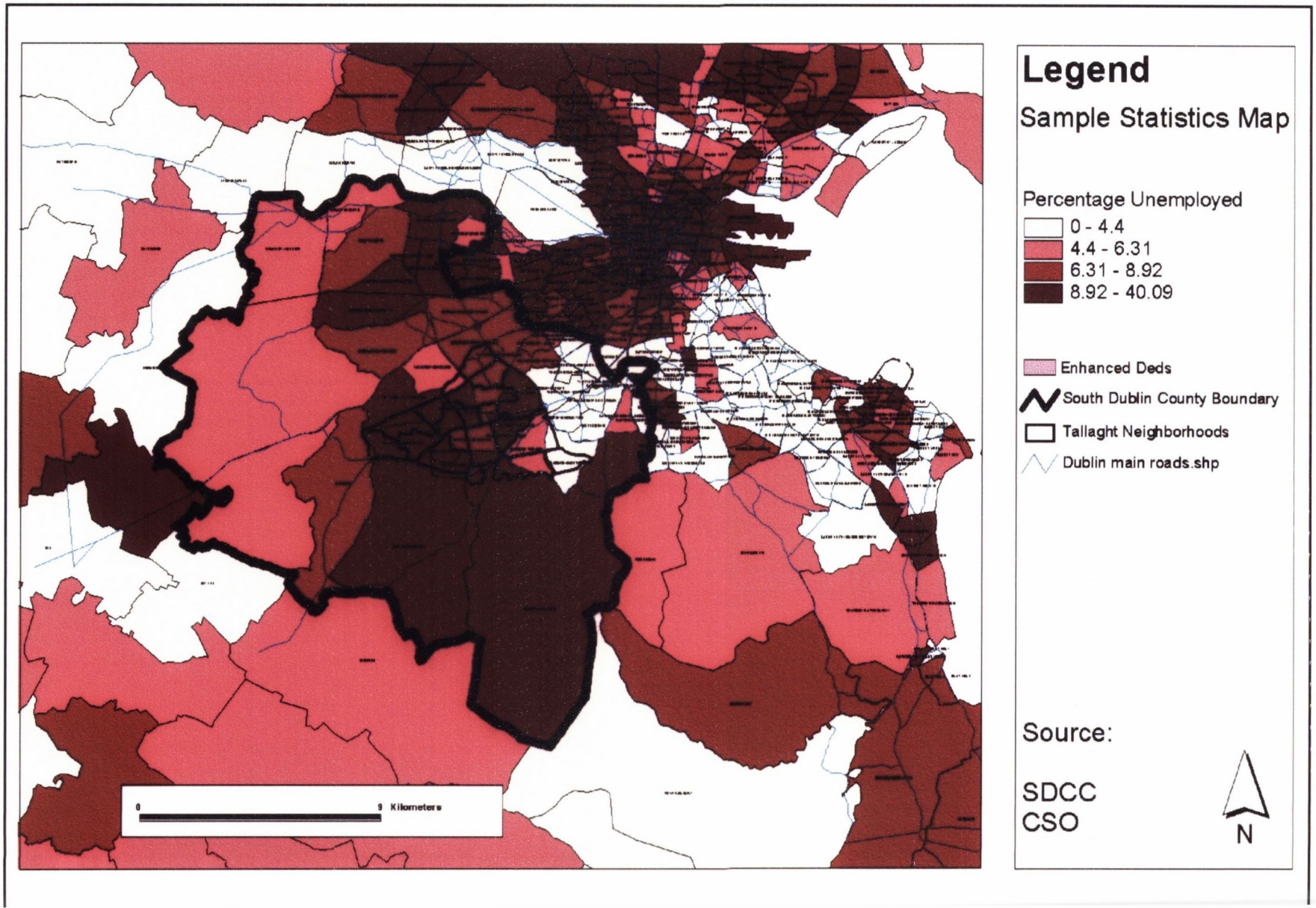
The Tallaght Partnership was instrumental in facilitating the fieldwork. Community development workers spread the word throughout their networks of contacts regarding the GIS research project and organised meetings. Additionally, the Tallaght Partnership provided office and computer facilities in the three locations. Upon the initiation of the project the local government was contacted at which point formal data set collection and storage commenced. The Planning Department of SDCC provided access to high quality digital spatial data files, which were copied on to CD-ROM for research purposes as well as aerial photographs, documents and other data.

The initial results of this fieldwork revealed that there were no appreciable difficulties in the ability of the grassroots GIS to collect and store the variety of "formal" government, spatially referenced data. Technically the ArcView version 3.2 GIS can handle many digital file types including, CAD, (dxf and dgn) files, aerial photographs, (tiff and jpg) as well as database, (dbf) and spreadsheet data (xls.). Examples of the base maps and other formal digital data themes are contained in maps 6.1, through 6.7.

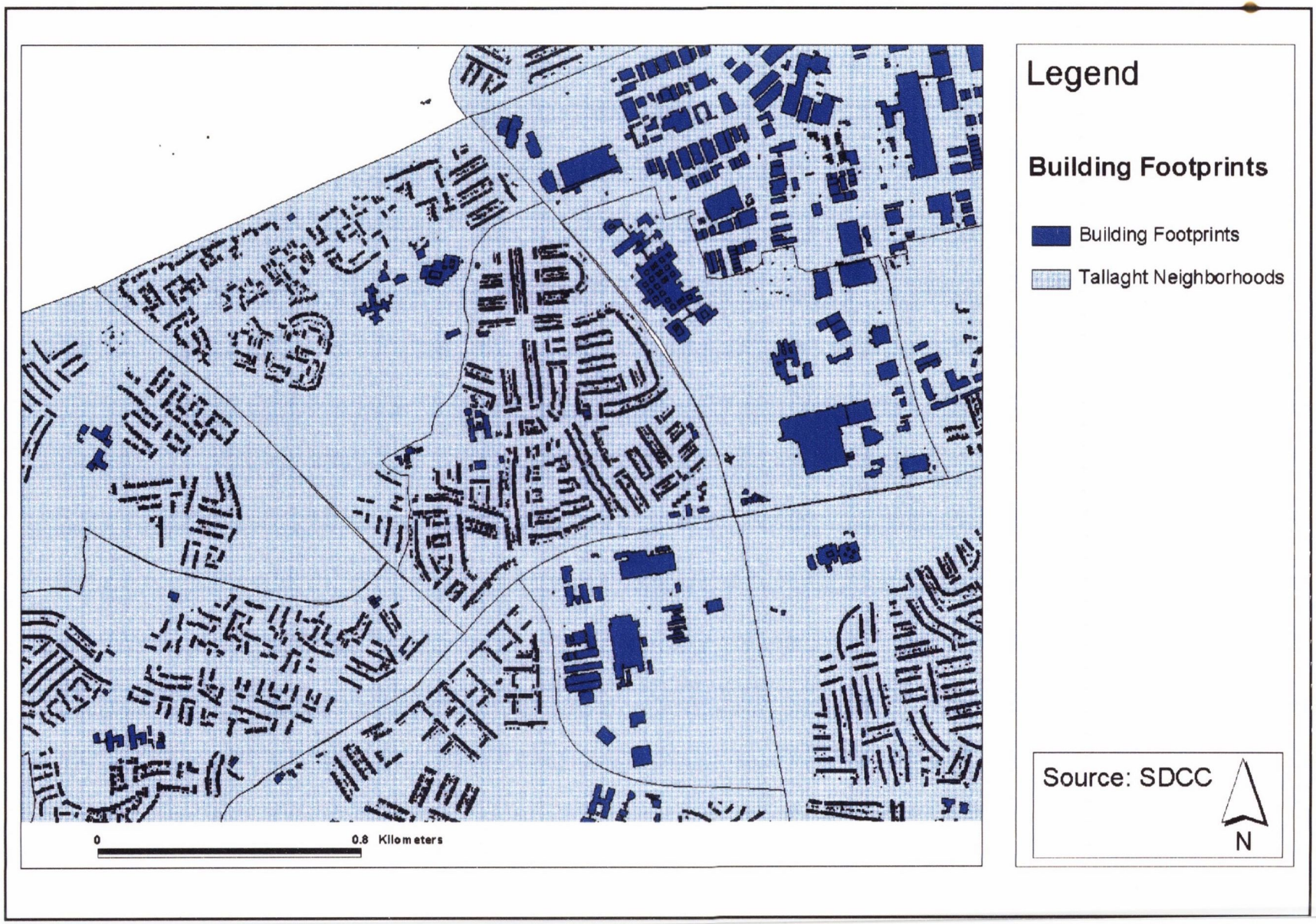
Map 6.1. Formal Data Map: SDCC CAD Theme



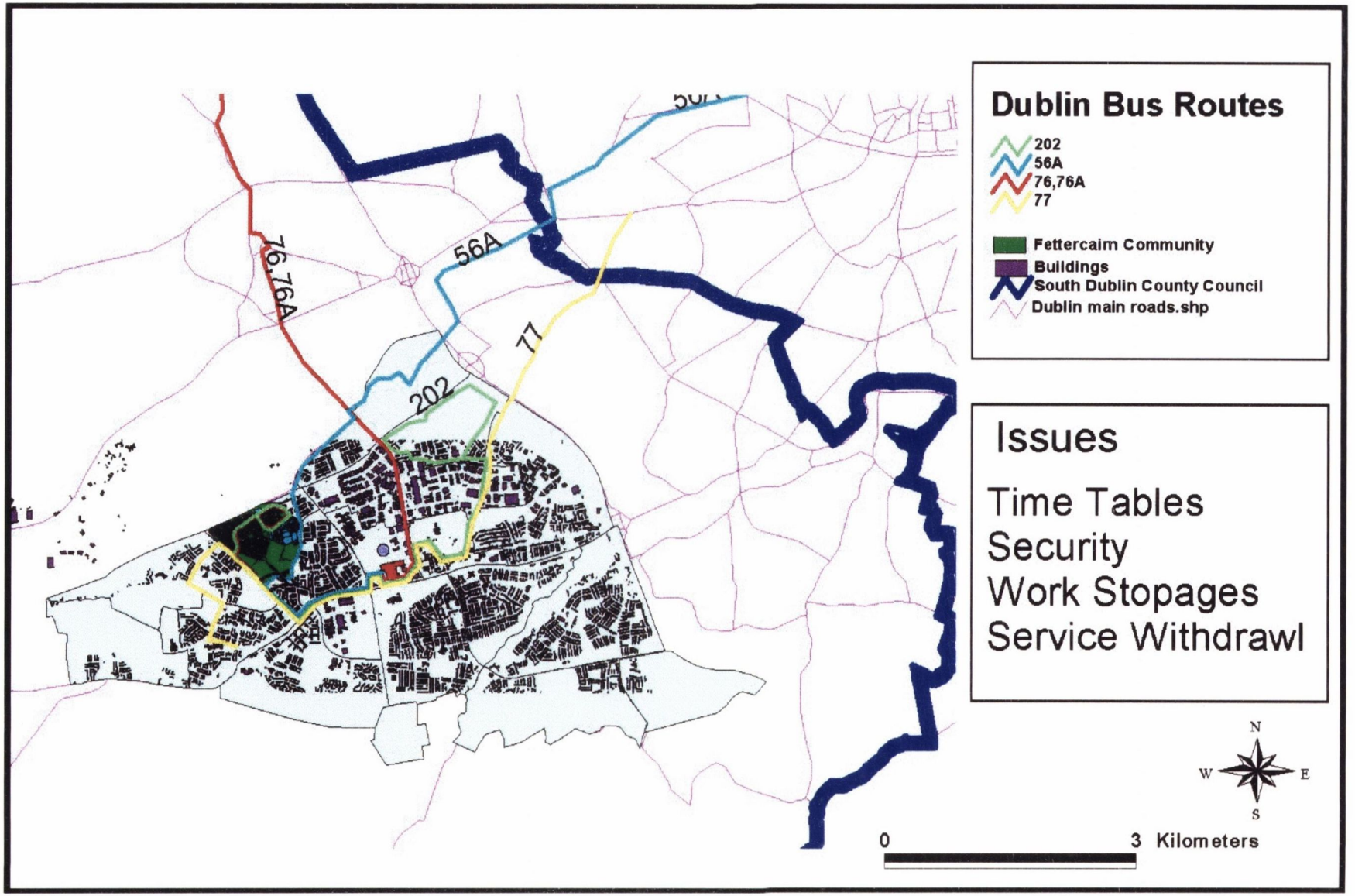
Map 6.2. Formal Data Map: CSO Unemployment Data



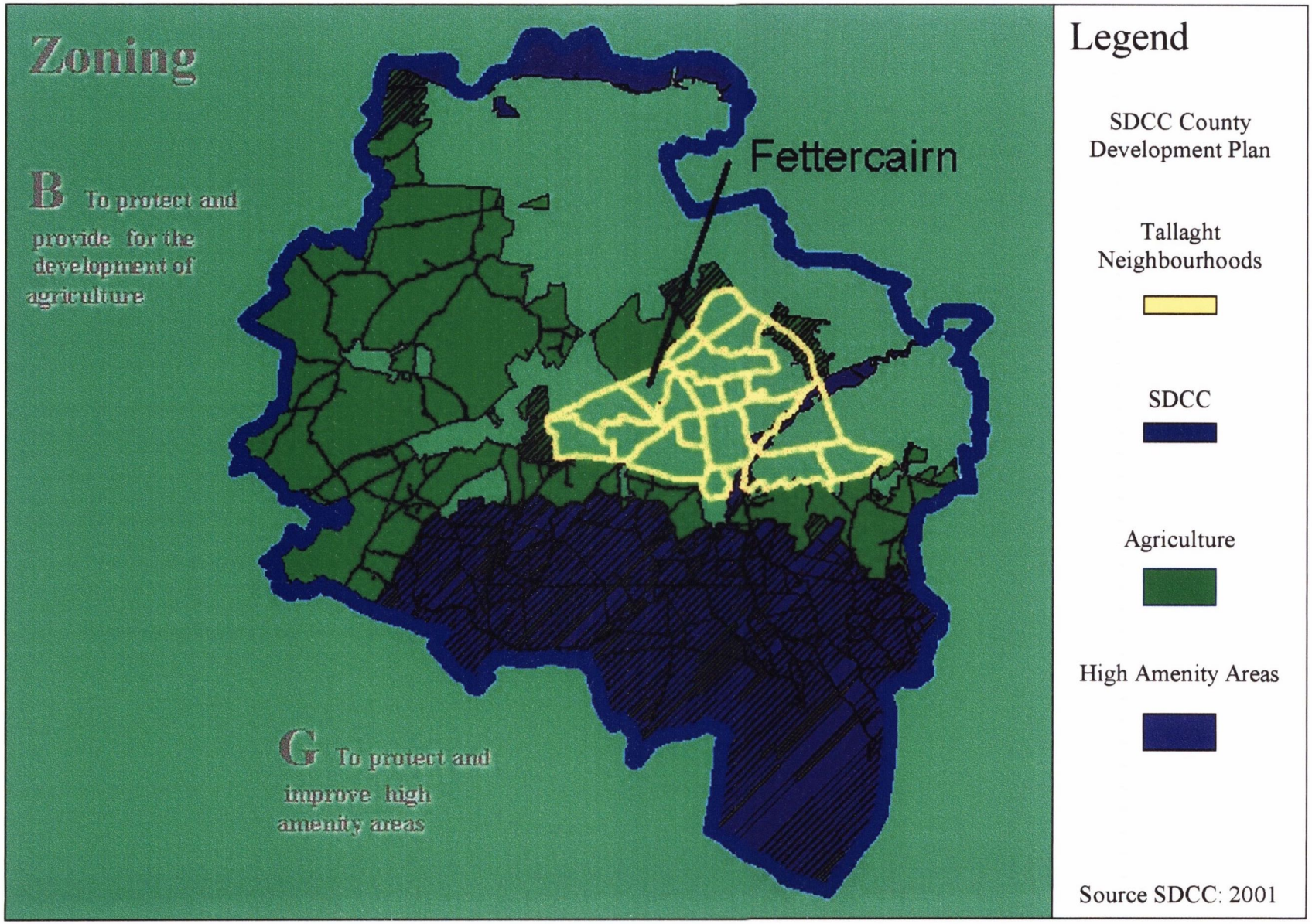
Map 6.3. Formal Data Map: SDCC Building Footprints



Map 6.4. Formal Data Map: Dublin Bus Transport

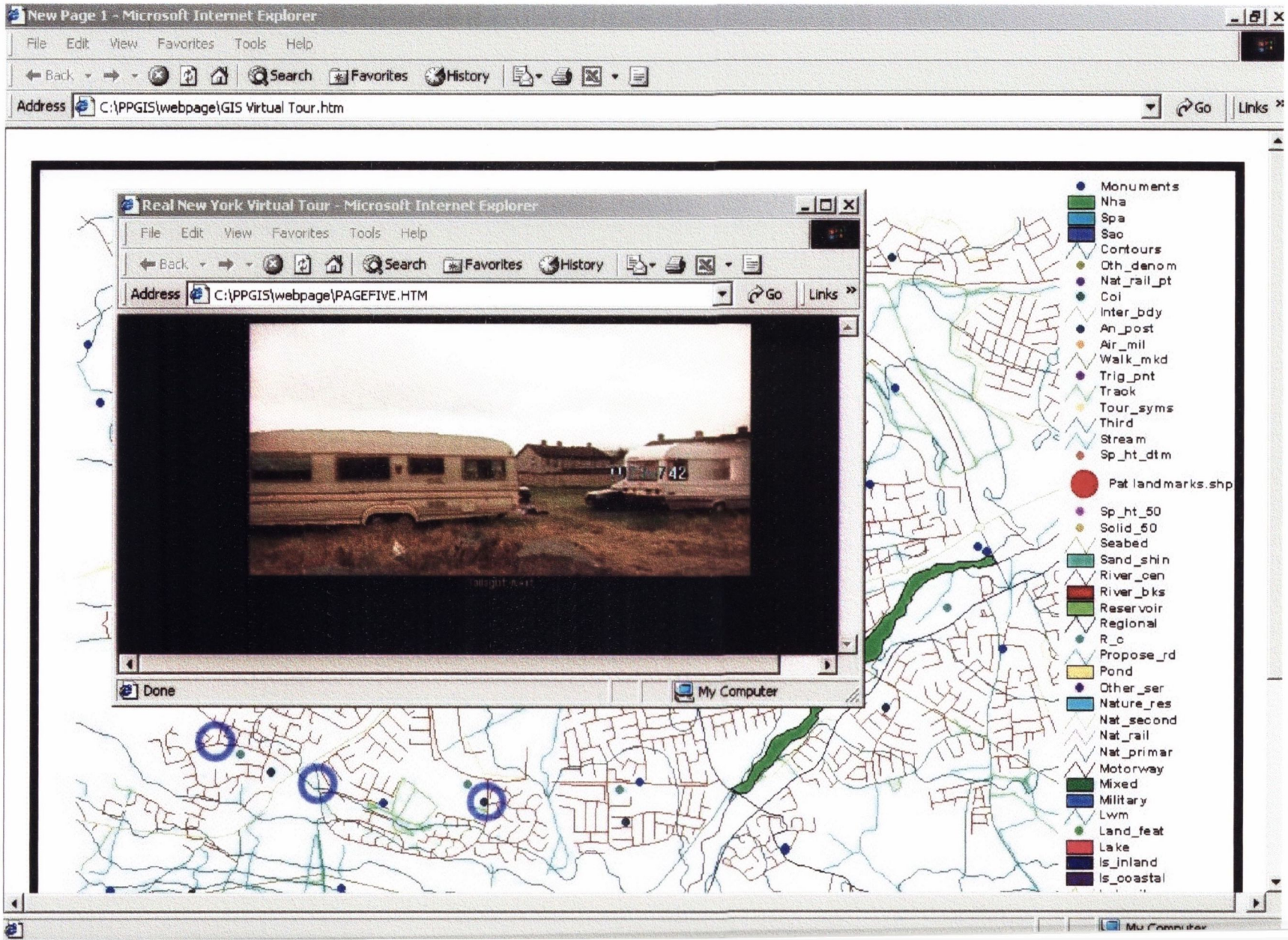


Map 6.5. Formal Data Map: SDCC Zoning Theme



Map 6.6. Formal Data Map: Aerial Photograph

Map 6.7. Formal Data Map: Digital Video Survey



6.2. THE PPGIS PROCESS MEETINGS

The second component consisted of six separate PPGIS process meetings where local residents and individuals representing CBOs were presented with the PPGIS concepts and data in small group forums and asked to comment and contribute information. The meetings were organised by community development workers at the Tallaght Partnership. Meetings involved the use of PowerPoint presentations and ArcView version 3.2 GIS displays of thematic digital maps, statistics and multimedia data representing the Tallaght area. The participants in the fieldwork were mostly impressed with the high quality, detailed, formal data provided by the SDCC, including those data used as base maps.

Local residents and individuals representing various community organisations attended the PPGIS process meetings. Table 6.1 contains summary information on each PPGIS process meeting. A total of approximately sixty-five separate individuals attended the PPGIS process meetings. The PPGIS process meetings were semi-structured and open-ended, allowing for the collection of both broad topics of interest and specific points of importance to the participants. Specific issues were also covered in small, informal group meetings as the PPGIS evolved to include more data and functionality. Additionally, when the group setting was deemed inappropriate for the collection of data, for instance in relation to time consuming or sensitive issues, semi-structured interviews with individual were used, (Appendix C). An example of this involves interviews with a key local informer regarding the strained relationship between some local CBOs and the Tallaght Partnership.

Table 6.1. The PPGIS Process Meetings

Meeting Location	General Topics Covered	Persons
Brookfield Enterprise Centre	Initial Data, Privacy, PPGIS Contacts, Support	12
Lone Parents Centre, Fettercairn	Formal Statistics vs. Local Knowledge	6
St. Marks School, Fettercairn	Computer Maps vs. Hardcopy Maps	12
Fettercairn Community Centre	Local data collection, Video Technology	20*
Tallaght Partnership, Killenarden	Potential Applications, Local Data	10
West Tallaght Resource Centre	Potential Applications, Support, Data, Web	5
*** Approximately**	**Total**	**65***

Each PPGIS process meeting began with an overview of the project and GIS technology. This overview was presented in Microsoft PowerPoint format using a computer data projector and a laptop. During the process meeting at St. Marks School large format, hardcopy planning maps were used in addition to the digital maps. The PPGIS process and information presented was used to familiarise the participants with GIS technology and functionality. The introductory presentation also included a series of slides containing the various formal datasets contained within the GIS.

After each introductory presentation the participants were asked to comment on the technology and data. In most instances the presentations provoked strong reactions allowing for a wealth of comments, suggestions and issues to be recorded. The facilitator present at each meeting recorded the discussions during the PPGIS process meetings on white boards or in field notes. Participants interacted with the GIS technician, regarding the technology and data, making queries regarding the collection, display and communication of spatial data. Additionally, the participants discussed with each other the issues of concern in the community that were raised through the display of the spatial data in the GIS.

An example that demonstrates this process occurred during the meeting at the Lone Parents Centre. After the initial introductory presentation the participants asked to see more information on the Fettercairn estate. The GIS technician was able to zoom into the area using an ArcView version 3.2 GIS and display the various data associated with the area. It was immediately recognised by a participant that the formal data set containing the number of single parents in the estate was in error. The participant knew that there were approximately 50% more single parents than indicated. It was explained that the data were provided by SDCC and that they were up-to-date. The discussions centred on addressing the shortcomings in the formal data and problems encountered with the SDCC by the Lone Parents organisation.

The third component involved the more structured PLA sessions where formal large group approaches were used to facilitate the collection and storage of community information or local knowledge. These data are described in the next sections. The final component brought together the various formal and informal data collected during the fieldwork into a

community based, designed and owned GIS. The new grassroots GIS was implemented in the form of the GIST project, the results of which are described in sections 6.5. to 6.9.

6.2.1. INITIAL ASSESSMENT OF THE PPGIS FIELDWORK

The initial responses of the participants in the grassroots GIS were of great importance to the overall feasibility of the research in Tallaght. Accordingly, those participating were given an opportunity to make extensive comments on the grassroots GIS during these meetings and elaborate on issues and concerns at length after the meetings. The results of this data collection and analysis are organised into the following broad themes:

- **Initial Reactions**
- **The Potential of PPGIS to Empower**
- **Participation and Contributions**
- **Controversial Issues**
- **Negative Reactions**
- **Heightened Expectations**
- **Formal Data Set Issues**
- **Other Issues**

6.2.2. Initial Participant Reactions to the grassroots GIS

The majority of the comments regarding the grassroots GIS were positive and supportive. There appeared to be little reluctance to participate or contribute on the part of the participants and there were only a few negative first impressions of the grassroots GIS. A number of important insights were gleaned from the participants that would prove valuable for design and implementation of GIS in community settings and the overall participatory process in general. The important findings of the grassroots GIS fieldwork are:

- **The genuine interest and excitement of the participants with respect to the potential of GIS, PPGIS and ICTs more generally was easily discernable. This was encouraging for the prospect of conducting more extensive research in this community and further developing the grassroots GIS.**

Some examples of the typical statements that were made during the PPGIS process meetings include:

> "This is an exciting project."
>
> "This technology has great potential."
>
> "The maps are really interesting...the amount of detail is incredible...how much does it cost?"
>
> "There is so much information available, I didn't realise that maps like this existed... the council needs to make this available."
>
> "GIS will greatly assist whoever wants to take it on board."
>
> (*Fettercairn Residents*)

Most comments regarding the technology by local residents participating in the process strongly supported the entire concept. These initial findings indicated that the use of GIS in this particular community setting was feasible. Residents displayed an interest in the GIS computer technology, the various data contained within the GIS and the overall discursive process initiated through the presentations.

Community development workers were also strongly supportive of the project:

> "We need to get more groups involved... people will be interested in participating in this project."
>
> "You are in great demand... We need to get this project funded."
>
> (*Community Development Workers*)

Comments like the last one above suggested that some participants considered the research to be more of a "consulting" type project. Information technology consulting projects are prevalent in the literature and involve a fee for service or product, provided by an expert to local organisations. The nature of this research was described in this instance as being more experimental or exploratory in nature. It was explained that there was no product to purchase and that the GIS technician or researcher would not be building a GIS for the community to use. The nature of the research was to test the feasibility of the community

discovering potential applications of the technology and building their own GIS. This explanation of the nature of the research project provoked the following response:

> "People can see the potential applications of GIS...there is great potential for this project."
>
> "You are the GIS expert... you need to lead the process and tell the users what to do with it."
>
> (*Community Development Workers*)

Again the experimental nature of the research was described. It was emphasised that the project would be lead from the "bottom up" and by "grassroots" participants. At no point in the fieldwork did the GIS technician tell the participants what they needed to do with the GIS. All GIS uses, potential applications and recognition of the empowering characteristics of the technology come from local participants.

6.2.3. Recognition of the Potential of the Grassroots GIS to Empower

Many participants recognised the empowering characteristics of the GIS technology shortly after their introduction to it.

> "We have had problems with the council in the past, we need tools that we can use to beat them at their own game."
>
> "The developers have access to all this technology... we need something that can help level the playing field."
>
> "I can see that this project has an enormous potential to empower our community."
>
> "We need to move ahead with this project immediately."
>
> (*Fettercairn Residents*)

The community networking capabilities of the grassroots GIS were also recognised by many of the participants. The participants generally acknowledged the feasibility of the concept of information sharing thought the technology. Examples of the recognition of

this potential to build a community network through the use of GIS are recognised in statements such as:

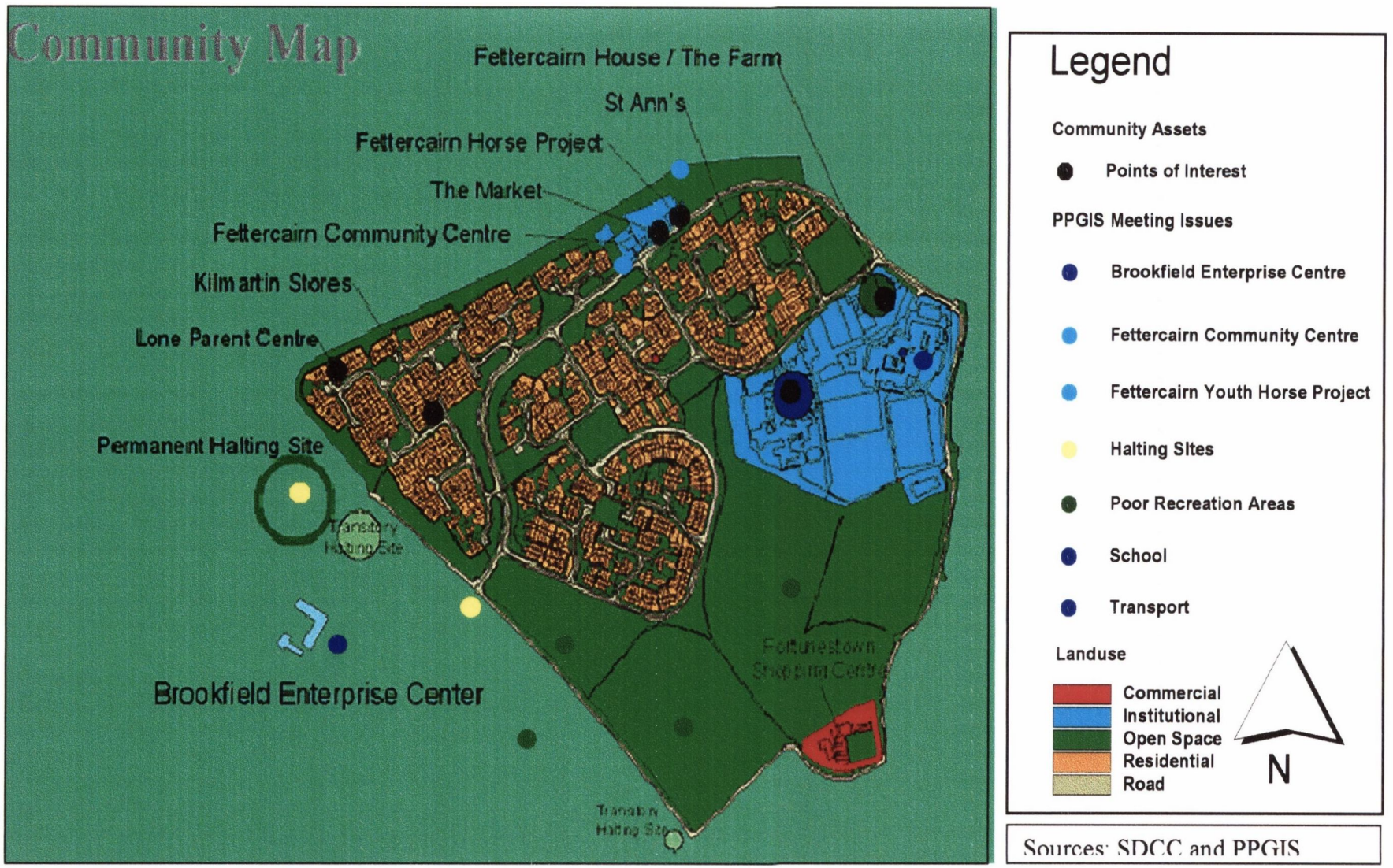
> "GIS is a golden opportunity for local communities to share resources, collect information and think about basic issues."
>
> "GIS shows people how their community looks...and how they want it to look...it gets people involved."
>
> (*Fettercairn Residents*)

- **The importance of the process itself as opposed to a focus on product, outcomes or technologies was recognised during the discussions:**

> "The computer, GIS and the information...it's the combination of all the different elements...the coming together of all elements."
>
> "The GIS gets people to look at the issues in this community in a different way."
>
> "Immediately ideas started popping into my head...GIS was helpful in coming up with a plan."
>
> "It allows good ideas to grow"
>
> (*Fettercairn Resident*)

The representation of the community in the GIS through the display of digital base maps allowed participants to point to specific issues on the screen. Issues including housing, crime, public transport, traffic, recreational facilities, pollution and others were displayed and discussed in the PPGIS process meetings. The results were recorded on hardcopy maps by the GIS technician and in note form. The GIS technician then entered these data into the GIS to form a local knowledge, thematic data layers. Map 6.8 shows the results of a PPGIS process meeting.

Map 6.8. PPGIS Process Meetings Results Map

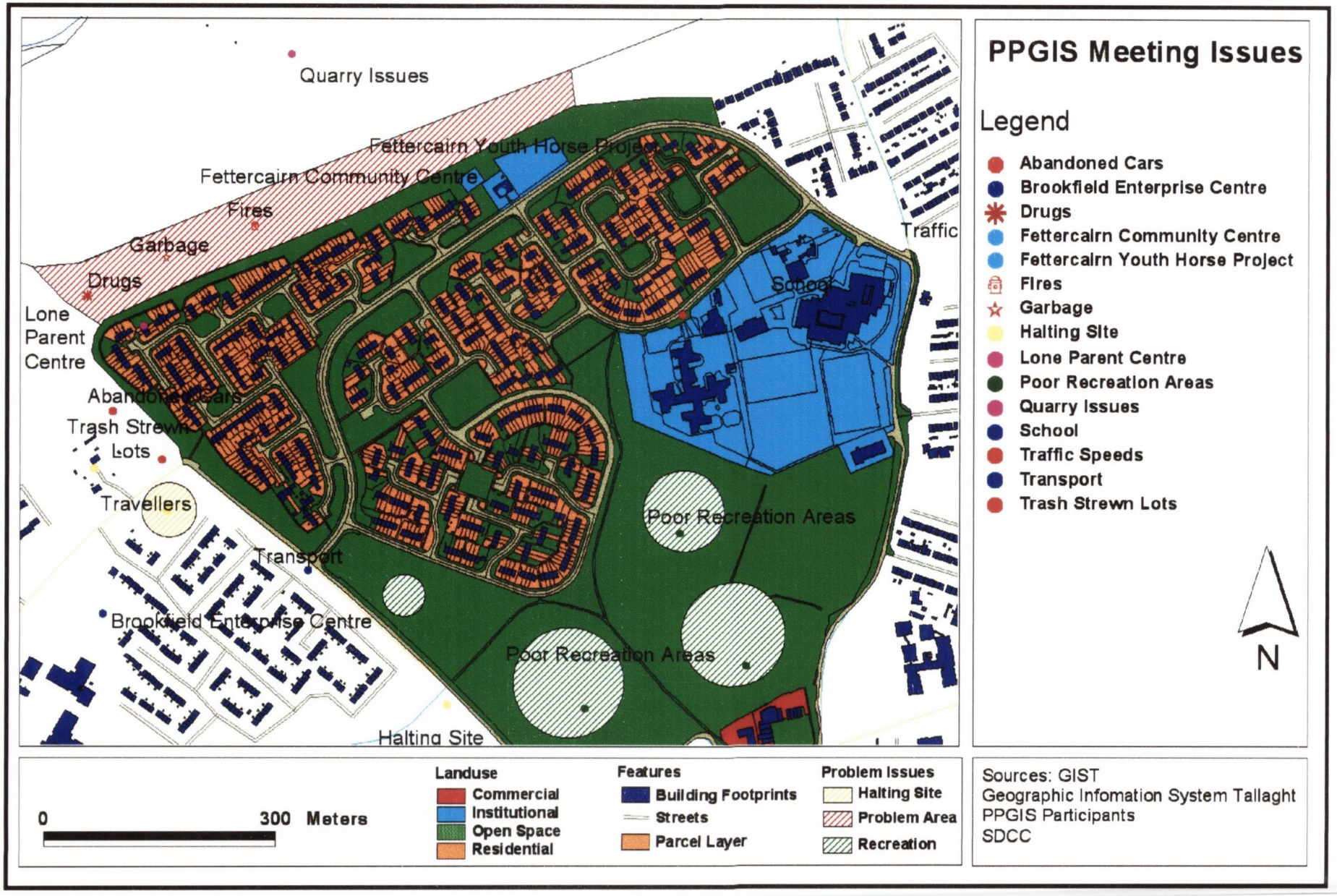


Map 6.8 represents the collection and storage of community information. The participants exposed to these PPGIS process maps were able to view, comment on, make refinements, add additional local knowledge to and prioritise issues on the maps.

- **The ability of the PPGS to collect, store and communicate other additional important community issues was also observed.**

These additions were recorded using field notes and added to the PPGIS by the GIS technician. The technical skills required to edit and modify the GIS to allow for the storage of PPGIS process meeting data were beyond the capabilities of the vast majority of community participants. It was not until a much later stage of the fieldwork, namely the development of the GIST and associated website that technical abilities among several participants became evident. Map 6.9 is a refined PPGIS process map. Map 6.9 contains more information and is more sensitive to some of the local issues of importance. Without the participation and contributions of local residents the creation of maps that accurately reflect important issues would be impossible.

Map 6.9. Refined PPGIS Process Meeting Map



6.2.4. Participation and Contributions to the Grassroots GIS

The PPGIS process meetings allowed for large amounts of spatially referenced local community knowledge to be collected almost immediately. Local residents displayed an interest in contributing local knowledge in the form of their own experiences, stories and viewpoints on the issues under discussion. Participants also contributed other data such as, documents, books, poetry, photos and video information. More that twenty-five poems were collected written by local participants. One of these poems contains a striking portrayal of one participant's experiences moving from inner city Dublin to the Tallaght community. An excerpt reads:

City of Doom

"They have ripped the heart out of my city,
Demolished and destroyed it without pity.
Children, who in its streets once did play,
Sent now out to the barren fields of dismay.

In long winding queues they now stand,
Holding out an undignified beggars hand.
In rows of endless houses they now stay,
Waiting until buried beneath the clay.

Pale faced and living in endless gloom,
The whole place now their eternal tomb.
Fire and brimstone has no fear or sway,
With people who live with it every day..."

© David John Brophy Sr. (2000)

Appendix D contains examples of other local knowledge in the form of the photographs provided by participants for inclusion in the grassroots GIS.

- **The willingness of the participants to cooperate regarding the collection of formal data and the inclusion of other sources of local knowledge was also encouraging.**

Participants began a discussion almost immediately in most meetings whereby they suggested potential sources of additional local data. Over the course of the process

meetings, suggestions were made relating to the collection of local knowledge from the following main local sources:

a) Local schools where students had undertaken projects to collect stories and photographs of the area from some of the long time residents.
b) Local artists, poets and "characters" were referenced as potential sources of community information.
c) A local pub that had historical photos of the main streets in the area and numerous "old aerial photos" showing the area was identified.
d) Numerous local CBOs were identified as potential contributors.
e) Books, reports, documents and other reference materials, including newspaper articles, photos, maps and a video that might be of interest were identified.
f) Contacts at government agencies and other institutions were identified as potential contributors, namely, the planning department, the anti-drugs taskforce and St. Dominic's Church.

Additionally a local community worker stated:

> "You have to get the support of the local priests. They have a lot of power in the community and all the contacts... Nothing gets done around here without them approving it or knowing about it."
>
> (*Local Community Worker*)

The identification of numerous potential data sources and new contacts began a process where by a network of contributors to the grassroots GIS was established. The expectations of the participants with regards to the potential of the system to collect, store and share community based information were raised.

6.2.5. Controversial Issues

The willingness of the participants to share information was encouraging. This also included information on controversial or sensitive issues:

"There are no Garda foot patrols in this area like there are in other parts of Dublin. We have some of the highest crime rates and the lowest number of police patrols."

"At Roadstone the blasting is annoying. The noise almost everyday at the same time, 3 o'clock... the dust and the vibrations... I have cracks in my walls because of the quarry."

"These council houses are built really cheaply... there is no proper heating or insulation."

"The trash builds up in the open areas between estates...there are abandoned cars there...you get rats in those fields...it's not safe for the kids."

"Cars speed through the streets here, we keep complaining but the council does nothing...we need traffic calming measures here, especially near the schools."

(*Fettercairn Residents*)

Many participants viewed the grassroots GIS as a potential means to address some of these issues casting the entire concept in a favourable light. However, not all of the initial reactions to the grassroots GIS were positive. The next section examines some of the negative comments with regards to the GIS technology and process.

6.2.6. Negative Participant Reactions and Comments on the Grassroots GIS

- **A minority of participants conveyed outright hostility to the entire concept of PPGIS.**

Comments and suggestions that could be construed as more negative in nature regarding the feasibility of the PPGIS were fewer in number than the positive comments. These are nonetheless of importance and interest to this research. The negative comments and suggestions of the participants regarding the PPGIS are as follows:

"No one is interested in this spatial bullshit." [1]

"No one knows what you are on about with this project."

"Only a few people in this community can afford computers... this technology will be of little use to them."

"What about the people who can't read?"

(*Community Development Workers*)

Comments such as these are possibly a reflection of a lack of understanding of the purpose and capabilities of PPGIS. The confusion regarding the mapping of community issues and the applicability of GIS to community development problems existed mainly among community development workers. Some community development workers did not view the project as feasible in a community with such low educational and IT skill levels.

These types of comments generally came from the community development workers with little or no IT skills. The concept of using a computer for anything beyond word processing appeared to be alien to several participants. This is an important consideration as it may reflect a "built in" negative bias among some towards computers, IT and GIS in general. This negative bias may be caused by the fear of the having to learn a new skill, fear of the unknown or a fear of being "out of one's element". The comments of one local resident supports these assertions:

"Technology is a barrier... Community leaders of an older generation are not comfortable with technology."

(*Local Resident*)

However, despite the criticisms of a small minority, the majority of participants in the process felt that the technology appeared useful and was a potential step forward in providing a basis for more concerted action on community issues. A majority of

[1] Interestingly, this community development worker was to become an ardent supporter of the use of GIS and computers in community development activities as his familiarity with the technology increased. This transformation from vocal opponent to supporter of GIS occurred in other local actors as well. This illustrates the point that although the opinions and attitudes of certain actors appear strong and fixed they can change through time.

participants stated that they would be willing to contribute information and help in its collection for inclusion in the grassroots GIS.

6.2.7. Heightened Expectations

It was observed that the expectations of the participants were raised with regards to the potential and applicability of PPGIS and ICTs in the context of community development. Several unrealistic or non-feasible proposals were put forth. Several of these proposals and comments indicated a lack of understanding of the scope and nature of the PPGIS specifically with regards to technical considerations and costs. The technical and financial resources available to the PPGIS project were described in detail during the process meetings. Nevertheless, confusion seemed to remain in the minds of several of the participants with regards to these aspects of the project. For example, during one public meeting a number of unrealistic proposals were put forward and discussed. A community worker with SDCC suggested:

> "This system should be accessible through a kiosk placed in the local community. This would allow people without computers to access it."
>
> (*South Dublin County Council Employee*)

The development of a "kiosk" type device or structure that would allow members of the public and other interested parties to access the data in the PPGIS is an extensive undertaking. Kiosks are popular in many localities. They are usually "touch screen" devices that allow the browsing of an "*Intranet*" or the Internet.

It was explained that the technical considerations and costs associated with the development of such a system for the purposes of this grassroots GIS were beyond the capabilities and scope of this project. It was suggested that if SDCC were to implement such a system it would not be unfeasible to incorporate the grassroots GIS using a web page type of interface. Using this approach, data and maps could be made available through a kiosk.

Additionally, the council worker noted:

> "There are serious privacy and legal issues with this type of information...You can't take pictures of people's houses and put them on the Internet without their permission...If you include any photographs of people you will have to get their permission first."
>
> (*South Dublin County Council Employee*)

The entirely voluntary and community based nature of the project was explained in response to this comment. Additionally, it was noted that Internet access could be password protected to allow restricted access until such time as a committee could review and approve the information in the grassroots GIS for public release. A community development worker stated at this point that:

> "The community will decide what goes in the system. I don't see that privacy is a concern especially if we are dealing with environmental issues... We are not talking about taking pictures of people's houses."
>
> (*Community Development Worker*)

However, doubts appeared to remain regarding privacy protection and the legality of including certain types of information for public consumption. The data included in grassroots GIS are of great importance. They determine the uses to which the technology can be employed. Issues with regards to the datasets incorporated into the grassroots GIS are explored in the next section in more detail.

6.2.8. Formal Data Set Issues

During the PPGIS process meetings, the participants raised issues and concerns related to specific datasets and their shortcomings, particularly the formal datasets. These issues and concerns include:

- **Serious undercounting by the local council of the number of single parents in the estates.**

After reviewing the GIS data layer that contained the "official" statistics for the estate, provided by SDCC, a member of the Lone Parent Centre stated:

> "There are far more lone parents in this area than that! We know of at least 130 and that doesn't count those in Springfield... We have had this problem with the council before when they do these surveys."
>
> (*Lone Parent Centre Participant*)

- **Issues were raised with the quality of the open space and recreational facilities in the area.**

> "There is a lot of open space around here but it's useless for playing football on. Most of the year it's water logged. It just collects trash...it needs to be taken care of."
>
> (*Fettercairn Resident*)

The digital maps contained in the grassroots GIS are highly detailed and colour coded (Maps 6.8 through 6.11). Open space, playing fields and other "recreational" land uses are coded green. At first glance it would appear that the Fettercairn estate is surrounded by open space and recreational land uses. However, this is not the case. Many of the football pitches are "water logged" and unplayable for most of the year. The usable playing fields and suitable areas for recreational activities are well known to local residents. The SDCC maps do not reflect this local information. This raises the possibility of further classifying the open space in the area through the inclusion of more detailed local knowledge.

- **An interest was shown in the digital spatial video windscreen survey. However, there were few suggestions regarding its applicability.**

The digital spatial video was devised as a means to document the Fettercairn estate using multimedia technology. A digital spatial video camera was used to record a five-minute clip in a drive through or windscreen survey of the area. A Global Positioning System (GPS) recorded the precise spatial locations of the camera at intervals of approximately one second. This allowed for the creation of a digital video and route map of the survey. The digital spatial video is available as a theme in the grassroots GIS; a mouse click on the item in the ArcView version 3.2 GIS initiates a Microsoft Visual Basic (VB) application that runs the clip.

This type of technology is widely used by local councils in the U.K. to document traffic volumes as well as street and other public infrastructure issues like signage, utilities, trees

and housing conditions. Used primarily during public hearings by planners this video technology can provide a valuable alternative view of a community (Shiffer, 1996 and 2002). In the grassroots GIS the video technology augments the standard two-dimensional digital maps.

- **Issues were raised with regard to the accuracy of the transportation data contained in the grassroots GIS. These data helped highlight the poor levels of bus service, scheduling problems and safety concerns of area residents.**

> "Your bus route map is out of date. Those services are on different streets now... and the route numbers have changed."
>
> "The schedules that you have included are totally useless. The buses never run to the timetables."
>
> "We need better bus service...people depend on them to get to their jobs...the service is poor but there's no other choice."
>
> (*Lone Parent Centre Participants*)

The transportation map was created from the latest map published by Dublin Bus. The timetables were recorded directly from the bus stops and entered into the GIS. Dublin Bus has experienced many difficulties with regards to the quality of its services recently. Many of these difficulties are related to severe traffic congestion throughout the Dublin region. A letter to the editor of the Irish Times newspaper from Phyllis Plant (2002), titled "Trials of using public transport" describes a recent trip through Tallaght by bus:

> *"My experience began on Monday morning waiting at the Square in Tallaght to get a bus to Dundrum. The bus was due at 9.10. I arrived at the stop at 9.00 and by 9.45 there was no sign of the bus. I took a taxi, at a cost of €15. I had naively bought a day ticket, thinking it would be of use to me...But my worst experience was yet to come...At 6.45 that evening I turned up at the bus stop...I was still standing there an hour and a quarter later, without having caught as much as a glimpse of a bus. By now it had got beyond a joke. I was standing many miles from home and it was getting dark."*
>
> (Plant, 2002).

In the Tallaght area there have been a number of recent high profile incidents that have further exacerbated the problems of providing adequate public transport services to the community. Recent articles in the Irish Times tell of disputes between Dublin Bus drivers and Tallaght passengers. Headlines such as "30,000 left stranded after bus pranks" (Yeates, 2002) and "Drivers tell of the bad days on the number 77 bus route to Tallaght" (Healy, 2002), paint an extremely negative picture of public transport in the area. These incidents culminated in the theft of a bus by local youths, which resulted in a "wildcat strike" by drivers who demanding increased security on buses going to Tallaght (Ni Cheallaigh, 2002). During a PPGIS meeting a local resident stated:

> "We've had problems with Dublin bus lately... the drivers don't want to come out here because of the abuse they are getting."
>
> (*Lone Parent Centre Participants*)

With regards to the inclusion of these types of data in a GIS, the issues involving transport highlight the fact that data are highly perishable. Routes, bus numbers and schedules require updating. Additionally, circumstances that may involve the temporary cancellation of services, such as strikes or construction projects, need to be taken into account. Finally, data regarding new services need to be added to keep the grassroots GIS up-to date. The question that this raises is, if Dublin Bus does not do this, then, why go to the trouble and expense in the Tallaght grassroots GIS?[1]

The answer to this question is found in the responses of local residents and workers for CBOs. Because the grassroots GIS is "community owned" and a "bottom up" system, built by residents for residents, the decisions to include or exclude datasets reside solely with these owners and users. If a number of users find that this type of information is of practical value to them or others then it is appropriate to include such information. With regards to Dublin Bus' levels of service and timetables protests were organised by local residents against cutbacks. Collecting and communication information on these issues promotes their cause and strengthens it. The grassroots GIS can assist in this process of information collection, dissemination and issue promotion.

[1] Dublin Bus has a website, (www.dublinbus.ie), that contains updated fares and scheduling information, however, this site contains no information on the problems associated with public transit that have been identified by the participating Tallaght residents.

Additionally, with regards to public transportation issues important points can be raised. In the case of Tallaght it is important to raise public awareness of local conditions and problems. The grassroots GIS can serve to highlight specific problems with public transport in the Tallaght area. It is important to remember that the "New Town" of Tallaght was developed on a garden suburb model where private vehicles are considered to be the main mode of transport. Unfortunately, the segment of Dublin's inner city population that was relocated to the Tallaght area was the least likely to have the resources to acquire private automobiles. This lack of foresight and adequate planning served to isolate and marginalize the residents of Tallaght.

Additional issues ranging from poor service, out of date routes and scheduling problems as well as security issues and denial of service events, that have had a disproportional impact on the residents of the Tallaght community, can also be documented and communicated in a grassroots GIS. The question as to why 30,000 Tallaght commuters were left stranded for several days because of some schoolboy pranks needs to be answered by Dublin Bus, the Garda Siochána and council authorities.

6.2.9. Other Issues Regarding the Grassroots GIS

Some of the other issues that were observed with regards to the grassroots GIS are as follows:

- **The prioritisation of community needs proved difficult especially with the large number of issues raised during the process.**

Participants were aware of a large number of long standing problems in the community. The use of a PPGIS, although suitable to record and store information on any number of them, would not seem, initially, to present a viable means to contribute to a prioritisation of the issues or to discussions of potential solutions.

- **Many participants had negative perceptions of the local council, planners, developers and of the government in general.**

Several participants perceived a link or close association between the grassroots GIS and the endeavours of the SDCC and developers. The formal data in the grassroots GIS, specifically CAD maps, building footprints, landuse, zoning and development plans were described as being used by planners and developers in their day-to-day operations. However, it was explained that in many instances these types of data and technologies such as PPGIS are used to protect local communities from unwanted development. It was emphasised that the basic purpose of this research was to see if these and other types of local data could be used for purposes that local residents deemed appropriate.

Past problems and issues with developers, planners and politicians related to housing and new developments in the area were raised on several occasions. A local resident described what a local politician said during a public hearing to discuss new development plans for the Tallaght area:

> "He stated during a public meeting that a new housing development was going ahead and that there was absolutely nothing we could do about it!"
>
> (*Fettercairn Resident*)

When the issue was raised about an appeal against development decisions the resident replied:

> "He told us that the cost of an appeal would be £15,000.00 if we lost against a decision made by the council."
>
> (*Fettercairn Resident*)

This is clearly not an accurate portrayal of how the Irish planning process works. The exchange sheds light on how possible misrepresentations; confusion and possibly manipulation can enter the planning process.

- **Criticisms of the funding and the potential long-term viability of the project were raised on several occasions by community development workers.**

Support for the grassroots GIS was more mixed among community development workers than the local residents. Concerns were raised regarding the next steps and what the

community would "get out of the process". Formal structures and frameworks, specifically a user committee were suggested to facilitate the process and to seek additional support and funding sources. The responses of the community development workers could be construed as indicating their need to modify the grassroots GIS to fit into the structures and local community development strategies already in place in the area.

In conclusion, it was clear from the PPGIS process meetings that the participants felt that the technology was an effective means for the display of both formal and informal information on the community. The collection of local knowledge was observed to be straightforward and the potential for its inclusion in the planning process was deemed to be great. However, the questions of the participants revealed some shortcomings in the datasets selected and in the GIS technology. This implied that modifications were required with respect to the manner in which the grassroots GIS was sponsored, designed and implemented.

6.3. The PLA Sessions

The following sections examine the results of PLA sessions One and Two, respectively. It should be noted that both PLA sessions were designed to focus on community issues using the approaches and strategies of Participatory Rapid Appraisal (PRA) tools such as maps, sketches, diagrams and ranking boards based on the work of Chambers (1992) and described in section 4.4.6. A PLA "professional" was brought in to facilitate the process in conjunction with members of the Community Coordination Team of the Tallaght Partnership who were instrumental in setting up the meetings and providing support and facilities.[1] The PLA sessions were funded through a grant provided by the Tallaght Partnership. All materials and results, including notes, issue boards, diagrams, photos and maps from the PLA sessions were turned over to the GIS technician for inclusion in the grassroots GIS. The results of these efforts are contained in the next sections.

6.3.1. PLA Session One

The first PLA session was held on October 12, 2001. Table 6.2 contains a list of the participating organisations represented in PLA One. There were a total of fourteen

[1] Oriaith McCaul, Development Studies Centre, Holy Ghost College, Kimmage Manor and Sinead Fitzpatrick and Grainne O'Kane Community Coordination Team, Tallaght Partnership

participants representing ten different organisations present at the first PLA session. It should be noted that the majority of participants in the PLA sessions were representatives of community development organisations working in and around the area.

Table 6.2. PLA Session One: Participating Organisations

Name	Organisation Type
Lone Parents Centre	CBO
Youth Horizons	CBO
Tallaght Travellers CDP	CBO
Tallaght Intercultural Action	CBO
Partas	CBO
Tallaght Arts	CBO
Fettercairn Disability Group	CBO
Tallaght Community Radio	CBO
After Schools Club	CBO
Tallaght Youth Horse Project	CBO

The participants listed a plethora of issues regarding the local community that were of concern to them. These were ranked and categorised during the process and displayed as diagrams and ranking charts by the facilitators. These diagrams and charts were then entered into the grassroots GIS to form the basis of a community issues map in conjunction with the PPGIS process meetings described in the previous sections.

To summarise, the main issues and concerns raised by the participants in the first PLA sessions were:

- Exploitation of workers
- Lack of community facilities
- Alcoholism
- Drug abuse
- Housing crisis
- Affordable accommodations
- Racism and discrimination
- Poverty
- Social exclusion
- Problems with community institutions
- Lack of police presence
- Anti-social behaviour
- Low levels of literacy
- Lack of childcare
- Lack of halting sites
- Unemployment
- Family violence
- Prostitution

The plate contained in Figures 6.1 shows the graphic representations of the discussions that occurred during PLA session one. Additionally, "bubble diagrams" were constructed by the participants describing additional community issues and needs. These are:

- Social Welfare
- Transport Networks
- Guards
- Local Priest/Church
- Schools and College
- Estate Management
- Local Council
- Local Groups
- Partnership
- Child Care Services
- Health Boards
- Public Transport
- Community Services
- Social Welfare
- Police
- Community Facilities
- County Council
- The Church

These "bubble diagrams" are contained in the plates in Figure 6.2 and 6.3.

Figure 6.1 PLA Session One

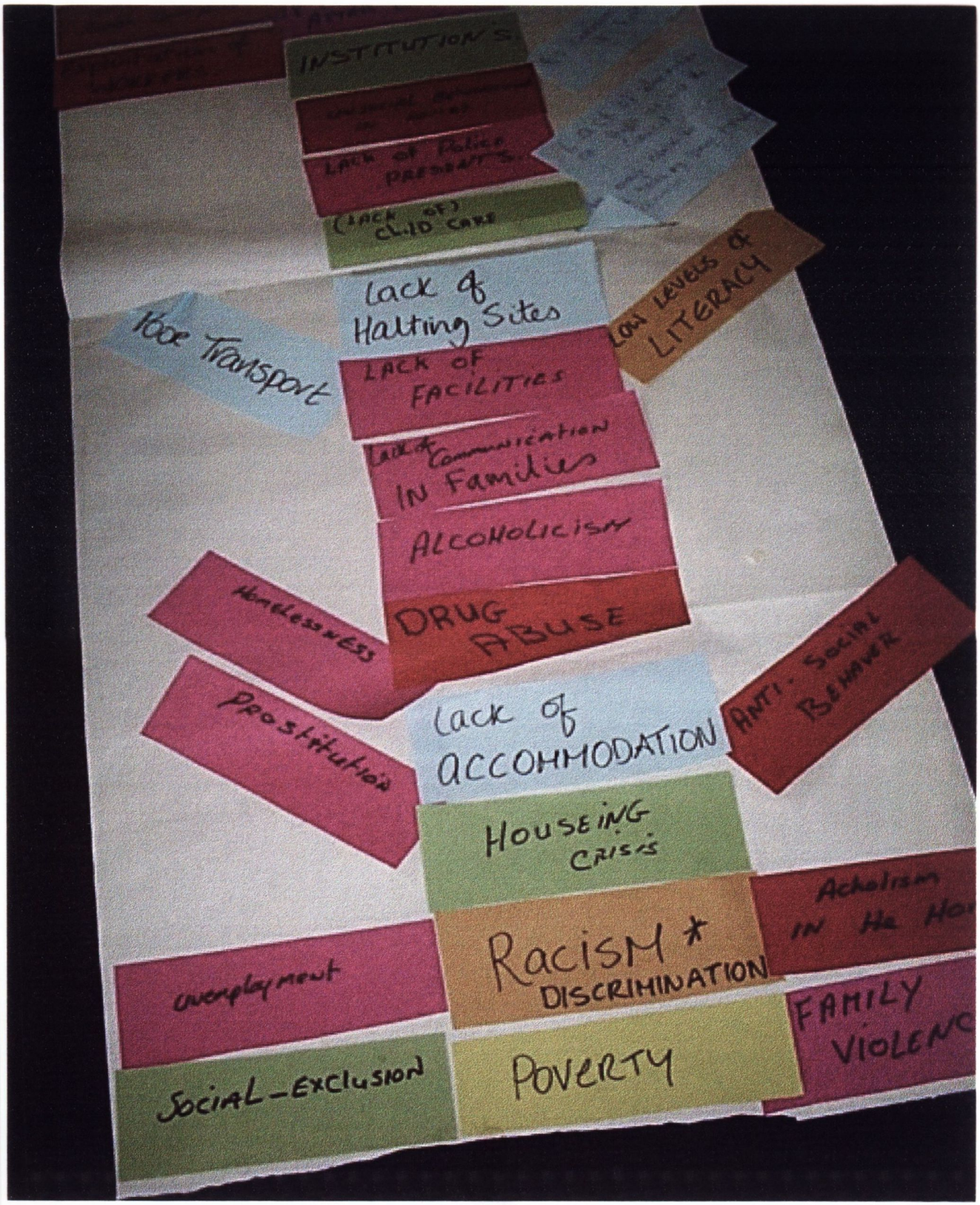


Figure 6.2. PLA Session One Plates

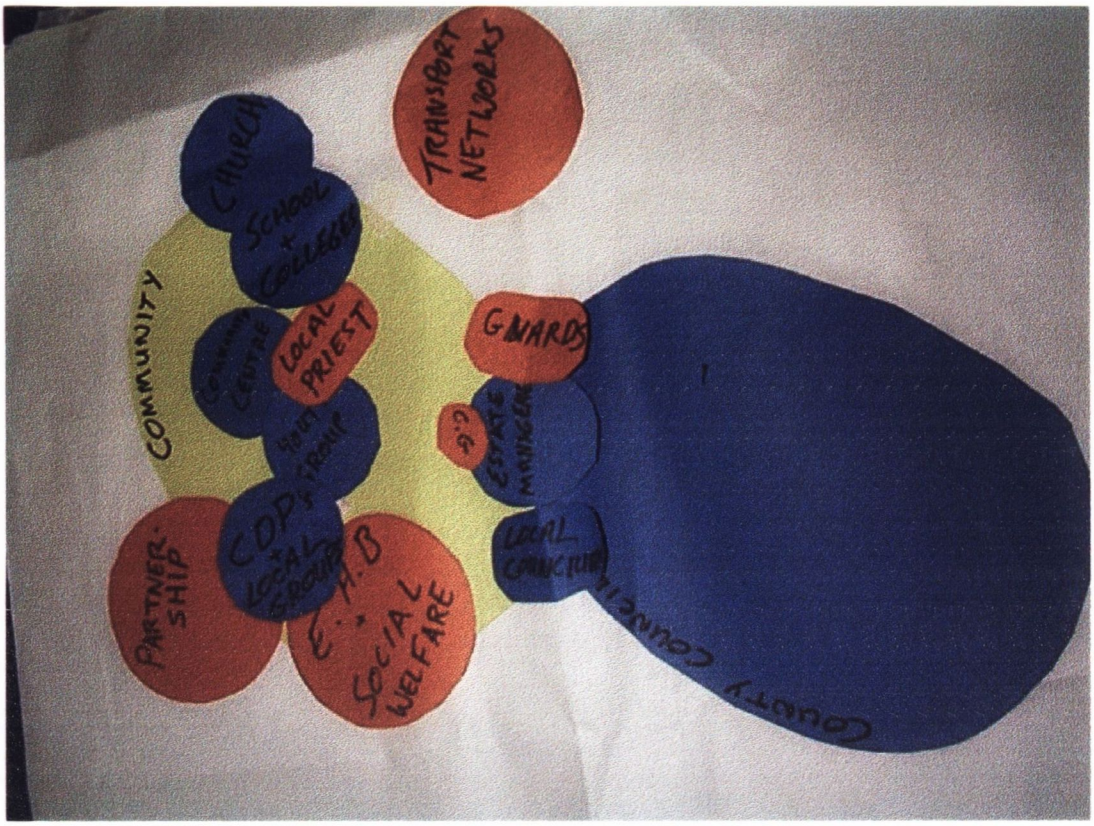


Figure 6.3. PLA Session One Plates

6.3.2. PLA Session Two

The second PLA session was held on October 16, 2001. Table 6.3. contains a list of the participating organisations represented at PLA Two. A total of twenty-three participants representing fourteen different organisations took part in PLA session two.

Table 6.3. PLA Session Two Participating Organisations

Name	Organisation Type
Fettercairn Community Centre	CBO
Fettercairn Rapid Representative	Government Initiative
Lone Parent Centre	CBO
Jobstown CDP	CBO
Health Board	Government Agency
Brookfield Resident	Local Resident
Fettercairn Disability Group	CBO
Young Mothers Group	CBO
Tallaght Youth Services	CBO
Community Coordination Team	NGO
PACT	CBO
Pride/Swan	CBO
Tallaght Intercultural Action	CBO
Tallaght Radio	CBO
Partas	CBO

The main issues and concerns generated during the second PLA session include:

- Low self-esteem
- Unemployment
- Early school leaving
- A lack of community facilities, infrastructure
- Lack of childcare facilities
- Addiction to drugs
- Mistrust, "us versus them"
- Large housing estates without local facilities
- Media problems, bad press
- No Planning
- Lack of social inclusion
- Inaccessibility to resources for people with disability
- Educational disadvantage,
- Inadequate policing,
- Poor quality policing
- Poverty
- Unequal distribution of resources
- Low community input to issues
- Unequal community input to issues
- Lack of regulations, rent controls
- Council not working with community
- Lack of primary healthcare facility
- Fear of the unknown

The plates contained in Figure 6.4 and 6.5 show the graphic representations produced from the discussions that took place during the second PLA session. Map 6.10 contains the results of the combined data collection efforts of both PLA sessions.

6.3.3. Summary of the PLA Sessions

In summary, the PLA sessions revealed that there were many issues in the community of importance to the participants. These issues primarily focused on negative social problems. These problems are similar in nature and can be found in many other low-income communities in Ireland and elsewhere. Drugs and alcohol abuse were ranked as the issues of most importance to the participants as shown in Map 6.10. Educational disadvantage and early school leaving received the second highest number of comments. Closely following these issues in the rankings of importance to the participants are infrastructure issues, unemployment and a lack of facilities for young people. Public transport issues figured further down on the list. This conflicts with the findings of the PPGIS process meetings, which deemed public transport to be one of the most important issues to the community. This can possibly be explained by the fact that many of the PLA participants were professional community development workers with access to private transport.

The amount of negative community issues to come out of the PLA process compared to the PPGIS process meetings is notable. The PLA sessions produced a bleak picture of the Tallaght community. Many of the positive elements and attributes of the community failed to materialise in the PLA sessions. Discussions and potential solutions to the problems and issues raised in the PLA sessions were not forthcoming. The data collected and the GIS map produced serve to emphasise the negative characteristics of the community to the exclusion of almost all other characteristics and features.

Figure 6.4. PLA Session Two

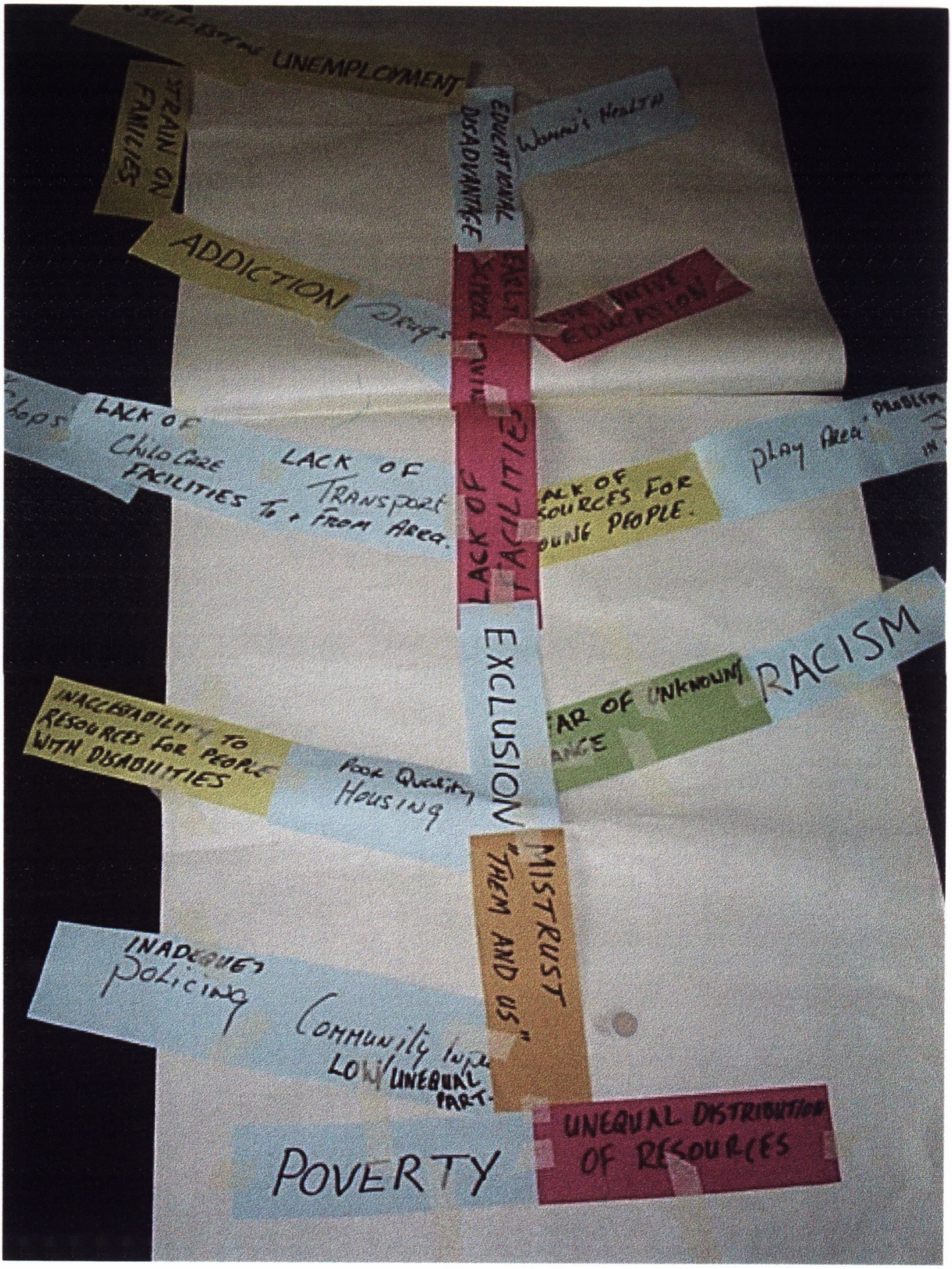
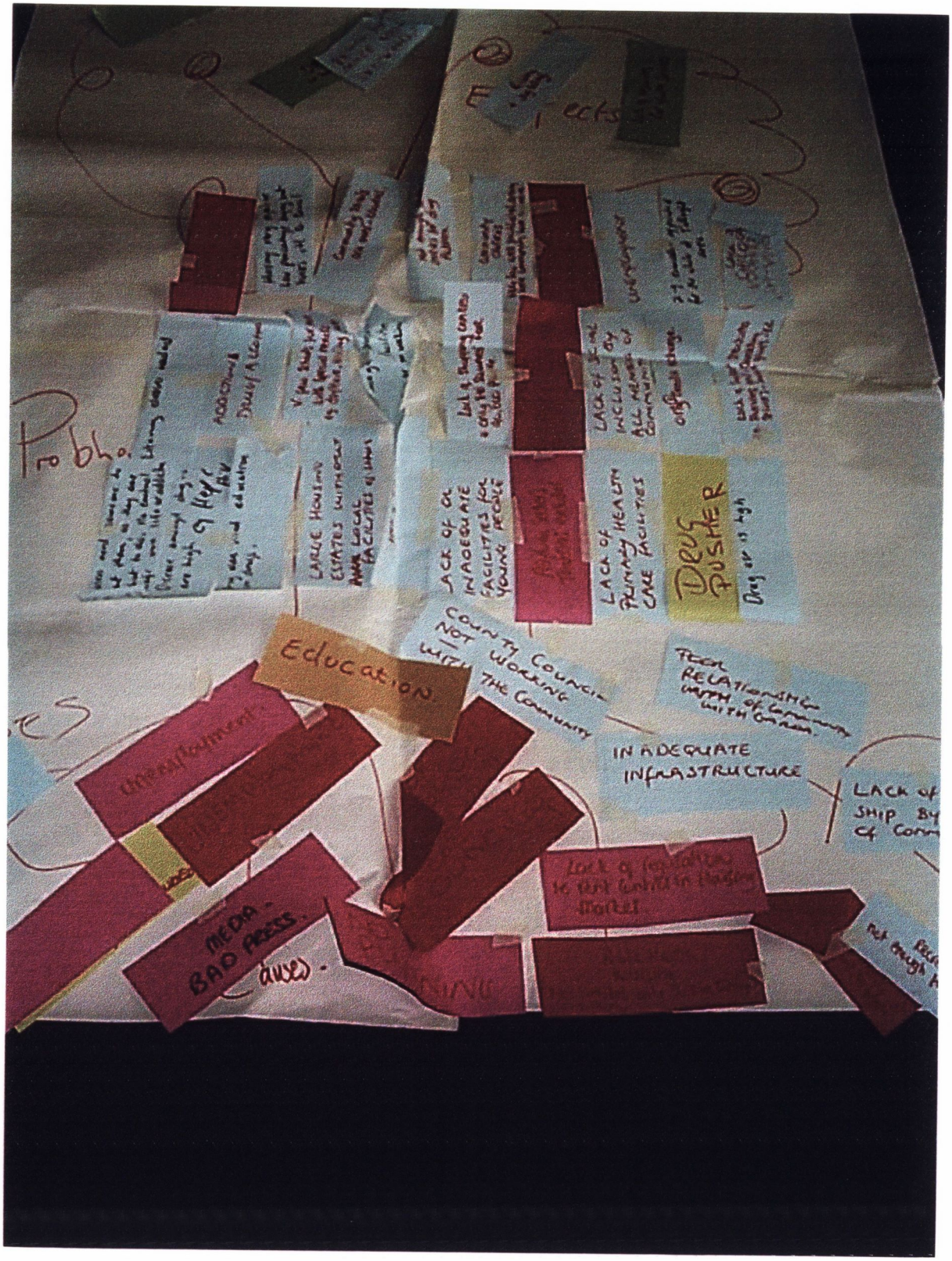
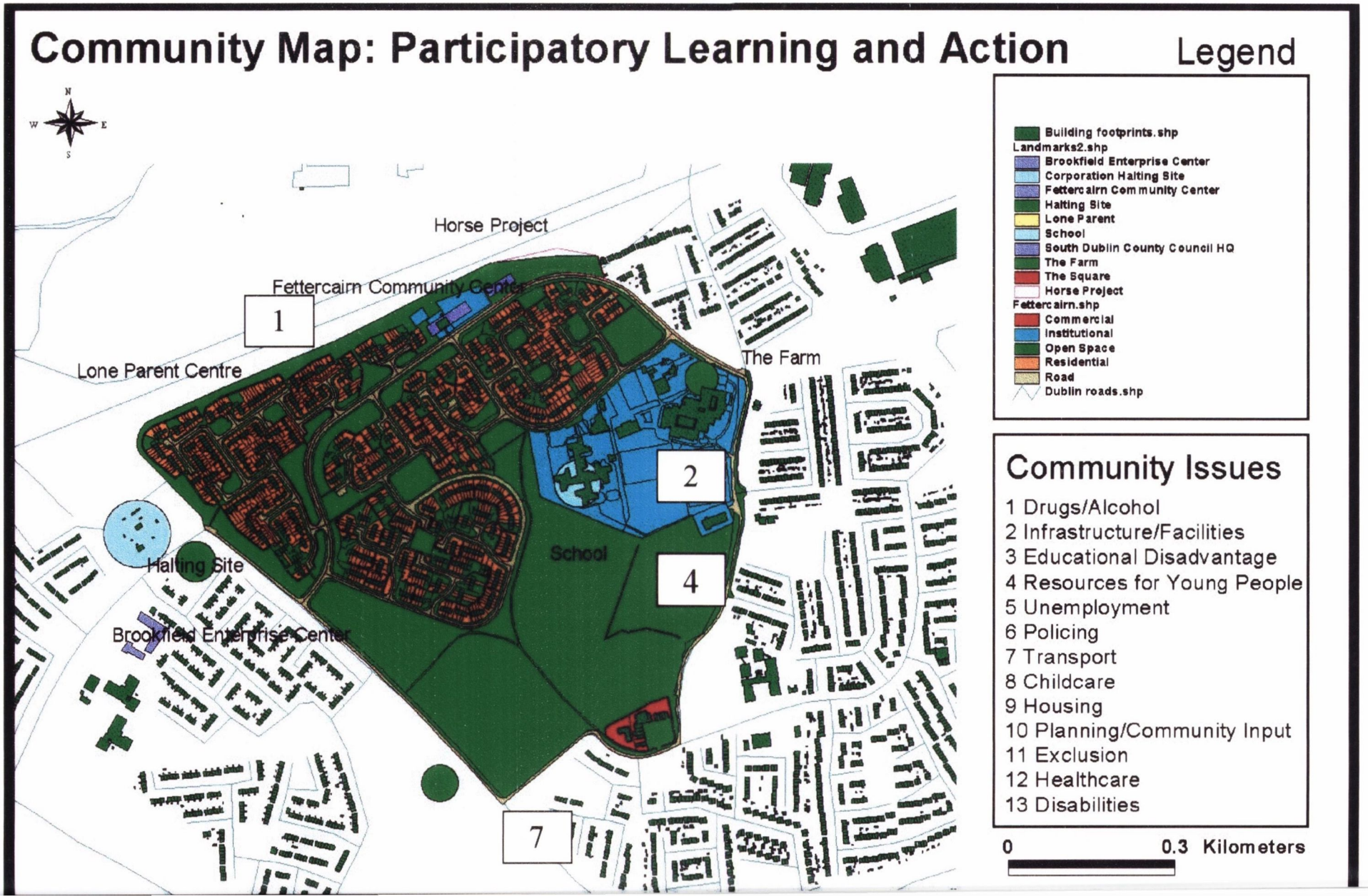


Figure 6.5. PLA Session Two



Map 6.10. PLA Sessions Map



The types of problems listed can be found in many communities. They are persistent and obvious to residents, community development workers, civil servants and elected representatives alike. They point to structural deficiencies in our society and to problems with capitalist economies in general. They are not easily addressed and it is beyond the scope of this research to pose solutions. PLA approaches in different geographical locations, from inner city industrial and isolated rural communities in the developed world to less developed nations, have identified similar issues. This could be described as a weakness in the PLA approaches in that they are one-dimensional or singularly negative.

The two PLA sessions made a mixed contribution to this research. The data collected during the two PLA sessions proved invaluable to the construction of the primarily negative "community issues map". Additionally, the collection of a large amount of information on the community held by a variety of local actors familiarised the researcher with important community issues. The PLA sessions also served to expose large numbers of individuals including residents, members of different CBOs and community workers to the GIS process. This served to establish a two-way flow of information between local actors and this researcher.

Finally, organising the large PLA sessions, which included the establishment of contacts, logistics, support and scheduling was time consuming and expensive. The structured nature of the PLA process required the freeing of large blocks of time, a full day, for all participants involved. The costs associated with bringing in a "PLA professional" to facilitate the process and train the participants could be considered prohibitive.[2] Several individuals appeared to have participated in the process for reasons of personal gain. A community development worker who helped facilitate the meetings stated:

> "They (participants) were asking what was the next step and if there was any money to pay them to put their training to use. It seemed that they were looking for some work as facilitators on other PLAs."
>
> (*Community Development Worker*)

These attitudes convey a sense, that in some instances, participation in the process was seen as a half-day off of work or a means to gain personally through direct payments or

[2] Funding was provided by the Tallaght Partnership in the sum of £1200.00 Irish Pounds (€ 1500.00).

training. There is the potential for some to work on other PLAs or community initiatives in the future through the contacts with the organisations represented in the sessions. Alternatively, this can be seen as a positive outcome of the PLA sessions. The fact that some participants were eager to continue the process or take their PLA training and apply it to other community projects can be regarded as a success. Finally, the establishment of contacts among a network of local actors during the PLA sessions, in of itself, can be considered an important outcome of the sessions.

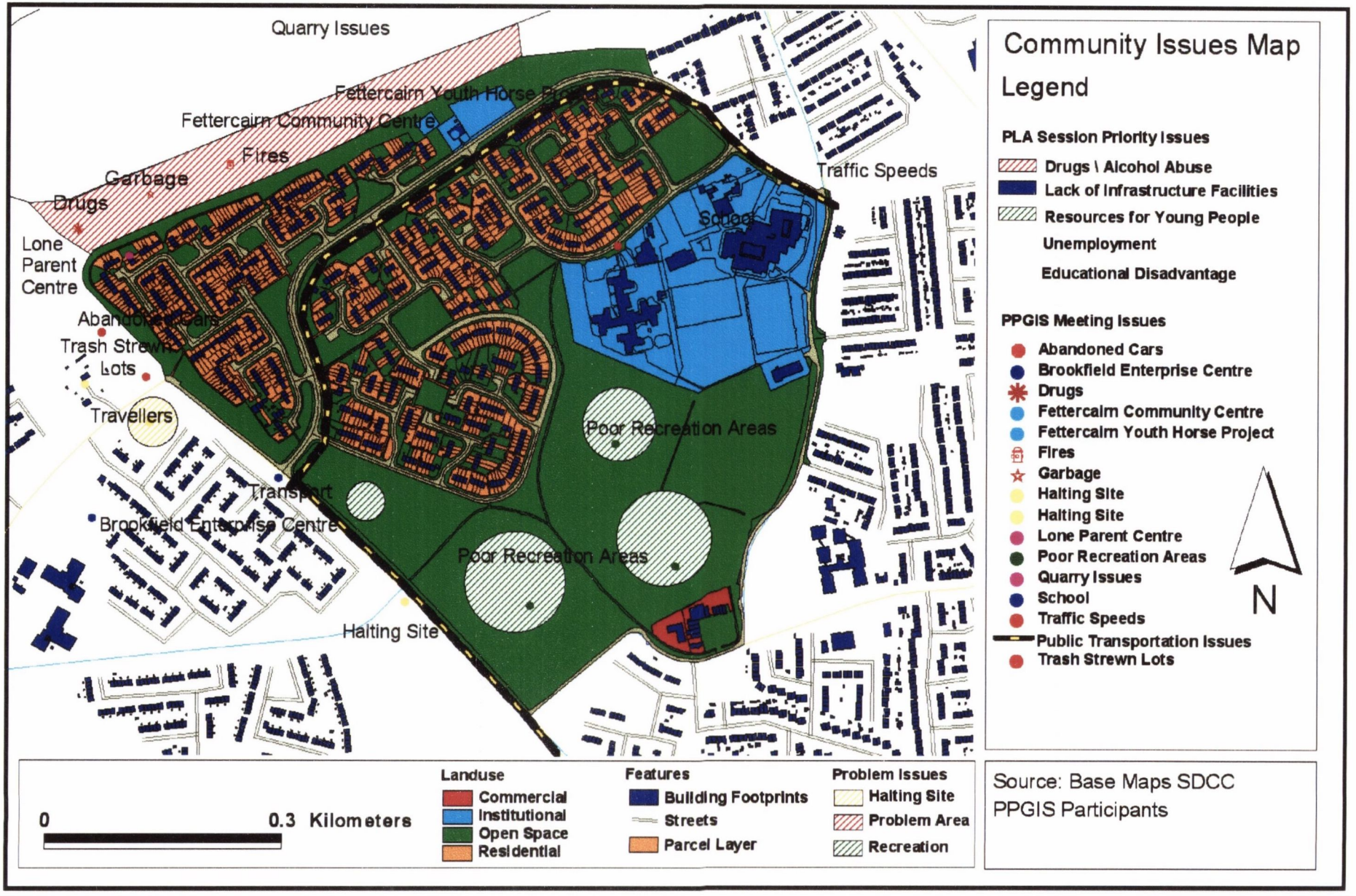
6.4. The Data Creation Process

6.4.1. Findings

The information collected during the PPGIS process meetings and the PLA sessions were combined and incorporated into the grassroots GIS. A community base map was created from these data sources. What was at first discernable was the focus on negative community issues during the PLA sessions as opposed to the PPGIS process meetings. These issues are clearly discernable on Map 6.10, the PLA sessions map. Map 6.9 shows the issues raised during the more balanced PPGIS process meetings.

When the two approaches are combined a more balanced picture of the community emerges. The GIS technician in consultation with local actors combined the graphical representations from both PLA sessions one and two and combined them with the PPGIS process meetings map to construct a "community issues map", (Map 6.11).

Map 6.11. Combined PPGIS and PLA Community Issues Map



Although the PLA sessions were not designed to be "gripe sessions" they clearly revealed a large number of negative issues and community problems. The participants working for CBOs seemed to emphasise the negative attributes of the community. This may be explained by the fact that these participants were from outside of the community and less familiar with the more positive features of the local area. Additionally, many of the PLA participants worked for CBOs involved with single-issue organisations or programs. In the cases where this single issue was negative, for example, with those involved with the drug dependency program, the issues raised in the PLA were for the most part negative. The PPGIS process meetings on the other hand revealed positive points of interest as well as negative ones. The PPGIS process meetings identified community assets in a method more akin to the strategies employed by Kretzman and Mcknight (1993) as explored in the theory chapter. Additional strength of the PPGIS process meetings follow in the next section.

6.4.2. Strengths of the PPGIS Process Meetings

To summarise, the PPGIS process meetings had several strengths that were identified during the fieldwork. These strengths are:

- **An informal and relaxed nature**

The PPGIS process meetings were more informal than the structured PLA sessions. The relaxed and open-ended nature of the discussions allowed for the free flow of information from participants to researcher.

- **Location advantages**

The smaller and more intimate venues allowed for better "hands on" exposure to maps and GIS.

- **Spatial Referencing**

The PPGIS process meetings produced accurate spatial references for many of the issues of importance to the community.

- **The PPGIS process meetings identified problems and issues that were specific to the agendas of the members of the particular CBO in attendance**

- **The PPGIS process meetings allowed issues to be put forward that addressed many of the problems and concerns of group members**

- **The PPGIS process meetings identified problems inherent in GIS technology**

6.4.3. Strengths of the PLA Sessions

To summarise, the PLA sessions had several strengths that were identified during the fieldwork. These strengths are:

- **The PLA sessions allowed for the setting of priorities and ranking of community issues**

- **The PLA sessions made it possible to achieve consensus and identify goals**

The PLA sessions did serve to prioritise issues of relevance to the community through the use of issues boards, linking diagrams and some community mapping. The prioritisation of issues was accomplished through PLA consensus building techniques.

- **The PLA sessions allowed for a large number of issues to be discussed, considered and prioritised**

During the PLA sessions a survey was conducted, issues were raised, ranked and recorded on "issue boards". This information was used to create the PLA priorities map, which consists of the contributions of a large number of PLA session participants collected through the structured PLA sessions. The issues boards were represented in the grassroots GIS as a layer, thematic map or GIS theme. These efforts are shown in the PLA community issues map (Map 6.10).

6.4.4. Weaknesses in the PPGIS Process Meetings

Some criticisms emerged from the participants with regards to the PPGIS process meetings. These include:

- **A "too academic" or technical approach to the presentations**

A local resident and member of a community based organisation stated:

> "Did you see how their eyes glazed over? Your approach was too academic, you need to put things in terms that local people can understand."
>
> (*Local Resident*)

- **Small number of participants**

The meetings tended to be small with only a few groups represented in each. This allowed for single issues groups to "hijack" the process and present their concerns in some instances. The emphasis on public transport issues during one PPGIS process meeting is an example of a single issue "hijack". This potential problem failed to materialise during the PLA sessions.

6.4.5. Weaknesses in the PLA Sessions

The PLA sessions had several weaknesses that were identified during the fieldwork. The major weaknesses are identified as:

- **Lack of "hands on" mapping and GIS work**

One weakness observed in the PLA sessions in general was the lack of "hands on" mapping and GIS work. Mapping and GIS usage was more easily facilitated through the PPGIS process meetings. As the PLA component of the data collection was coordinated and facilitated by a community development "expert", GIS was not the priority. The participants did draw some maps using the blank community base maps as a guide. However, the spatial issues emphasis or focus during these sessions was limited.

- **A focus on the negative aspects of the community**

The negative comments and reflections on the community tend to stigmatise the area and the people that live there.

- **The lack of community assets and positive aspects of the area takes an entire dimension of the community "off the map".**

The primary focus on the negative aspects of the community can be considered a potential weakness in the PLA sessions. Many of the negative issues are well known. Highlighting social pathologies in the grassroots GIS does little to solve these problems. Without community efforts at action or suggestions for solutions, the PLA sessions as conducted in this research are limited and one-dimensional.

- **General nature and non-spatial characteristics of the data**

Many of the issues discussed during the PLA sessions lacked specifics or geographical locations in the community making cartographic representation difficult. The PLA sessions did not appear to be an appropriate means for the identification of spatially referenced issues compared to the PPGIS process meetings. Additionally, the poor quality of the maps produced and the more general nature of the issues discussed presented a cartographic and GIS mapping challenge.

6.4.6. Transitioning from the PPGIS Process Meetings and PLA Sessions to the GIST

The examination of the strengths and weaknesses of the PPGIS process meetings and the PLA sessions provided important guidance to the design of the GIST. The PLA sessions and PPGIS process meetings both proved valuable for the collection of a large amount of local knowledge. These meetings also served to introduce large numbers of local participants to ICTs and GIS technology and the formal data collected by the researcher in a collaborative and networking building process. The transition from the collection and display of information to the use and implementation of grassroots GIS technology occurred as a result of the time and effort invested in establishing the formal and informal datasets and a local network of contributors.

After all of the PPGIS process meetings participants were asked if they or their organisations, community projects, activities or initiatives would be interested in exploring in more detail the use of GIS technology and the available datasets. Contact numbers and email addresses were provided to participants. Over the course of the next several months a number of organisations contacted the researcher. The organisation with the most

significant need was the Fettercairn Youth Horse Project (FYHP), in which workers were interested in an information brochure. Workers with the Tallaght Intercultural Action (TIA) organisation also expressed interest in the GIS through their exposure to the technology in the offices of the West Tallaght Resource Centre. Finally, after an extended period of time, (one year), after the end of the PPGIS process meetings and the PLA sessions the DART Outreach organisation was made aware of the grassroots GIS and expressed an interest in participating.

This organic and "bottom-up" networking of ICT technology, over an extended period of time, is a characteristic of "grassroots" GIS and the key to transition from design to implementation. The leadership and support role provided by the local community participants is also important for addressing issues of sustainability prevalent in the literature (Smith, 2002). The next sections explore the results of the implementation of the GIST through the detailed examination of these three organisational users.

6.5. OBSERVATIONS ON THE GEOGRAPHIC INFORMATION SYSTEM TALLAGHT (GIST)

The GIST is a community based PPGIS established by local residents and community workers in the Tallaght community of West Dublin. The GIST in an ongoing community supported project that makes GIS technology and the formal data and local knowledge collected during the fieldwork phase of this research available to local individuals and organisations. Since the establishment of the GIST a number of organisations have utilised the technology for a variety of purposes. The next sections outline the objectives and structure of the GIST and examine the implementation and results of the use of GIST by three different organisations in detail.

6.5.1. The Objectives of the GIST

The following points outline the main objectives of the GIST:

- **To implement the grassroots GIS**
- **To act as an enabling tool to facilitate community networking**
- **To implement practical PPGIS applications**
- **To answer the research questions**

Additionally, throughout the implementation of the GIST equality among the groups and individuals participating was maintained in an attempt to ensure that no one viewpoint dominated over the others. The initial results and the lessons learned from the early fieldwork aided in the construction of the GIST.

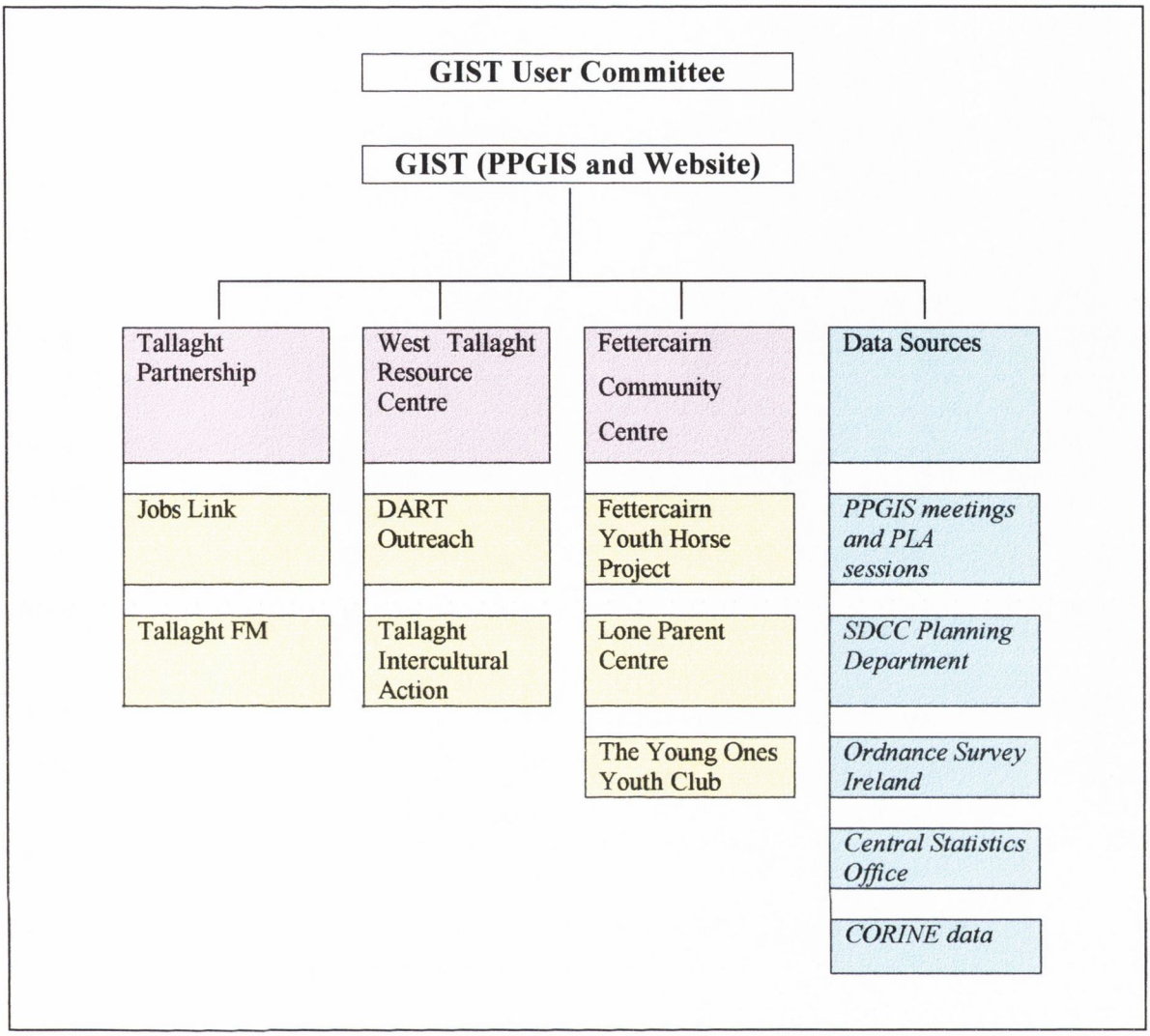
6.5.2. The Structure of the GIST

After consultations with local actors and workers with the Tallaght Partnership, it was determined that the GIST project would benefit from the establishment of a more formal structure. It was stated by community development workers that the creation of a committee structure would be useful in lending legitimacy to this community initiative by showing that it is truly "community based". It was also stated that the GIST would "fit into" other ongoing community development initiatives in the area more easily if this structure were in place Moonen (2003) and O'Kane (2003).

The establishment of a GIST user committee was deemed necessary to oversee the implementation of the GIS and associated website. The user committee was tasked with establishing the mission statement and goals of the GIST project. The user committee's role was to organise all community based efforts involving the GIST, including grant applications and the development of practical applications using the grassroots GIS and associated data. Additionally, the importance of having the committee structure in place was viewed as a potential means to be used to secure additional partners, resources and funding sources which is the established means to conduct CBO operations in the Tallaght area (Moonen, 2002). Figure 6.6 contains the committee structure and the associated organisations and data sources contained within the GIST.

In addition to the creation of the committee, steps were taken to form a separate GIST CBO. Having a "legal entity" in the form of the GIST would allow for wider recognition of the project and give the participants the means to solicit additional funding. CBO status would also allow for the GIST to be given office space in the West Tallaght Resource Centre (WTRC) and avail of the facilities there including, computers, printers, phone, fax, photocopying and technical assistance, specifically computer support and accountancy (Brophy, 2003). This process is still on-going.

Figure 6.6. The Structure of the GIST



6.5.3. The Results of the Implementation of the GIST

Many of the local actors who chose to use the GIST were familiar with the technology, having been exposed to GIS through the PPGIS process meetings and PLA sessions during the early fieldwork. Several participants were interested in the representation of their information in the GIST. Volunteers and community workers associated with the DART-OUTREACH organisation (DART), the Fettercairn Youth Horse Project (FYHP) and Tallaght Intercultural Action (TIA) CBOs expressed the greatest interest in the technology. Several of these actors were able to employ the GIST in relatively quick and simple applications. On two occasions members of other CBOs used the base data in the grassroots GIS to create maps showing the locations of upcoming community meetings. These maps were included in standard information brochures along with written directions

and distributed to local residents. The three primary cases involving the exploration of the potential to develop practical applications for the GIST and the empowering aspects of the technology are explored in the next sections.

6.6. A DETAILED EXAMINATION OF THE CASE OF TALLAGHT INTERCULTURAL ACTION (TIA)

TIA is a local Tallaght CBO based in the West Tallaght Resource Centre (WTRC). The mission statement of the TIA organisation states: "TIA recognises diversity among communities in Tallaght and works to raise cultural awareness and participation by using anti-racist and intercultural principles." (TIA, 2002).

6.6.1. TIA Actors

The key actors involved with the TIA organisation who were observed in detail as they interacted with the GIST during this research include:

- **TIA coordinator**
- **TIA worker**
- **TIA support personnel**

These actors were involved in trial use of the GIST system to facilitate information exchange. Members of the TIA organisation experimented with GIS technology in an effort to communicate location information regarding their organisation. The GIS technician facilitated the use of the GIS by editing and modifying the ArcView 3.2 GIS datasets to meets the needs of the users. The participants made comments and suggestions and led the exercise. The potential of the GIST and the use of GIS to enhance organisational effectiveness and communications through this process were explored in this manner.

6.6.2. Results of the Case of TIA: The Base Maps

The initial TIA users of the GIST had favourable comments and suggestions. Interest was shown in the technology and the potential of the GIST process was recognised. The coordinator of the TIA organisation stated:

"I'm certainly interested in the GIST project, it has great potential."

(*TIA Coordinator*)

Additionally the actors in the case of TIA made practical suggestions for the use of GIST and associated data and recommended potential applications of the technology. These suggestions included the creation of "standard" maps showing the local area in detail and the locations of the TIA office and other points of interest. It was explained that this effort would meet the requirements of many of the requests for location information that TIA receives, proving useful (Gallagher, 2003).

In the case of TIA several weaknesses in the GIST were exposed. The main weaknesses that were identified by the TIA actors related to the base maps. It was stated that:

- **There was "too much detail on these digital maps"**
- **That the GIS was "too complex" for the average computer used to take advantage of**

The GIST resides on several stand-alone computers in the offices of the Tallaght Partnership and the West Tallaght Resource Centre (WTRC). The software needed to access the data is ESRI's ArcView version 3.2 GIS. Users wishing to explore, edit and query the data in the GIST must be familiar with the ArcView software and Microsoft Windows. This requires training and a substantial investment of time and effort. GIS training was offered to TIA members for free as part of the research project but none availed of it. Additional weaknesses include:

- **Too much work involved to justify the use of GIS as opposed to standard procedures for using maps**
- **Not enough spatial data coverage of the wider community**

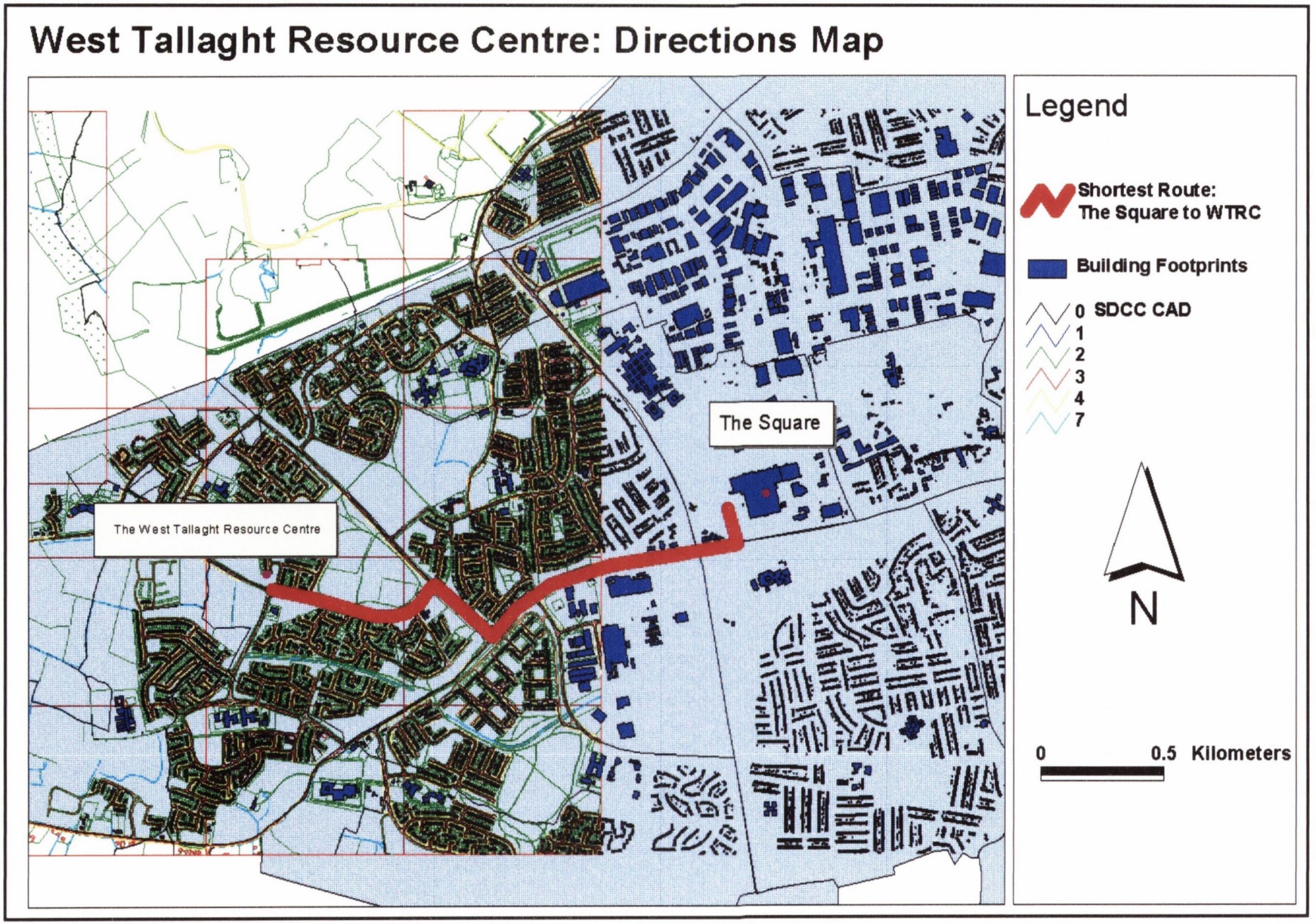
The first of these potential weaknesses came to light when a community development worker with TIA attempted to use the GIST to produce a map containing the location of the West Tallaght Resource Centre (WTRC) for an information brochure. The digital base map containing streets, landmarks (including the WTRC), housing estates and building

footprints was deemed to have "too much detail". The community development worker stated:

> "I need a map that is simple and easy to read...There is too much detail on these digital maps ...The people attending the meeting need directions from the Square, if you include everything between here and the Square the map will be too detailed. It appears cluttered with all this information on it."
>
> (*TIA GIST User*)

At this point the TIA user and the GIS technician experimented with the GIS to obtain the desired map. Several of the socio-economic GIS layers were removed to produce a street, buildings and landuse map with a highlighted route to the WTRC and the meetinghouse from the Square shopping centre. The map was marked with directional arrows and a heavy red line graphic showing the most direct route. This digital map was augmented with street names and local landmarks and accompanied with text directions describing the route. The results of these efforts are contained in Map 6.12.

Map 6.1.2 TIA GIST Map



However, upon the creation of the new GIST maps they were still deemed to be "too detailed" and the GIST "too complex" for an average computer user to take advantage of. The TIA community worker stated:

> "This seems like a lot of work. I'll just photocopy the street atlas, that's what we usually do."
>
> (*TIA GIST User*)

The TIA community worker decided that for the purposes of the upcoming meeting that the "standard" procedure would be adequate. The fact that this was a likely violation of the street atlas copyright agreement was lost on the user. The community worker went on to state:

> "I just don't have the time to include those GIS maps... the scanned graphic map did not turn out that good but we have to use it at this point."
>
> (*TIA GIST User*)

For the purposes of the more formal and "professional" information packet that the TIA organisation was planning on producing it was decided that the highly detailed and colour coded maps in the GIST would be a valuable addition. Plans were made at this point to produce a more formal base map using the GIST and detailed, colour coded maps for the TIA organisation's information packet. This has not occurred to date and even the "standard" photocopying techniques were too time consuming for the TIA actors. The end result of the TIA mapping exercise is contained in Appendix E.

Although, the experiences of the participants with the TIA organisation with regards to map production and the implementation of the GIST were less than successful several important results can be recognised. Firstly, flaws inherent in the GIST, particularly with "clutter" or too much detail at larger scales were revealed. The ability to turn off superfuous information, easily accomplished in standard GIS packages, was important but not the entire solution. Quality maps showing the locations of important community landmarks and easy to understand directions from the main transport nodes to important locations should be "at the ready". This will serve to avoid time-consuming cartographic

exercises and potentially lesson the frustrations of new users searching for quick mapping solutions.

Additionally, the role of the GIS technician or facilitator was recognised to be an important one. Although GIS training was offered none of the participants deemed the technology worthy enough to invest time and effort. However, the participants were willing to have the GIS expert produce their maps for them in what can be described as an opportunistic approach. This scenario is not compatible with the fundamental nature of "grassroots" GIS or this research, so it did not occur. Without a GIS expert present to do the mapping and analysis or substantial amounts of training it is unlikely that wide spread GIS use will occur in the TIA organisation.

Finally, the TIA organisation had "standard" practices for the use of maps in their organisation. Photocopying and crude hand drawn directions served their purposes. The value of the GIST to TIA and similar organisations may not be evident at first. Upon further examination some interesting observations can be made. TIA has no dedicated website, or web presence. Their participation in the GIST project can provide this. By including their organisation in the GIST, TIA now has ready-made, high quality maps and directions available on-line. A description of the TIA project along with their location in a high quality, print ready format now exists. In the future the need for TIA to produce maps for clients and in publications separately may be replaced or greatly reduced by a quick visit to the GIST website, located at, http://www.eiretek.org/index.php. Members of TIA can now ask one simple question of their clients, "Do you have access to the Internet?" It remains to be seen, however, if this will be the result of TIA actor participation in the GIST project.

6.7. A DETAILED EXAMINATION OF THE CASE OF THE FETTERCAIRN YOUTH HORSE PROJECT (FYHP)

The second case examined in detail is the FYHP, a high profile Tallaght CBO that has attracted the attention of many to the area. Over the past ten years it was recognised that there were numbers of horses running loose on the public open spaces and agricultural lands in the vicinity of the Tallaght community. Local children were caring for the horses in makeshift stables on abandoned industrial lands. The FYHP provides for the care of

these wild horses. Extensive funding for the activities of the FYHP was provided by the local council, the Irish government and from international sources, specifically the America-Ireland Fund. A National Geographic Discovery Channel program featured the "Urban Cowboys" of the Tallaght area and the efforts that were undertaken by the FYHP to provide for the care of the horses has attracted additional attention to the project.

The objectives of the FYHP are:

- **To establish controlled grazing and stabling for horses in the community**
- **To develop opportunities for social, personal, vocational and educational development of young people**
- **To provide the opportunity for young people to develop skills in relation to horse riding and animal welfare**
- **To explore the possibility of developing community businesses (Equine related)**
- **To encourage the social, cultural, environmental and economic development of the Fettercairn community (FYHP, 2001)**

The importance of the FYHP to the residents and local activists in the Tallaght community is widely recognised. Several participants in the GIST project identified the high profile status and positive aspects of the FYHP as vital to the community. The inclusive ethos of the FYHP and its high profile status in the community make it a welcome addition to the GIST and a valuable case to study.

6.7.1. FYHP Actors

The key actors involved in the FYHP that were interviewed and observed in detail during this research include:

- **FYHP director**
- **FYHP workers**
- **FYHP volunteers**
- **FYHP participants**
- **The Tallaght Partnership community coordination team**
- **The Tallaght Partnership student placement worker**

These actors were involved in a process where by ICTs were used to produce an "information brochure". Members of the FYHP decided to produce this brochure for use in promoting the organisation and to aid in their attempts to solicit additional funding for the project. These actors provided interviews as well as open access to records and internal meetings for the purposes of this research. The potential of the GIST and the use of ICTs to enhance organisational effectiveness and communications through this process are explored in the next section. The FYHP "information brochure" is contained in Appendix F.

6.7.2. Results of the case of the FYHP: Intra-Organisational Issues

The main issues that are revealed in the case of the FYHP can be termed "intra-organisational" in that the use of ICTs impacted the organisation internally. Although the FYHP did not implement GIS *per se*, the volunteer workers and community activists involved in the project showed an interest and a willingness to participate in the GIST project. With regards to the use of GIS specifically one of the FYHP workers asked:

> "How can ICTs help this project?"
>
> (*FYHP worker*)

During the initial development of the information brochure, it was determined by members of the FYHP and the Tallaght Partnership that the inclusion of graphics and digital photographs would give the publication a more "professional look" and increase the chances of getting additional funding. FHYP actors collected relevant documents on the project such as its history, mission statement, newspaper clippings, photographs, past and future events and activities, personnel and participants and other information.

The information collected was collated into a Microsoft word document. The actors determined that the brochure would be used as the "public face" of the FYHP, and presented to grant making organisations. The concept of converting the brochure into a website and including it in the GIST was deemed a suitable means to present the material until such time as funds were available to develop a dedicated website for the FYHP. However, this has not taken place to date. Throughout this process, data were collected through participant observations and semi-structured interviews.

During the development of the FYHP brochure several issues arose. The exposure of workers at the FYHP to the GIST project and ICTs in the form of digital photographs and computer graphics raised some interesting issues of relevance to this research. The main points with regards to the use of ICTs as determined by the case of the FYHP include:

- **GIS was considered to be irrelevant for the needs of the FYHP**
- **Word processing and mailing lists are considered adequate uses for ICTs in the day to day operations of the FHYP**
- **ICTs used for special purposes such as in the form of a high quality, multimedia publication have the potential to aid the FYHP**
- **The process of developing materials for public consumption can resolve internal organisational debates**
- **ICTs in the form of a website can aid the FYHP**

The participants unanimously considered the use of GIS irrelevant. Opportunities to include maps of the horse project site and the local community were rejected out of hand as being unnecessary and superfluous to the intent of the brochure. Detailed schematics and architectural designs of the facilities, including a cross section of the stable building were also rejected for inclusion in the brochure. The extent of the day-to-day use of ICT in the FYHP involves word processing and a mailing list of "friends of the FYHP". Word processing and the standard mailing list were considered adequate for the needs of the FYHP.

It was suggested that professional grant writing services be explored to ensure the best chances of success. A community development worker stated:

> "Funders don't want to know about the urban cowboys or the shacks that they kept the horses in... Funders want to see that their money will be well spent...they want to see clean facilities and well run programs...they don't want to hear about any problems..."
>
> (*Community Development Worker*)

The development of the brochure precipitated an internal debate within the FYHP allowing for the "hammering out" of the future direction of the project among competing interests and viewpoints. In the case of the FYHP a clear break was made with the past. The

perception of the project as a bottom-up, community controlled and supported grassroots initiative that many in the FYHP organisation had held from its inception, was now diminished. The process of developing a grassroots GIS can raise these types of issues within participating organisations. The mission and direction of community based initiatives, the allocation of scarce resources and the resolution of internal debates within less structured, less hierarchical organisations are all important issues that can come to the fore as CBOs implement ICTs including PPGIS.

6.7.3. Results of the Case of the FYHP: The Communication of Information

The need for the FYHP to gain more exposure in the wider Tallaght community was obvious especially to those involved with the project. The effective communication of organisational information can facilitate this. A worker with the FYHP noted:

> "We are trying to attract more day riders and those paying for horse riding lessons. We changed the fee structure last month but the number of riders has not increased."
>
> "We need to advertise and expand the program... We are applying for funds from a variety of sources."
>
> (*FYHP worker*)

It was explained that this research was seeking to determine exactly if and how ICTs can help CBOs. It was suggested that one potential aid to the project could be to place the new fee structures and the schedules for riding sessions on the website. This would serve to inform interested parties and also act as a form of advertising. Additionally, announcements of upcoming events and special projects or even on-line riding session bookings could be implemented. The history of the project is of interest to many people as well. If this type of information was included anyone interested in the project could visit the website to obtain all the relevant details. If the information on the website were determined to be insufficient or unavailable the contact information of someone who could provide it would be there.

With regards to the large numbers of people who lack access to a computer with Internet access, it was noted that the information could be printed off on the office computer and passed on to the interested party in person or by post. This could potentially be a more

efficient means to communicate information on the FYHP project and prove a better marketing tool. The current methods employed to market the project seem to rely more on word of mouth than on any coherent strategy. ICTs could be of assistance in regards to the communication of a variety of organisational information.

An additional issue that arose with regards to the case of the FYHP and the communication of information concerns the nature of the project itself and its representation using ICTs. When a FYHP worker was asked about the nature of the project and the importance of communicating information about it to the wider community she stated:

> "Our project is about bringing the country to the city..."
>
> "All the kids see around here is concrete and asphalt. I'd like to think that when they walk through those stable doors they leave some of that behind for a while...That's what we're trying to do here."
>
> (*FYHP worker*)

On the role of the GIST and ICTs more generally this same FYHP worker stated:

> "I don't think that what you're doing with the technology can really be of use to us."
>
> "How can GIS and the Internet help this project?"
>
> (*FYHP worker*)

In this particular instance regarding the FYHP and the use of ICTs, numerous issues were raised, identified and recorded. The fact that the FYHP has a variety of information that needs to be communicated in a more efficient and effective way is undeniable. Shortcomings regarding the announcement of changing FYHP schedules, fees, staff, support, and events can potentially have a detrimental impact on the popularity and financial success of the project. The use of ICTs including word processing, graphic packages and the Internet can expose community initiatives to potential clients, funding sources and the community at large and help their cause. ICTs have helped support the operations of many CBOs as revealed in the literature review.

6.7.4. The Results of the Case of the FYHP: Multimedia

The tools to convey organisational information included the use of multimedia in the development of the FYHP brochure. In an effort to impact potential funding sources by impressing upon them the project in the most positive light, the content of digital photos, their angles and exposure levels were experimented with. The community development worker tasked with taking the digital photos asked:

> "How can we angle this photo to give the best impression of the facility?"
>
> "Can we zoom in on this area to make the facility look bigger?"
>
> "Can we make this photo brighter?"
>
> (*Community Development Worker*)

The experimentation with the digital camera involved the search for the clearest and most "flattering" views of the horse stabling facilities and the Fettercairn Community Centre. The digital photographs of the community facilities, participants and horses were taken to provide clear and unobstructed views. These efforts to promote and sell the FYHP are a reflection of the competitive pressures that are now being placed on many CBOs in the struggle for funding and scarce resources.

6.7.5. The Case of the FYHP: Conclusions

The effects that the implementation of the GIST and of ICTs in general had on the organisations active in the Tallaght area are of particular interest to this research. Some of these effects are clearly demonstrated in the case of the FYHP. The use of multimedia technology to enhance the "public face" of projects and promote their funding agenda has been established. The potential to improve the communication of organisational information through the use of ICTs, specifically the Internet has also been established.

With regards to the intra-organisational usage of ICTs, the members of the FYHP have yet to decide if they will pursue the option of developing a "formal" more elaborate website or if the online brochure will suffice in the near future. The development of the brochure did

highlight some of the internal differences within the FYHP and served to resolve several important internal debates. The creation of a "public face" for such projects in the form of a website can serve to clarify and rectify potentially disruptive differences within CBOs. The PPGIS process has the potential to create this type of effect in CBOs through their participation in projects like the GIST.

Finally, when used as a means to precipitate organisational change the PPGIS process can prove effective. Although this was not done intentionally in the case of the FYHP the development of the brochure and the presentation of the "public face" did force the clarification and resolution of internal divisions. These divisions had heretofore been unresolved. The PPGIS process and the development of brochures and websites can precipitate change and debate. This change and debate may be enhanced and prove more intense in the less hierarchically structured world of community development and non-profit organisations. These types of organisations have a less rigid chain of command where decisions are made in a more fluid manner compared to the commercial or government sectors. In this type of environment the PPGIS process could prove especially beneficial in promoting organisational change.

6.8. A DETAILED EXAMINATION OF THE CASE OF DART-OUTREACH (DART)

The acronym DART stands for Disability, Action, Research and Training. DART OUTREACH or DART is a CBO with an office in the West Tallaght Resource Centre. Formed in 2000 its mission is to promote the accessibility rights of the disabled in the Tallaght community. To undertake this mission the organisation has formed a committee, which regularly meets allowing links to be made with members of other local CBOs and NGOs. This committee meets monthly to determine the agenda of DART, expend resources and promote the overall objectives of the organisation.

In the words of the Dart organisation they, "are a group of citizens, people with disabilities and advocates of community development and disability issues who got together in order to fight for the rights, dignity and equality of people who are socially excluded because of their disability and to facilitate the support and training necessary to meet their collective objectives." (DART-OUTREACH, 2002).

The stated aims of DART are to:

- **To create an accessibility strategy and resource for key people and organisations through the provision of information**
- **To ensure people with disabilities have a voice and are engaging in decision making structures and processes**
- **To create opportunities and mechanisms for integration and inclusion**
- **To ensure disability is put on the agenda and represented appropriately on the agenda**
- **To be proactive**
- **To develop and provide disability awareness training in schools, businesses, etc.**

6.8.1. DART Actors

The key actors involved in the DART organisation interviewed and observed in detail during this research are:

- **DART committee chair**
- **DART committee members**
- **DART volunteers**
- **The Tallaght Partnership community coordination team**

These actors were involved in a process where by GIS "applications" were developed to pursue DART's agenda. The potential of the GIST project and the use of GIS to enhance DART's organisational effectiveness and internal and external communications were also explored.

6.8.2. Results of the Case of DART: GIST Applications Development

During a committee meeting of the DART Outreach CBO it was determined that the GIST project would be a suitable means to assist the organisation through the implementation of several potential applications. The potential of the GIST as determined by the DART committee are:

- **To aid in the development of an "accessibility audit"**

- **To act as a "pre-survey" instrument for a video of the area**

- **To develop other web based applications to support community communications such as an online community "forum"**

- **To develop an assisted living housing database**

The GIST was deemed an appropriate means to highlight issues and concerns to the DART committee that were to be addressed in an upcoming "accessibility video". The concept of an online community "forum" or "chat room" geared towards the issues of the disabled members of the community also appealed to members of the DART committee.

6.8.3. The Application of the GIST to Facilitate an Accessibility Audit

Accessibility audits are conducted by disability groups to exposed weaknesses in the physical environment that contribute to a lack of mobility and exclusion. They are conducted in the form of a survey addressing the specific needs of the physically disabled. Accessibility audits include:

- **Buildings, their internal and external ingress and egress characteristics**
- **The built environment, sidewalks, footpaths, curb cuts, crossing lights and streets**

Using the mapping and multimedia capabilities of a GIS package was deemed an appropriate means to collect, record, store and analyse the information collected during the accessibility audit. Digital photographs can be readily linked into the GIST base maps and text information recorded on each location. These data form the basic components of the accessibility audit database. These data will be used to highlight the deficiencies in the built environment that impact on the specific needs of the physically disabled in the Tallaght community.

The use of the data collection, storage and retrieval capabilities of the GIST in combination with web accessibility can be a tool of empowerment for the DART organisation. The members of the DART committee now have a tool to store their information spatially and map it and a tool that makes their data readily accessible and readable. As the GIST evolves, these data have the potential to play a key role in the allocation of scarce resources and the prioritisation of the activities of group members.

The tools and data are now in place to aid in the development of specific policy initiatives and affect positive change in the Tallaght community.

6.8.4. The Application of GIST in a Preliminary Survey

In addition to the accessibility audit it was also determined that GIS technology would be an excellent way to survey the community in preparation for an upcoming video production. A technician at the local community college, The Institute of Technology Tallaght (ITT) with expertise in audio video technology and multimedia had come forward and volunteered to create a video highlighting the needs of members of the DART organisation. The GIST would be used as a preliminary survey to identify areas suitable for filming and convey them to the creators of the accessibility video.

As a tool to aid the DART organisation and support the production of the video, the GIS was deemed to be suitable. A pre-survey can prioritise issues and reduce the time that the production team needs to spend in the field. Additionally, the information already contained in the GIST regarding the community and the data collected through the accessibility audit can be used as "pre-survey" material. These efforts reduce costs in time and resources even further and contribute to the support of the DART organisation.

6.8.5. The Application of GIST in a Housing Survey

A housing survey using the GIST was identified as a possible contribution to DART's continuing efforts to track housing in the area. The DART committee was concerned that there were large numbers of houses that had been altered to accommodate the needs of disabled persons in the community but that no records were available. The committee determined that information such as the number of the altered houses, their location, address, residency status and the exact nature of the alterations could be collected and entered into the GIST. The housing data collected by the DART organisation was deemed appropriate to be entered into the GIST. The ability to readily access information on housing characteristics has the potential to allow for the DART Outreach organisation to further their aims of providing adequate housing and accessibility services to their members. Additionally, members of the wider disabled community in Tallaght can benefit from an open and readily accessible housing information system.

The tools of communication that are contained in the GIST and related Internet capability have the potential to allow the DART organisation to communicate their agenda to a wide audience, including the local council, other disability groups and CBOs in the region and nation as well as other individuals in the Tallaght area that are interested in the efforts of DART. In these regards the implementation of the GIST has a positive impact by supporting the activities of DART and of empowering local residents and CBOs involved with specific community development initiatives in the Tallaght community.

One DART actor stated that the GIST was an "invaluable" tool, with great potential to empower local groups:

> "I think that the GIS and the use of spatial references is an invaluable tool for local groups. It gets people thinking in a different way. The maps and computer data are something that people are not familiar with... they are interested in what it can do for them and what the project is about."
>
> (*DART Actor*)

The potential of the GIST project to attract participants to local causes and community development initiatives was widely recognised. A Dart actor stated:

> "It (GIST) will bring like minded people out of the woodwork and to the table... People who are interested in computers, web design and technology in general... People who want to learn something new, something from a different perspective will participate."
>
> (*DART Actor*)

When asked to write down specifically what the GIST project meant to him a DART actor wrote the following:

> "The purpose of the GIST project is to research how such a system can best be utilised in local communities by providing an information database and base maps which are hot linked to information and community resources in order to provide the community with the tools to enhance and improve economic and living environments and to empower

> the residents to take control of and responsibility for their own community."
>
> (DART Actor)

Another DART actor interviewed felt that the technology could have many practical applications particularly for people with disabilities. This citizen with mobility problems noted:

> "The possibilities are virtually endless! For people like me who can't get to meetings to be able to go online and view issues and contribute to the community is empowering. The use of the forum I feel would be invaluable... It gives the disabled a chance to contribute."
>
> (*DART Actor*)

6.8.6. The Case of DART: Conclusions

In conclusion the fieldwork involving the DART case revealed many potential applications of the GIST, GIS and ICTs. The development and testing of GIS applications to support and empower local residents, community activists and CBO workers points to a sustainable process where local actors have recognised the potential of the GIS technology and are actively pursuing it. DART is one of many organisations with an agenda to affect positive change in the Tallaght community. The GIST represents the means to both support and empower the members of the DART organisation as determined by those same members.

6.9. THE RESULTS OF THE IMPLEMENTATION OF THE GIST: OTHER ISSUES

In addition to the above cases, several other organisations and individuals participated in the implementation of the GIST. The main issues and results to come out of the implementation of the GIST with regards to these cases are as follows.

6.9.1. Access Issues

For several of the community development workers and residents exposed to the GIST, additional issues arose with regards to the use of the technology. Individuals based in the WTRC expressed interest in the GIST. However, usage was limited. One community worker stated:

> "We had twelve computers donated by... They would not allow us to set them up in here because of concerns regarding the use of unlicensed software contained on them... Some legal issue were raised..."
>
> (*Local Community Worker*)

It appeared that the management had systematically curtailed the widespread adoption of computers in the WTRC. When the interviewees were queried as to why this appeared to be the case several interesting issues arose. One of the interviewees felt that there was an age gap with respect to computer technology in general and that this had restricted the enthusiasm for the use of computers in the office. One local community worker noted:

> "The older ones tend to have a problem with computers in general. They can't see the benefits and have no understanding of what they can be used for...I mentioned to (details withheld to ensure anonymity) that my nephew met his new girlfriend on the computer and (details withheld) looked at me as if I was crazy, she had no concept of what a chat room was... It was no use explaining."
>
> (*Local Community Worker*)

One of the interviewees holding a management position felt that there was a need to control access to the Internet:

> "We had a problem here with inappropriate use of the Internet. We can't have open Internet connections here because of liability issues.... If someone wants to go online here they need permission and I can check the sites that they visit."
>
> (*Local Community Worker*)

The restrictive Internet access policies at this particular field location can be deemed as a self-imposed restriction. There is no general Internet access policy within the umbrella group of organisations working in the Tallaght location. It appears that an incident involving access to inappropriate sites by a single employee, (since dismissed over the issue), has had a long-term detrimental effect on open access to the Internet in this office.

6.9.2. Training, Technical Support and Costs

Concerns were raised by several participants with regards to training on the use of computers and related ICTs. A training session on the introduction to computers was organised and funded through DART OUTREACH funds and facilitated through the Tallaght Partnership. It was suggested that trainees could also benefit from a course on the introduction to the Internet to allay some of the concerns of individuals with little or no computer experience. During the implementation of the GIST, this researcher provided computer technical support and training to users, all of whom were already familiar with the basics of computers.

The level of GIS training ranged from beginner to advanced. Training sessions involved one-to-one ArcView GIS software "tutoring" where the basic capabilities of the application were explored. Loading data sets, turning themes on and off, zoom in and out, colour schemes, data entry and map editing were the topics covered during training sessions. GIS tutorials or "step-by-step" instruction books were also provided to those interested in exploring the GIS further. Additionally a list of websites and online GIS resources were provided. Five participants availed of the more advanced training while the majority of users appeared more comfortable with the GIS technician handling the map production efforts.

The GIST project also benefited from the support of the local community through the donation of computer equipment and additional office support. A local resident donated a used Gateway computer and printer. Although, the computer was two years old it was equipped with an seventeen inch monitor, a 18.6 gigabyte hard drive and 128 megabytes of ram. This computing power was more that enough to run GIS, graphic, web design and word processing packages required by the GIST project. The computer was housed in an

office in the West Tallaght Resource Centre. The centre made available office, phone, photocopy and other technical support to the GIST project.

Finally, issues surrounding the operational costs, continuing usage and update of the GIST were raised on several occasions. This points to the importance of the concepts of sustainability and appropriation of the technology identified in the literature review. Participants in the PPGIS process meetings suggested setting up a committee structure to guide the project and garner additional long-term support. This strategy acknowledges the interconnections between the various NGOs, CBOs, government agencies, local activists and residents in the area. One local CBO member noted:

> "There's a spider's web of connections in this community. People from the partnership sit on all these committees of local groups and they all sit on the partnership's board."
>
> (*Local CBO member*)

Concerns were raised by both FYHP and Tallaght partnership community workers that the costs of the website, updating the site, training and web hosting would be prohibitive. The GIST can allow for the initial cost concerns to be addressed through the inclusion of the brochure converted to a website. This in effect alleviates the immediate needs for expending resources associated with the upkeep of a website.

6.9.3. Inter-Organisational Issues

The interrelationships between the local CBOs, NGOs and government agencies in the Tallaght area are of interest to this research. The next section explores some of the issues surrounding "Inter-Organisational" networking and connections in more detail. These issues are termed inter-organisational as they impacted on the relationships between different organisations.

The implementation of the GIST system raised issues regarding the relationship between the Tallaght Partnership and several local CBOs active in the area. Over the course of a number of years, the relationships between these area CBOs, the NGOs, and government agencies active in community development initiatives have been strained. Certain incidents have caused many in the area to view the council and even the Tallaght

Partnership with mistrust. Past history aside, the perception on the part of some that progress on community development issues in the community has been slow is identifiable. One local resident active in CBOs stated that:

> "Its like pissing in the wind with that lot. You go to meetings and talk and talk and talk for hours and nothing ever gets done. I had some great ideas (details withheld to ensure anonymity) but they kept throwing that (details withheld) issue back at me. I got so pissed off I decided to stop going to meetings."
>
> (*Local Activist*)

6.9.4. Marketing the Project to Establish a Network

The final point with regards to the implementation of the GIST within an existing network of local and government actors involves the nature of the overall process itself. The PPGIS process in general needs to be pro-active in nature. One interviewee felt that the GIST was a technology that had great potential but that this was not obvious to many working in the community. This interviewee noted that:

> "You have to sell the GIS to local groups. You need to put a bug in their ear about its potential... at the end of the day if you want people to use the system you have to create the demand for the technology."
>
> (*Local CBO Member*)

A local CBO instrumental in "putting the bug" in people's ears was Tallaght FM, the local community radio station. On two separate occasions radio interviews were conducted to promote the GIST project and associated website. The first announced the creation of the project and made a call for volunteers and other interested parties willing to participate. The second announced the launch of the GIST host website. This free local publicity heightened the profile of the GIST project and served as free advertising. The responses were limited however, and no additional participants were "signed on" as a result of these efforts.

The importance of networking in the local community or "broadening" the base of support for the GIST was widely recognised by participants in the process. One member of a local CBO stated:

> "We need to broaden the project out. The more issues that are included in the GIST the more people will see the benefits of it... We need to have local sports activities and local clubs... ... there are local points of interest all over the maps of this area."
>
> "I see tourism as a great potential application... there are holy wells and ancient sites right here that no one knows about...the American tourists love that stuff."
>
> (*Local CBO Members*)

When the issue was raised that Tallaght was not known for it's tourism potential and that in fact it had quite a poor reputation even among locals as an area with social problems, exclusion, crime, poverty, unemployment, drug abuse, alcoholism, and teen pregnancy a heated exchange ensued.

A local resident and CBO member stated:

> "There are literally hundreds of organisations working in this area all sorts of community projects...this is a very active community with lots to be proud of!"
>
> "Tallaght is one of the most historic and scenic areas in all Ireland. The views of the Dublin Mountains are spectacular and you can see right down to Dublin Bay from many spots in this area... We probably have more holy wells and sites of architectural and heritage value per square mile than any other place in Ireland... There is a book on Tallaght that tells how the area was settled by the Partas, an ancient tribe..."
>
> "Tallaght takes its name from the old Irish meaning plague grave. During the famine times there was a large mass grave, it's marked by a headstone over near the county council offices."
>
> "There are many positive things going on in Tallaght, even the council has recognised the tourist potential. They put out information brochures on local sites and the castle. They just

> built that big hotel at the square...that's not for locals only you know."
>
> (*Local Residents and local CBO member*)

After these exchanges a wealth of local historic information and local contextual data was uncovered. The identification of the large number of community projects was verified when at a later meeting this researcher was provided with a spreadsheet listing more than 250 local groups, NGOs and government agencies active in the area. This list is contained in Appendix A. The list is used by local NGOs as a reference and is more locally oriented than the Tallaght Citizen's Information Centre (2002) which focuses more on government service provision.

The interaction with the GIST by local users began a networking process, which was able to draw out more and more information on the local community. Much of this was local knowledge unattainable from other sources. Additionally, the positive attributes of the community came to the fore as community assets, "feel-good" projects, history and myth were identified. The challenge was there to produce a positive "portrait" of the community. The GIST represented a technological means to display this portrait, to those with computer access, Internet connections, and an awareness of the project. The GIST provided the structure to facilitate this. The potential to "grow" the project and the means to promote local causes and agendas are "virtually unlimited".

6.9.5. The Creation of the GIST Website

Finally, the GIST project is something tangible. It exists on the Internet and on the computers of the Tallaght Partnership and West Tallaght Resource Centre. Although the GIST is ostensibly in a digital format when transferred to a CD-ROM, it provides the community with a grassroots GIS that can be placed in the palm of the hand and transported. This represents a tangible and transferable community information system, which includes photos, video, text and all the associated formal and informal information on the community in one location. In the right hands the GIST, when combined with the software and hardware tools to access it and the PPGIS process to implement it, can represents a means to affect positive change in the community.

The GIST project data were made available to local activist David Brophy who undertook the development of the Internet site in cooperation with the GIS technician and others. His unique skills and local contacts made him ideally suited to undertake the design and construction of the site. It should be noted that the skill that this one individual "brought to the table" were far in excess of those of the "technical experts". Additionally, his interest and enthusiasm with regards to the digital maps, GIS technology and PPGIS process proved invaluable. The GIST Internet site can be viewed at the following site, http://www.eiretek.org/index.php. The "screen grabs" of the GIST Internet site are contained in Figures 6.8, 6.9 and 6.10.

The website was constructed by extracting digital maps and other data from the GIST "standalone" GIS and incorporated them into the GIST website with the aid of the GIS technician using "screen grabs". The website contains a summary of the existing GIST participants and a collection of their contributions. The website can be seen as a community platform on which to display existing information as well as seek additional community support and participants. The high quality of the website speaks to the importance and effort that some have invested in it.

Funding for the development of the GIST website was negligible. All software and hardware used in the creation of the site were acquired from local sources. The hosting of the site is on a year-to-year contract with the Irish operation of 365 Degree Networks, a large U.S. web hosting company. The costs are €170.00 per annum and were obtained from research funds made available by Trinity College Dublin to support this Ph.D. research. The Tallaght Partnership has also made available computer hardware, software and office facilities to continue the development of the website and to act as data storage and backup.

Figure 6.7 GIST Main Page

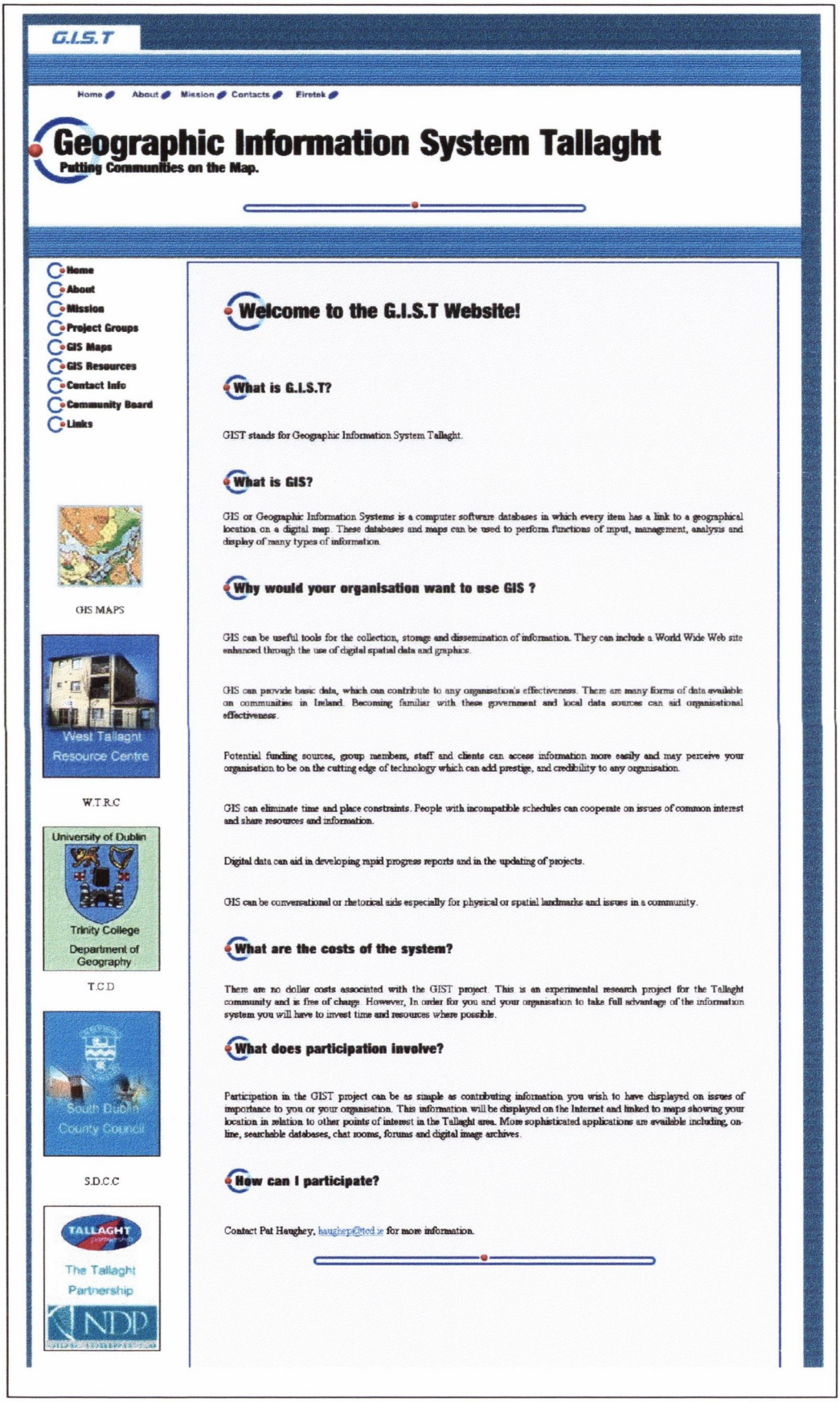


Figure 6.8. GIS Page

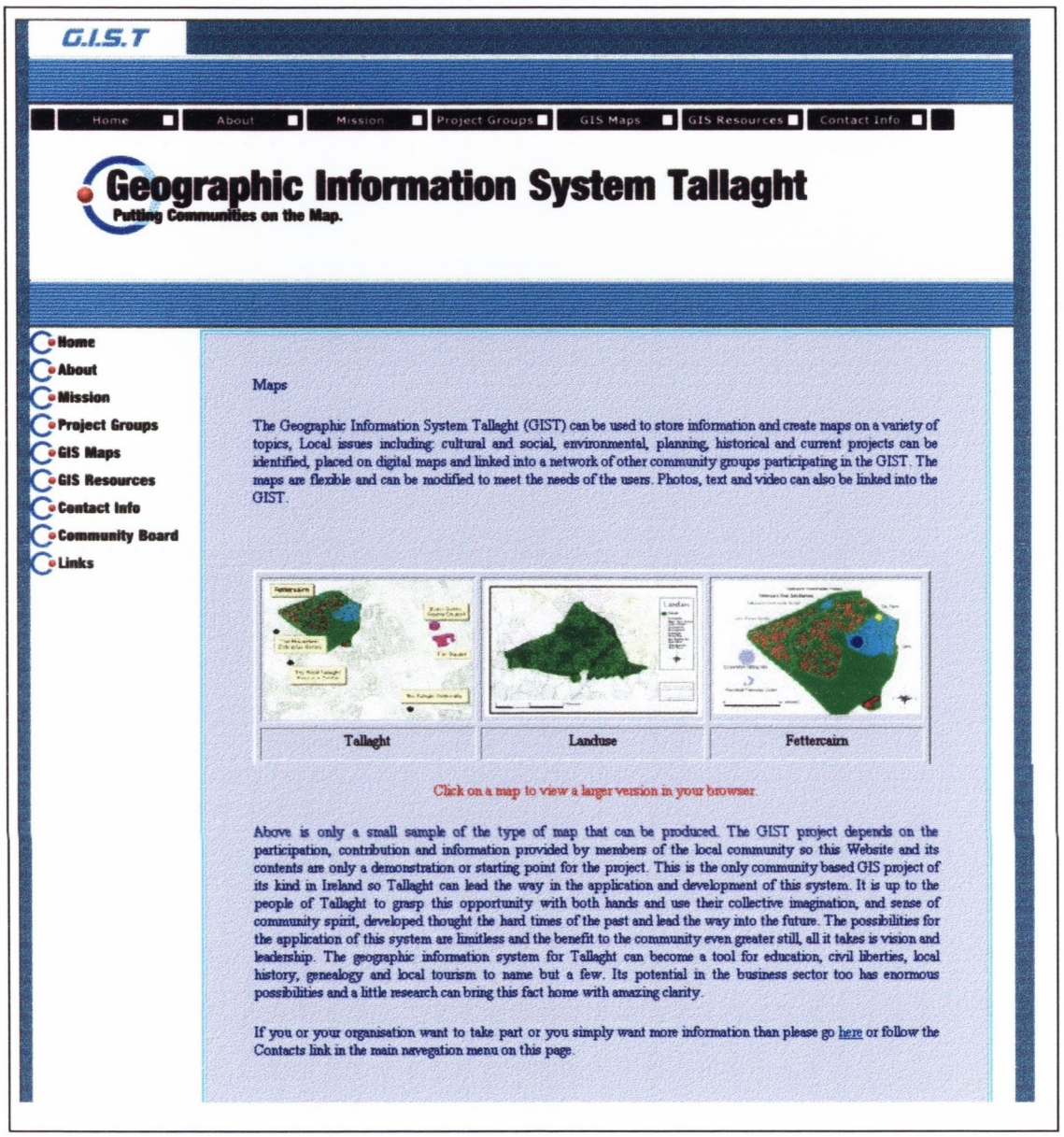
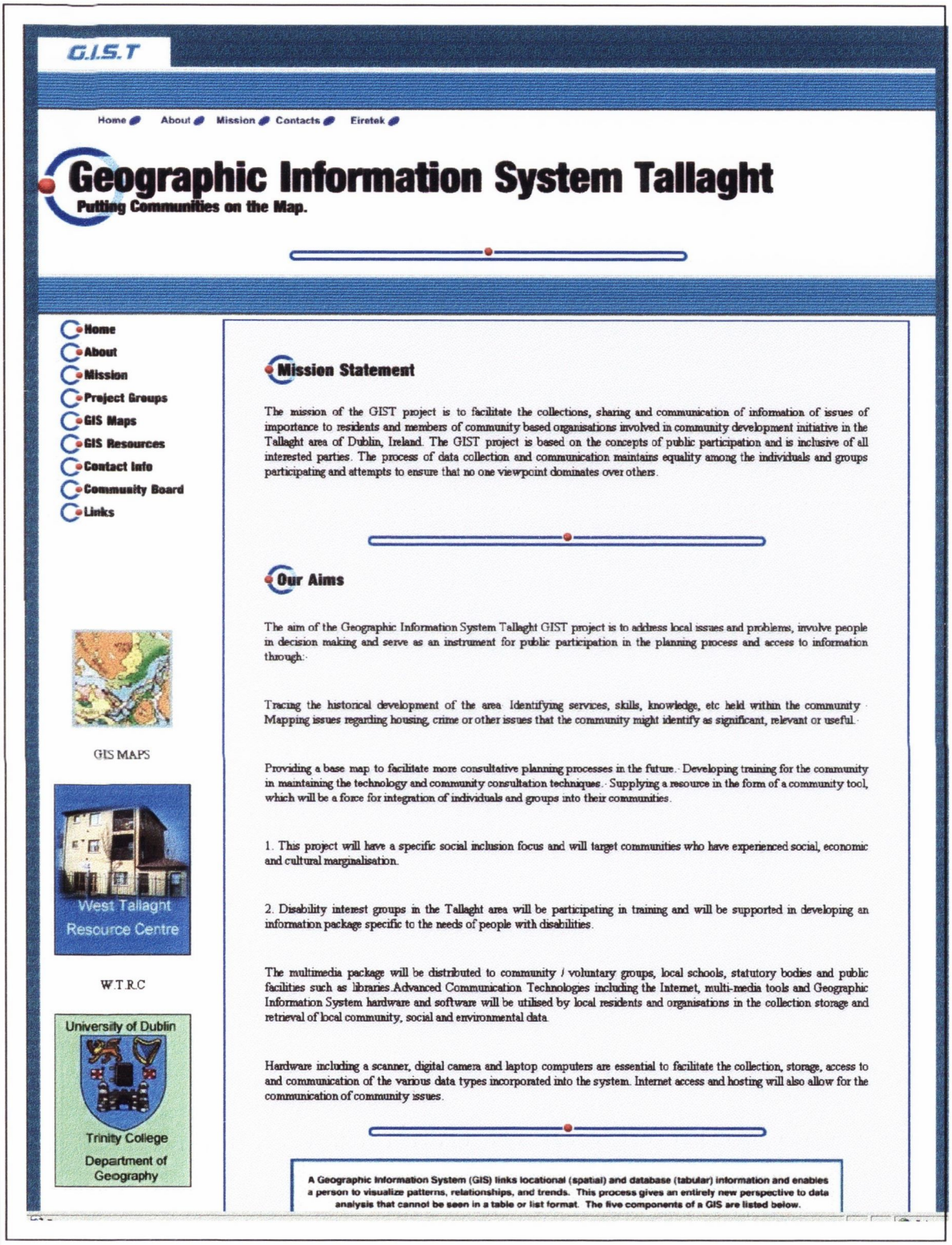


Figure 6.9. Mission Statement Page



6.9.6. The Final Results of the Implementation of the GIST

The final results of the implementation of the GIST can be described as mixed. With regards to the website, one of the local actors stated that the traffic has been "dismal to say the least". The uptake of the GIST and participation by community based organisations, community development workers and local residents was less than anticipated. Despite repeated attempts to "market" the project, including two radio interviews, several information brochures, other announcements and strong local support from the Tallaght Partnership and local GIS champions the GIST project, its datasets and applications are to date "under exploited".

One of the community activists stated that it is important to get local actors to the website but this was not what he considered the primary concern of the project. What was more important to this activist was getting more "people involved in their community". It does not matter what vehicle is used to accomplish this. The GIST project is just one of many local projects that can accomplish this. For some these new and innovative technologies were the deciding factor to "get involved", or the "hook". One local activist suggested experimenting with 3D computer modelling of the local area using the digital files containing elevation data and the building footprint maps. He stated that "3D is where the future of GIS technology is heading" and that "people will be interested" and that these technologies could be an additional potential hook for others.

It should also be noted with regards to the results of the GIST the amount of time and effort involved in the creation and application of the grassroots GIS. Chapter Five contains a timeline of the step-by-step processes involved. Year one involved the initial preparations, contacts and acceptance of the researcher into the community. Additionally, formal data collection and GIS development occurred in the first year. In the second year the GIS technology and data were introduced to the community as a base for the collection of local knowledge and informal data. Finally, it was not until year three that the community through exposure to the GIS, in an organic way, appropriated the technology for their own purposes.

6.10. FIELDWORK CONCLUSIONS

It is possible to draw a number of conclusions from the examination of the PPGIS process meetings at PLA sessions conducted in Tallaght. The formal data collected from the local authority was of high quality allowing for the production of suitable base maps. These base maps when converted for use in the ArcView GIS by the GIS technician were useful for the collection of additional local knowledge. Large amounts of these local data were collected during the fieldwork on a variety of issues of importance to the community. Both the PPGIS process meetings and PLA sessions contributed to this.

A summary of the evaluation of the processes used in the fieldwork is as follows:

- **The processes used in the PPGIS fieldwork allowed for the collection of large amounts of relevant, up-to-date and accurate information on the community in a relatively short time**
- **Issues of both general and specific nature were discussed and recorded**
- **In each instance, the PPGIS approaches enabled members of the public and individuals representing CBOs to participate in providing information on their area**
- **The PPGIS meetings and PLA sessions sounded out the opinions of the people attending the meetings**
- **The PPGIS approaches allowed local actors to get directly involved in the collection of information, the analysis of findings and the creation of community issues maps and GIS datasets**
- **The PPGIS approaches created a sense of community ownership in some of the participants**
- **The empowering potential of the GIS technology and the PPGIS process was recognised by many of the participants**
- **The PPGIS approaches engender a more positive attitude to new technologies and their application to community development initiatives**
- **These participants also showed an interest in adopting the technology for use in practical local applications**

The grassroots GIS as designed in the fieldwork can offer residents and CBOs the ability to collect and store large amounts of local knowledge and formal data. Having access to

large amounts of these data on a variety of features, items and issues of interest to local actors can prove valuable. GIS, multimedia databases and Internet connectivity can also provide assistance to local community development initiatives through the collection, use and dissemination of other data. Additionally, during the fieldwork the collection of valuable local knowledge and large amount of formal data in cooperation with local actors familiarised the researcher with important community issues.

In summary exposing large numbers of local actors to the GIS technology, data and the PPGIS process was useful for:

- **The collection and storage of formal data and local knowledge**
- **Assisting in discussions and rankings of community issues and problems**
- **Exposing the community to the potential of the technology and data**

The PPGIS fieldwork tapped into sources of information and knowledge held within the West Tallaght community. The active involvement of the community was encouraged at all stages of the project, which was recognised as being critical to its success. The results and lessons learned in the fieldwork were incorporated into a grassroots GIS and implemented in the form of the Geographic Information Tallaght (GIST). The case of the implementation of GIST, a truly community based, owned and operated grassroots GIS, is discussed in the results chapter.

The results of the implementation of the GIST showed that the introduction of grassroots GIS into the Tallaght community by the first three organisations to consider its use were mixed. The TIA and FYHP organisations found GIS of little practical value to their day-to-day operations while the DART-OUTREACH CBO was able to design and implement practical applications based on GIS technology through the GIST project. This result has interesting ramifications. The limitations exposed by the TIA organisation with regards to the inadequacies of the base maps were not experienced by DART, which found the base maps and the detail adequate for their purposes. This inconsistency exposes the differing mapping and ICT requirements of CBOs. The point to consider is that what works with regards to mapping and digital data for one group may not be adequate for another.

Another point to consider is that the use of the GIST is still ongoing. To date three organisations have used the GIST extensively and with mixed results, however, in that the use of the GIST is still ongoing the process can be described as sustainable. This meets one of the fundamental guiding principles for the design and implementation of grassroots GIS. If at anytime in the future additional organisations recognise the benefits of the use of the GIST they will be able to avail of them. In conclusion the results of the fieldwork were that the key to the successful use of grassroots GIS might lie less in the particular practical applications developed by CBOs and more in the processes created through PPGIS data collection and design. The building of a base of information, both formal and informal upon which to conduct more in-depth initiatives, seek funding and promote CBO agendas at later stages in the community development process may be the key advantage of the implementation of a grassroots GIS. The next chapter discusses in detail the results of this research.

CHAPTER 7: DISCUSSION OF THE RESULTS

7.1. INTRODUCTION

This chapter explores in detail the findings of this research on the design and implementation of grassroots GIS. This chapter discusses the results of the fieldwork and addresses each of the research questions. The results of the fieldwork revealed that the grassroots GIS in the form of the GIST had mixed impacts on the organisations and individuals using it. PPGIS were revealed in this research to have similar strengths and weaknesses as many of those identified in the literature as well as additional characteristics heretofore not recognised. Issues that were raised in the theory, literature review and contextual chapters also have a bearing on the discussions of the results, which are addressed through an in-depth analysis.

The GIST, even with its limitations, proved a useful tool for some of the individuals who used it. For the purposes of community development, CBO support and the empowerment of individuals and community the results are more mixed. This is broadly in line with the recent findings of researchers working in this area, including Talen (1999ab, 2000), Sieber, (2000), Kingston, *et al*, (2002) and Laituri, (2002). In theory, PPGIS are appropriate technologies for the collection, storage and analysis of data for community based initiatives. However, the research to date on this topic has shown weaknesses and limitations in the practical implementations of grassroots GIS.

7.1.1. THE RESEARCH QUESTIONS

The research questions helped guide the fieldwork and served to focus the design and implementation of the GIST. The five research questions were:

1. How can grassroots GIS improve the collection storage and sharing of local community knowledge and formal information?

2. What are the limitations of the currently available data for use in grassroots GIS in Tallaght?

3. How effective are PPGIS process meetings compared with PLA session as a means to solicit and collect local community information?

4. A) How can the new model of Public Participation Geographic Information Systems support local residents and CBOs involved in community development activities?

B) How can the new model of Public Participation Geographic Information Systems empower local residents and CBOs involved in community development activities?

5. How effective are the more "organic" and "bottom up" approaches to PPGIS as designed and implemented in this research compared to other methodologies?

7.2. RESEARCH QUESTION ONE

The fieldwork was instrumental in addressing this question. The main results to come out of the fieldwork with regards to research question one are:

- **The computer hardware and software used in the grassroots GIS are useful tools for the collection and storage of local knowledge and formal information, however there were some limitations**
- **The PPGIS process is useful for the two-way communication of information**
- **"Multimedia" representations proved a useful means to share information**

7.2.1. The Applicability of Computer Hardware and GIS Software

The results of the fieldwork revealed that "Off the shelf software", low cost computers and inexpensive Internet hosting enhanced the abilities of CBOs to take advantage of the opportunities presented by GIS. For the GIS technician, the ArcView version 3.2 GIS was an adequate means to store various community data as it allowed for the linking of text, photo, video and websites to the maps as "hotlink" points. Most of the commercially available GIS software packages have multimedia and web publishing capabilities. Limitations with regards to the hardware and software only began to appear at a later stage in the fieldwork specifically with the implementation of the GIST. These limitations are:

- **For the GIS technician, the use of software and hardware proved relatively straight-forward however, training for users was time consuming and less than successful**
- **The learning curves associated with additional training for community members were prohibitive**
- **The costs associated with acquiring new and updated GIS software were excessive, especially for the implementation of "Web GIS"**

- **The greater than one-gigabyte installation of new software was not suitable for all of the computers based in local settings**

Several local residents and CBO participants were already familiar with web design. "Screen grab" techniques were used for maps required for publication on the web, which allowed them to be exported from the GIS and used in web pages. No "Web GIS" functionality was built into the system due to the cost and technical limitations mentioned above.

7.2.2. The Collection and Storage of Different Types of Data

One of the fundamental functions of GIS is to allow for the collection and storage of spatial data. Most of the definitions of GIS recognise this functionality particularly with regards to formal data. However, traditional GIS have shown some weaknesses with regards to the representation of informal information, qualitative data or local knowledge. Second generation GIS or GIS/2 are seeking to meet the needs of expanded access to geographic information and the representation of different types of data such as local knowledge. GIS/2 are also being used for more participatory kinds of activities as well as for personal use (Nyerges, *et al.* 1997: 225). Grassroots GIS is similarly seeking to meet these needs, especially those regarding the more participatory kinds of activities.

The fieldwork served to illustrate the points regarding the collection and storage of different types of data. When formal data were requested from the local council, the ArcView version 3.2 GIS application was well suited to store the digital CAD files in "*dxf*", (AutoCAD vector format), convert them to ESRI "shape file", spatial data layers or themes. These formal data were then represented through different views, scales and colour classifications. Other formal data from a variety of "official" or government sources were also stored and represented in this manner. See Figure 2.2 for a list of these data.

The planners with SDCC were cooperative in releasing the CAD files used in their "corporate GIS". An "Intranet GIS" was developed for use by the almost seven hundred employees of SDCC containing detailed maps and data of South Dublin County. The level of detail and quality of the SDCC data made them indispensable as base maps and themes for use in the GIST project. The SDCC also has a county GIS website. Unfortunately data

were not available from the county's Intranet GIS or website for public consumption and maps of the county were not present on the website. All requests for digital data must be made directly to the relevant council officers.

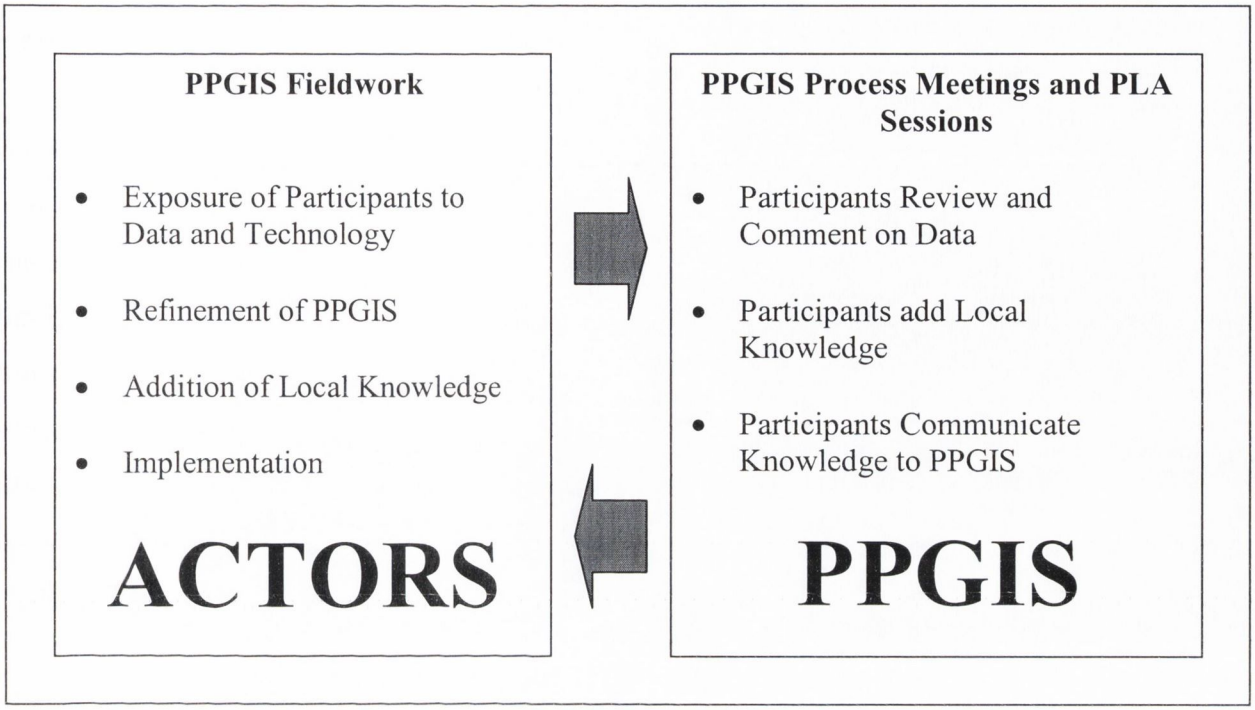
High quality "formal" base maps and official socio-economic and environmental data are vital for the success of grassroots GIS. The detail visible at five-meter accuracy and the colour coding to appropriate land use classifications in ArcView 3.2 GIS proved impressive. Decker acknowledges the importance of base maps (Decker, 2001) as previously discussed in the literature review. Base maps become the foundation upon which all the other data are added, including many local data sources. Starting with an accurate, high quality, digital spatial map foundation adds legitimacy and accuracy to additional data sources and the entire process. This "legitimisation" is not possible with many of the other participatory techniques employed such as PLA (Chambers, 1992), Planning for Real (SDCC URBAN, 1998) and Asset Mapping (Kretzman and McKnight, 1993).

GIS is well suited to collect, store, analyse and represent various datasets. However, in many instances if the high quality data are not forthcoming from government sources then the GIS is of limited value. Additionally, if there are restrictions placed on the use of the data or if they are too costly for smaller organisations to purchase then they will not be utilised for community development purposes. This issue is discussed in greater detail in the answer to research question two regarding the limitations of available data.

7.2.3. "Two-Way" Communications Flows

Evidence collected in the form of interviews and observations made during the PPGIS process meetings indicated that the PPGIS was a useful tool for the display of formal data and the collection of local knowledge. In addition to this there was also evidence of a "two-way" communication process or flow of information. This two-way flow, from the PPGIS to the local participants and back again has important implications. Figure 7.1 graphically represents this "two-way flow of information.

Figure 7.4. The "Two-Way" Flow of Information



During this process participants were able to review and comment on the formal data presented to them and then add their own local knowledge.

PPGIS is also a useful tool to aid "two-way" communications flows. The ability of GIS to enhance the one-way flow of information, from the GIS technician or planner to the audience is recognised in the literature. Computer graphics, colour maps, multimedia and text are an excellent means to communicate ideas, issues and points of interest to the community. For a number of years, since the widespread advent of computer assisted presentation mediums, it has been recognised that ICTs, multimedia technologies and spatially referenced data can play an important role in both one and two-way communications flows. This is broadly in line with the work of many researchers in the fields of planning and community development, particularly Anderson *et al.* (1994) and Shiffer (1995, 1996 and 1998).

As a means of initiating a cooperative discussion on the veracity of formal data and local knowledge, the PPGIS is arguably a valuable tool. The representation of these various data types using computer-assisted technology was useful. The digital representation of the local area in the form of high quality, colour coded base maps with integrated aerial photos, digital pictures and video, "sparked" people's interest and imagination. In most

instances where the PPGIS was presented, suggestions were made regarding additional sources of local knowledge held within the community as a potential contribution to the grassroots GIS project.

The more information that was collected, the more the participants seemed to want to contribute. This "snowball" effect in the early stages of the fieldwork was promising. As the process meetings went on and the data stored within the PPGIS became broader, the ability of the project to attract additional participants increased. This potential to attract other participants through the broadening of the data stored within the grassroots GIS is an important consideration. Common issues of interest, concern, and agreement and even disagreement with regards to the community have the potential to attract participants to the process in a "snowball" effect that can aid the establishment of a communications network within the community.

7.2.4. Multimedia Representations of Data

The abilities of GIS to represent community data are enhanced through the use of multimedia capabilities, such as, digital photos, text and video. PPGIS augmented with multimedia has the potential to communicate more effectively and overcome the limitations of more traditional GIS. Al-Kodmanys' work in Chicago attempts to do just that. Additionally, the inclusion of several different elements, such as multimedia 3D models, sketch boards and the Internet, helps broaden out these types of projects and militate against too narrow a focus (Al-Kodmany, 2001).

Shiffer (1998) has recognised this potential with regards to the use of multimedia by planners to support discourse. NGOs and CBOs can avail of these multimedia tools through the use of PPGIS to help initiate discursive processes seen in the literature. The processes of tapping into existing networks and developing new discursive community communications networks, that multimedia representations can help to support, are discussed in the next section. Research question four examines in greater detail these discursive processes as they relate to empowerment.

7.2.5. Community Communications Networks

The Tallaght community has many established communications networks and the structures to support them. These existing community networking structures and community development initiatives can play an important role in the support of ICT projects like the GIST. The "local partnerships" are an example of the existing structures that can be tapped and their networks of local actors and pools of resources and contributors called upon. Partnerships provide a framework that can successfully structure community efforts and processes. The committee structure that they rely upon with its chairs and officers, meetings, minutes and cooperative approach is widely used in community development activities throughout the industry.

Local partnership structures in Ireland have been much criticised. Issues regarding the negative impact of partnership approaches elucidated by Tovey (1985) and O'Carroll (1985 and 1987) have been explored in the Theory Chapter. These criticisms revolve around issues of "co-option" by the central government and communities developed as "clients" for the services of the government sector. The fieldwork in the Tallaght setting reflected negatively on some of the existing networks established through the partnership approaches. Some comments reveal the deep-rooted suspicions that many local residents have towards partnership:

> "It's like pissing in the wind with that lot..."
>
> "It's all talk!"
>
> "They need to create the demand for services and local community groups."
>
> "They take jobs and funding that should go to locals."
>
> (*Community Residents and Activists*)

These comments highlight the frustration with existing structures and the nature of some community development initiatives in the Tallaght area. The perception is that the process is in the control of the local council and that all of the important decisions have already been made. Some local residents suggested that the local partnerships are only needed to

put a "community face" on development, social service provision and environmental and quality of life initiatives and decisions.

However, regardless of some of the negative opinions of partnership, the established NGOs have the ear of government funding sources and have proven successful in the past. The facilities to support the local partnerships are well established. The technical wherewithal in the form of phone, fax, computer hardware, software, email, office, bank accounts, mailing addresses and the physical presence to solicit funds for CBOs are in place. Tools such as faxes, which only a few local groups in Tallaght have access to, are considered one of the principal tools for campaigning by lobbyists (Solomon, 1999). If the innocuous and widely used fax is considered to be a "principal tool" for campaigning, communicating and community organising then technologies such as grassroots GIS have the potential to offer much more.

Exposing CBOs to ICTs such as websites, and PPGIS can enhance their ability to communicate important issues and improve their chances of success. In situations where CBOs need to become familiar with their targeted communities, from spatial networking, information sharing and process building perspectives, then PPGIS can aid them. The results of the fieldwork in Tallaght have shown that grassroots GIS can quickly collect, store and communicate a variety of information as well as build networks of information contributors. Additionally, the results suggest that this can be accomplished with a limited amount of funding, computer hardware and software, training and facilities. It is in today's high technology, wired world, where the use of ICTs and the skills to implement them that this is accomplished.

Finally, existing community networks and structures can provide valuable data. Decker's GIS data law eight states, "the best sources of information about GIS data related issues are people working towards the same goals that you are." (Decker, 2001). This law can also apply to grassroots GIS and the collection of local knowledge. The best sources of local data are likely to be the people working towards the same goals that you are. Becoming familiar with the people in the community that are working towards the same goals that you are is recommended. Additionally, tapping into the networks that they have established will invariably lead to more and improved data sources, the sharing of resources and increase participation in the process. To conclude, specific datasets and

maps may be less important than the community networking aspects of the PPGIS technology.

7.2.6. Conclusions to Research Question One: The Limitations of the GIST

In conclusion the fieldwork established that the grassroots GIS as implemented in Tallaght was a useful tool for the collection and storage of various types of data. These data include firstly the formal or government data, and secondly the informal data or local knowledge. This local knowledge is available as a data layer in the GIST or as hardcopy printouts as shown in Maps 6.1 to 6.12. Additionally, for the purpose of aiding in the communication of information in a two-way manner the PPGIS process also proved useful. However, with regards to the final implementation of the GIST several limitations and weaknesses were uncovered.

Firstly, it must be noted that the GIST is an ongoing endeavour; the very nature of "sustainability" requires this. It has been recognised that community development initiatives requires time, patience and hard work and that they can be frustrating for community development workers as described by O'Carroll (1985), in the Theory Chapter. The grassroots GIS technology and the processes and structures to support additional projects are in place in Tallaght. However, additional progress and results may not occur or be evident until some time in the future. The community participants will be the determining factors as to when and how this will occur.

Additional limitations of the GIST as described by the local actors involved in the research are:

- **Weaknesses and limitations in the datasets regarding detail, coverage and scale**
- **Matching the technology with practical applications**
- **Attracting additional users, funding and support**
- **Long-term sustainability**

Although this research recognises the limitations of the final implementation of the grassroots GIS in the form of the GIST, several important additional points should be considered. The first is that the tools involved in the collection and storage of local

knowledge and formal data proved useful. Secondly a two-way process of the communication of information was established. The process initiated during the design of the grassroots GIS served to populate the GIST with data in a process that continues to this day. These two points serve to emphasise the value of the GIS technology and PPGIS process to participants, which indicates a potential for overcoming weaknesses. The next research question examines the data themselves and how the PPGIS process revealed their weaknesses and limitations.

7.3. RESEARCH QUESTION TWO

The fieldwork was instrumental in addressing this question. Specific limitations and weaknesses in the datasets were exposed through the implementation of the GIST. Additional limitations with regards to external factors were also revealed. The main results to come out of the fieldwork in answer to research question two are focused on:

- **Formal and Informal data or Local Knowledge Inclusion**
- **Data Quality Coverage and Scale Issues**
- **Copyright Restrictions**

7.3.1. Formal vs. Informal Data

The results of the fieldwork revealed that there were no appreciable differences in the ability of the GIST to include both formal and informal data. Technically the ArcView version 3.2 GIS can handle both quantitative and qualitative data. The participants in the fieldwork were mostly impressed with the high quality, detailed, formal data provided by SDCC, including those data used as base maps. Examples of the base maps and other formal digital data themes are contained in maps 6.1, through 6.7 in the Results Chapter.

Participants also seemed particularly interested in taking their own information and local knowledge on the community and contributing it to the project and seeing it represented on computer. Photos, poetry, art, personal and organisational stories and information on local issues, concerns, problems, and struggles in the local area were collected. An example of poetry is that contributed by David Brophy, which provided a perspective on the local community that is not to be found in the formal data provided by government. The

transfer of this local knowledge and perception to the PPGIS through its conversion to digital, GIS formats was facilitated with the cooperation of local residents and community development workers.

Interest and enthusiasm for the project was evident as the participants helped in the development of the GIST providing both formal and informal data. These were inputted quickly and relatively easily into the GIST by the GIS technician with the assistance and supervision of local actors including DART members and community development workers with the Tallaght Partnership. The amount of GIS training required for the local actors was minimal as many had extensive computer skills. This GIS training involved one on one lessons with the most interested participants and the provision of ArcView 3.2 training manuals and step-by-step "how to" tutorials devised by the GIS technician.

There were few limitations or restrictions evident in the early stages of this process as the technician facilitated the "technical" mapping work. There were no discernable technical issues or difficulties that arose with regards to the inclusion of the formal and informal data types. The ArcView version 3.2 was well suited for the handling of both the formal, quantitative data and qualitative, local knowledge data provided by residents and community development workers. With regards to the inclusion of both qualitative and quantitative data types, Craig *et al.* state:

> *"PPGIS is also a platform for integrating qualitative and quantitative information. This is significant for social scientists because of the historic dualism between researchers who employ qualitative methods and those who employ quantitative methods, and because of the unfortunate difficulties in merging the two. In this way, PPGIS highlights place, and in ways that conventional GIS systems normally do not. Such unanticipated benefits of PPGIS are important for geographers and other social scientists who (once again) have discovered the importance of place for scientific enquiry and development projects."*
>
> (Craig *et al.* 2002: 368)

The results of the design and implementation of the GIST recognises the importance of the different data types and values them equally. The limitations with regards to the inclusion of community data are not technical ones. Rather it is the perceptions that still exist in the minds of many that "formal", technical and scientific data are more appropriate for use in GIS as opposed to "non-conventional", informal or local knowledge. These qualitative types of data are simply not included or recognised by Irish local governments in their

GIS. CBOs engaged in activities of spatial story telling and who wish their *"place"* represented using qualitative data should be aware of this issue. Place is important as are the representations of place. PPGIS can help aid in these representations.

7.3.2. Data Quality, Coverage and Scale Issues

The PPGIS process meetings were instrumental in determining the usability, accuracy and quality of various forms of formal data. Transport, land use, buildings, and various socio-economic and environmental datasets were presented to participants for review and comment. Several local actors recognised errors during the process meetings and raised points and issues that allowed the GIS technician to "clean" many of the formal data layers. Additionally, DART actors were able to explore the datasets in detail after only minimal GIS training and make comments that improved the quality of data. These revised data layers were added to the GIST, enhancing the overall quality of the data. For example, official Dublin Bus transport routes, digitised from the most recent bus route maps, were inaccurate. Routes, bus numbers, schedules and levels of service had been changed. The "perishability" of these types of data was recognised and caveats made with regards to their use in the GIST.

The issues regarding the problems with transport in the Tallaght area are well known. Problems including under service, intermittent service and a lack of security for passengers and drivers persist. The means to communicate this information is contained in GIS technology. GIS offers a tool to show spatially the underserved estates, as well as the problem areas and routes where beefed up security is needed. These are all spatial problems that the community can address. A grassroots GIS can aid in taking up the challenge in dealing with these problems through the collection, storage and analysis of information and the search for, recognition and communication of solutions.

Additionally, some formal datasets were considered wholly unnecessary or inadequate for the purposes of supporting the activities of CBOs. For instance, the citizen led windscreen survey was shown to be an interesting technical and public interest exercise with little applicability. For the purposes of community development it proved inadequate as the random nature of the video survey or "drive through" of the area captured little other than young children playing in the streets and local traffic conditions. Capturing issues,

problems and concerns or local events on video might be more beneficial. Additionally, as a "gimmick" or "hook" to get people involved the video technology might be more useful. Acknowledging these shortcomings allowed the focus of the technical activities to be directed to other areas of inquiry. This type of refinement increased the effectiveness of the data collection and the overall design of the grassroots GIS.

Knowing what data to use is an important consideration for the designers and users of grassroots GIS. A "focusing" of the system occurs when less important themes are removed or ignored, missing items added and more important themes highlighted. An example of this is the Roadstone Quarry located half a kilometre to the north of the Fettercairn estate. Interestingly this large quarry, one of the largest and busiest in Ireland, was not included in the digital maps of the area provided by SDCC. The hard copy planning maps of the area fail to fully represent the site also. However, to local residents, the impact of the quarry is far greater than the maps and plans of the area would indicate. Complaints about the noise, dust, vibrations, garbage, pollution and questions regarding its future use, while hard to represent on planning maps, are included in the GIST.

With regards to the use of scale, a community worker with the Tallaght Intercultural Action (TIA) organisation interested in a map for informational purposes found the GIST of no practical value. The fact that the area of interest was just outside of the detailed, large scale, digital maps of the West Tallaght community limited its applicability. A commercial map provider, in this case the "Map Flow" website, was referred to as a means to acquire a suitable map product. In another situation discussed in the fieldwork, the scale was too large and the level of detail too great for the GIST to be of practical use. In this instance, it would have taken additional training and considerable effort on the part of the user to cut down the detail and draw a digital map adequate for giving someone directions to a specified location. The standard procedures of using a copy of the Irish road atlas of the area and a crudely hand drawn map served this purpose.

With regards to resorting to "standard" or traditional cartographic practice, Budic, recognised that this is a common procedure for many GIS users. His research revealed that even in planning departments in large cities, where the implementation of GIS and digital cartographic production processes have taken years and cost substantial sums of money, that paper maps and manual production processes are still used (Budic, 1994: 257).

Many tasks, according to Budic, still require data that are not in a GIS. Additionally, his study showed that time was not saved through the use of GIS for data collection or in the time needed to make decisions and identify conflicts.

7.3.3. Copyright Restrictions

Additional limitations with regards to the GIST data were identified as being external in nature. These limitations to the data had less to do with their applicability or technical specifications and more to do with the restrictions imposed on their use by government organisations through copyright and licensing. Restrictions imposed on the data include:

- **The Ordnance Survey Ireland (OSI) has prohibitive pricing, copyright and licensing structures**
- **The OSI places blanket restrictions on the use of its datasets on websites**
- **SDCC restricts the use of its formal datasets to research purposes only**

Kingston, *et al.* have identified problems with copyright restrictions and the expense of buying OS maps in the U.K. They claim that these restrictions have the potential to "make the whole exercise impractical." (Kingston, *et al.* 2000: 120). In their Web-based PPGIS for the village of Slaithwaite in the Colne Valley, they state that the ownership of each individual piece of information or datum within a system can cause major problems, especially for organisations with limited funds.

In Canada restrictive licensing and an almost ten-fold increase in the costs of paper maps since 1994 have made such products "prohibitively expensive and impractical" for use by community based groups such as those studied by Macnab (2002: 186), in Newfoundland, Canada. Additionally, Meredith *et al.* describe the legal barriers to the flow of information in the case of a PPGIS in Invermere, British Columbia. They state that, "Census data cannot legally be disaggregated to the level that makes it meaningful at the local level. This means that each stakeholder group works with a maximum data set that is only a subset of the total." (Meredith, *et al.* 2002: 210).

In the case of the research in Tallaght, OSI datasets could not be used on the GIST website. However, this did not impact the GIST adversely as the SDCC digital maps proved to be of a higher quality. The SDCC spatial data were also at a larger scale and

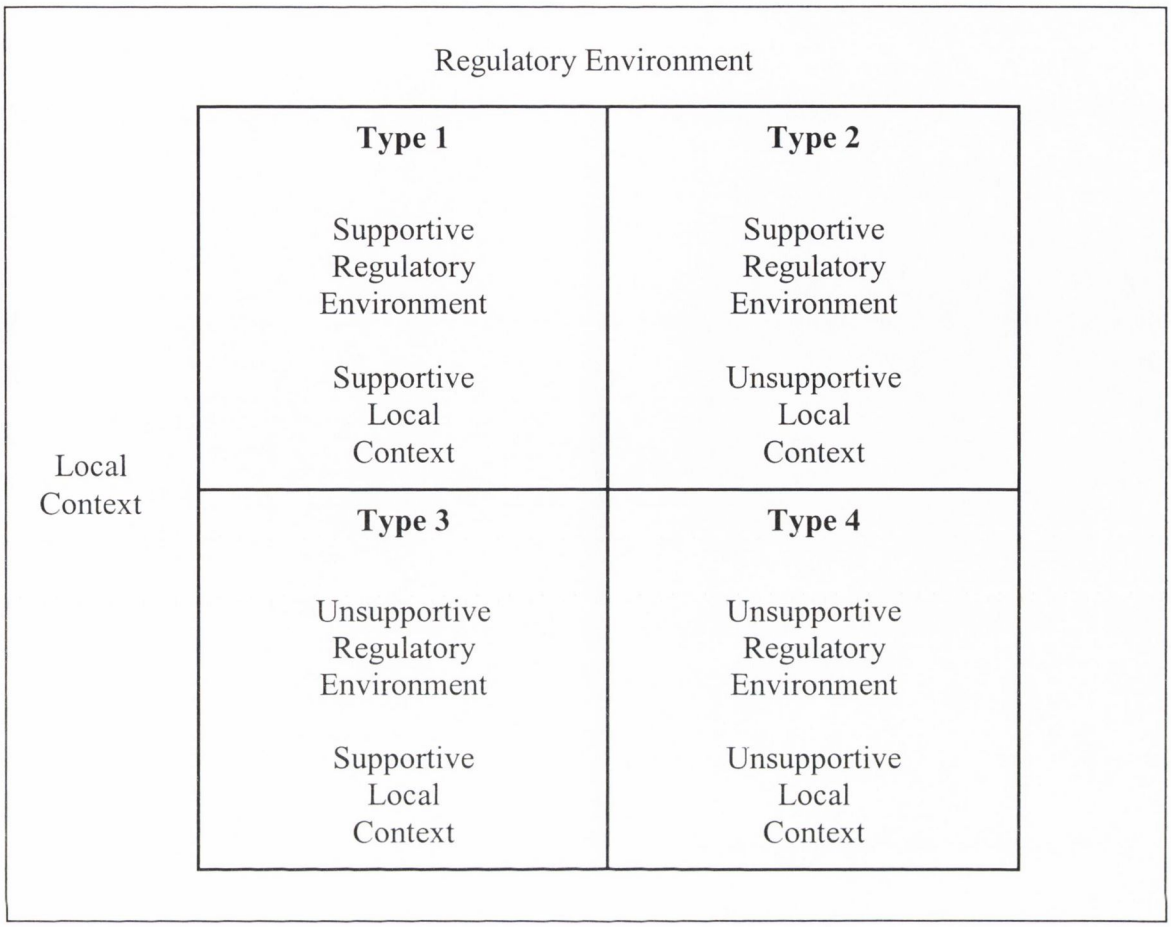
including much more detail than the OSI data. These CAD base maps provided by SDCC were utilised for research purposed only, circumventing the copyright and licence restrictions. All GIST maps are spatially referenced to the high standards of the original SDCC CAD drawings. Most informal data and local knowledge are the property of the GIST user committee as they are new data layers derived from the contributions of the local participants.

7.3.4. The Data Context and Regulatory Environment

It is important to consider limitations on the applicability of PPGIS regarding the data context. These contextual, external factors include the regulatory environment, self-imposed restrictions and possible negative perceptions regarding informal data and local knowledge and computer and ICTs usage in general. The cost, copyright and licensing restrictions imposed on data by local and central government in Ireland and other jurisdictions, limit the applicability of the data in PPGIS. Fortunately not all jurisdictions place these types of restrictions on their formal spatial data. One need only look to the U.S. where these types of limitations would be considered illegal due to concepts such as "the public domain", free speech and freedom of information. These are key context considerations that need to be addressed if the GIST and ICTs like it are to be more effective tools in meeting the needs of CBOs in Ireland as well as in other restrictive data environments.

As a means to aid in the discussion and explanation of these observations a "data context matrix" has been developed. Many of the case studies in the literature have described fieldwork sites in terms of "data rich" or "data poor" environments with regards to the availability of formal government data. These descriptions are limited, however, as the importance of the local context is not considered. Figure 7.2 provides a graphic representation of a matrix of contextual issues.

Figure 7.5. Data Context Matrix



Using this data context matrix the GIST as implemented in the Tallaght community can be categorised as a type three PPGIS. Similarly the cases explored by Kingston *et al*, 2000, Macnab, 2002 and Meredith. *et al*. 2002 are type three PPGIS. Difficulties, including the costs and licensing of data and the restrictions placed on communicating findings due to the actual or perceived burdens of copyright define type three cases. Unfortunately, these restrictions counteract some of the support and good will gained from a supportive local context, which results in mixed project outcomes.

For an example of a type one PPGIS, see the work of Sieber, (1994, 2000 and 2002). Her research into the environmental movement in California clearly recognises and explains the importance of both a supportive local context and regulatory data environment. Her case studies on community groups and their use of GIS benefit from a situation where mutually supportive and constructive cooperation between local groups and the authorities takes place. This is the ideal context for the design and implementation of a PPGIS.

At the other end of the data context spectrum is the type four PPGIS. The cases described by Walker, *et al*, (2002), and Stonich, (2002) exemplify this type. In each of these cases restrictive data access polices, through costs, copyright and other mechanisms and an unsupportive local context, where major local actors expressed outright hostility towards the PPGIS, undermined the implementations. Type four PPGIS cases can be considered the least likely to have successful outcomes or long-term sustainability.

The type two is the final category in the data context matrix. The case described by Towers, (1997) is a good example of this. The authorities presented formal GIS data and analysis to a local community regarding the citing of power lines in West Virginia. However, the unsupportive local context resulted in attacks on the findings of the GIS, its data and the technicians themselves. This case was then embroiled in legal controversy as the actors fought court battles further undermining the results and the applicability of the use of GIS in this case.

It may be that only type one PPGIS have any chance of successful outcomes and long-term sustainability. This raises the question, "How can GIST in Tallaght migrate to a type one PPGIS?" If the roadblocks to successful PPGIS project implementations in the local context are regulatory restrictions or lack of formal data there are "work-arounds." Numerous tiers of government and their respective agencies, from the local and national to the international, collect and disseminate digital spatial data. If blocked by one agency, identical or similar data may be obtained from another agency or source. These may also have different costs and licensing associated with their data. Additionally, in the U.S. "resellers", such as "Datamocracy", re-package, enhance and sell, in easy to access form, a variety of government data including spatial data. Private sector data suppliers may be the only source for some digital data.

Finally, Decker's GIS data law eight can apply to accessing formal data. He states, "the best sources of information about GIS data related issues are people working towards the same goals that you are." (Decker, 2001). This law can be restated, as the best sources of formal data are likely to be the people and organisations working towards the same or similar goals that you are. Communicating and networking with organisations involved with similar community development initiatives can provide data, sources and the contacts

needed to migrate a PPGIS to a type one where a supportive regulatory environment and local data context contributes to project success.

7.3.5. Conclusions to Research Question Two: The Limitations of the Data

In conclusion the exploration of research question two exposed limitations and weaknesses in the datasets, particularly the base maps, with regards to both their level of detail and area of coverage. Increasing the area of coverage and the level of detail in the formal maps is dependent on the cooperation of the local government. With regards to too much information, the solution is simple. A GIS technician or trained community worker using the GIST should possess the ability to turn off data layers and themes. This serves to reduce "clutter" and allows the focus to be placed on the data of highest value and interest. However, this requires the investment of time, effort and resources on the part of the users, in this case the actors involved in community development activities.

For those wishing to design and implement PPGIS, it is also worth considering the data context in which the case rests. The results from the case of the GIST were mixed, as was the overall support from the local authorities with regards to the availability of data. In Tallaght the ease of access to the formal data was then counteracted by restrictive cost, licence and copyright mechanisms. Without the support of both government authorities and the local community, the successful implementation and long-term sustainability of PPGIS may be unobtainable.

7.4. RESEARCH QUESTION THREE

The fieldwork allowed for the collection of data that addressed research question three. The analysis of these data reveals:

- **PPGIS process meetings and PLA sessions are both valuable mechanisms for collecting local community information**
- **PPGIS process meetings proved to be more easily organised than PLA sessions**
- **PPGIS process meetings provided a balanced picture of the community and a voluminous amount of information**
- **PLA sessions provided a more one-sided and negative picture of the community**

- **PPGIS process meetings are more effective, economical and balanced than PLA sessions for the collection and communication of local information**

7.4.1. PPGIS Process Meetings vs. PLA Sessions: Comparative Analysis

The use of the two different PPGIS presentation and data collection methods in the form of the PPGIS process meetings and PLA sessions resulted in different outcomes. One of the main findings of the fieldwork was that the PLA sessions provided for the collection of a large amount of negative information in general. This appeared to reflect negative perceptions of the Tallaght community on the part of individuals representing the various NGOs participating. Conversely, the information collected during the PPGIS process meetings was more positive and where negative issues did arise solutions were presented. These and other findings are discussed in greater detail in the following sections.

7.4.2. PLA Sessions: Ranking the Negative Issues

One of the main objectives of the PLA sessions according to a local community development worker in Tallaght was to, "structure community awareness and involvement in a process established among groups working in the area." This approach was different to the static or passive collection of information methods used in PLA and PRA projects and techniques employed by SDCC, such as URBAN and RAPID, in the Tallaght area recently. The PLA sessions proved suitable for bringing people together that would not normally have been involved in this type of process. The PLA sessions proved to be in-depth, focused and well structured, allowing for the collection of a large amount of primarily negative data on the community.

The participants ranked the negative issues explored during the PLA sessions. Many of the issues are more general in nature than those discussed during the PPGIS process meetings. In order of rankings, the main issues of concern raised during the PLA sessions are:

- **Drug and Alcohol Abuse**
- **Unemployment and other forms of Social Exclusion**
- **Educational Disadvantage**
- **Lack of Resources and Facilities for Young People**

- **Anti-Social Behaviour, Crime and Poor Policing**
- **Housing, Accommodation Crisis**

The PLA sessions allowed for the collection of this local knowledge, which was highly valuable. Converted into its own theme within the GIST, these data were used to "broaden out" the project. These data helped solicit comments, promote discussions and communicate problems, issues and concerns during the later stages of the research.

The maps and associated digital GIS data are available to local residents, volunteers and workers for CBOs in the offices of the West Tallaght Resource Centre and the Tallaght Partnership. These detailed digital maps contain a record of community issues that can be queried, modified and printed. The maps provide a base upon which additional data can be collected, stored and analysed. Additionally, these data can be used to debate and solicit comments about the local community and act as a basis to initiate, promote and inform future community development activities in the area. Finally, additional participants and CBO partners can be identified and taken on board the project by providing them with local data and an Internet presence. This will make the GIST a more broadly based community project in the future.

The focus on the negative issues in the community can be considered a drawback. Most of the negative issues raised were already well known to residents, community workers, politicians and the general public. Highlighting them in the PLA sessions and adding them to the GIST has little practical value without the inclusion of community efforts to discuss, suggest solutions and act on them. Links to action are the keys to successful community development initiatives; PPGIS can provide the basic information, analysis and networking capabilities to facilitate this. The PLA sessions as organised and implemented in this fieldwork did not provide or encourage such action.

Participants for the most part found the meetings interesting and were willing to cooperate in discussing the issues in the community. However, the results of the PLA sessions can be considered less than successful. The participants failed to take up the challenge of providing insights to the causes or potential solutions to the problems discussed in the PLA sessions. Also the participants failed to continue with the process and activities of the PLA sessions or show any interest in organising additional meetings. However, according

to a community development worker, some did show an interest in receiving payments for additional PLA related activities. (O'Kane, 2003).

The real challenge for those developing PPGIS is in converting the momentum, good will and enthusiasm of PLA type approaches into concerted action to affect positive change within a community. The results of the PLA sessions revealed just how difficult this is even when participants are paid community workers with a responsibility and obligation to participate in these types of activities. Getting residents, volunteers and others involved in such processes is a difficult undertaking. However, if the process and outcomes can be shown to have tangible benefits for individuals and communities or if participants are responding to specific threats to the community then participation should increase.

7.4.3. PPGIS Process Meetings: Spatial Discussions and Networking

The PPGIS process meetings revealed points of interest or community assets akin to the strategies employed by Kretzman and Mcknight (1993) as explored in the literature review. The creation of a spatial database containing the locations, contact names and numbers and descriptions of local CBOs and NGOs active in the community can prove to be a powerful tool. The use of the PPGIS in combination with the asset mapping approaches of other researchers provides an added dimension to the project and helps broaden interest in it. Kretzman and Mcknight recognise the power of ICTs and recommend their use for just such purposes, (Kretzman and Mcknight, 1993).

The PPGIS process meeting also allowed for the formal datasets to be presented and discussed in detail. The strengths and weaknesses of the data exposed in these meetings allowed for the correction of errors and the removal of superfluous data. This process enhanced the efficiency and usability of the GIST. The discursive nature of the PPGIS process meetings also revealed that the participants had potential solutions to many of the negative issues revealed.

The PPGIS process meetings included discussions of both a general and specific nature. The examples in Table 7.1 show that many of the problems discussed during the PPGIS process meetings were geographically precise. In these instances, the PPGIS proved to be a valuable aid in the identification and discussion of potential site-specific problems and their solutions, including spatial solutions.

Table 7.1. PPGIS Process Meetings: Discursive Solutions

Community Problems	Solutions Discussed
Excessive Traffic Speeds Near Schools	Traffic Calming, Speed Bumps, Crossings
High Crime Areas	Greater Police Presence, More Foot Patrols
Poor Public Transport	Increased Services, Altered Routes, Times
High Pollution Areas	Site Specific Cleanup Initiatives
Unplayable Football Pitches	New Facilities, Drainage, Maintenance

An important question to discuss is "can PPGIS help in getting these problems solved?" PPGIS can be used to build and support local networks of actors involved in activities that are designed to address issues like those shown in Table 7.1. PPGIS can be used to facilitate debate and solicit comments about the local community in a communicative process. PPGIS can also act as a basis to initiate, promote and inform future community development activities in the local area. Finally, PPGIS can attract additional participants, funding and support. However, PPGIS in of themselves cannot solve the ills of disadvantaged communities. This is up to the hard work, perseverance and activism of members of the local community who have a stake in it.

PPGIS can also help initiate, promote and maintain discursive networks of actors involved in community development activities. PPGIS can therefore be considered a catalyst acting to initiate and enhance local community development projects and activities. Shiffer refers to technology used in this way as, "a practical catalyst towards a more inclusive process." (Shiffer, 2002: 309). This approach differs from many traditional PPGIS geared towards the collection of information or increased participation in planning. These tasks are relatively easy; the hard work lies with the residents and community workers involved with affecting positive change in disadvantaged communities. PPGIS, no matter their funding or technical capabilities, cannot accomplish this task alone.

Wood, (1992) has some relevant points with regards to the power of maps. Similar in many respects to GIS, maps are tools that are of only limited value to communities and individuals in of themselves. To Wood, illegal drug use, AIDS, school integration, local self-knowledge or declining bio-diversity are all problems that communities have. Maps can help represent and display data on certain problems and issues, but cartographers are not the persons tasked to fix society's ills. Data can be collected and utilised in maps and

spatial information technologies can be used to promote causes, analyse problems and link users more closely to the communities in which they live. Maps and GIS can be used to further these agendas but they cannot do the work of community development.

Finally, the PPGIS process meetings were able to attract the involvement of like-minded people who helped contribute to and promote the overall project. This aided in the construction of a network of local participants, contributors and actors, many of whom had much to contribute. As a mechanism to collect, store and analyse qualitative and quantitative data on local communities a GIS is well suited. PPGIS process meetings can help facilitate these uses of the technology as well as help develop the local networks of actors that community development initiatives strive to tap into.

7.4.4. Comparing the PPGIS Process Meetings and PLA Sessions

A direct comparison of the PPGIS process meetings and PLA sessions is contained in Table 7.2. The table includes the methods, participants, issues, ownership, costs and the results of both. Additionally, for comparison the table includes the GIST project, representing the final implementation of the grassroots GIS.

Table 7.2. Comparison of the PPGIS Process Meetings and PLA Sessions

	PPGIS Process Meetings	**PLA Sessions**	**GIST**
Method	Presentation with Feedback	Group Discussions	Organic PPGIS
	"Two-Way" Information Flows and Communications	"Rankings of Problems"	Multiple Methods and Flexible
	Discursive Networking	Consensus Building	Inclusion
Participants	Single Group/Individuals	Members of Groups	Groups/Individuals
Issues	Limited Viewpoints	The Power of Many Minds	Networks of Local Groups
	Local Knowledge	Negative Focus	Sustainability
Ownership	Restricted to Groups	Shared	Shared
Costs	Limited (< € 1000.00)	Considerable (> € 1000.00)	Limited (< € 1000.00)
Outcome / Results	Voluminous Amount of Local Knowledge/Positive/ Solutions Presented	Issues Prioritisation Through a Rankings of Local Problems	Combination/ Mixed

The PPGIS process meetings and PLA sessions initiated through the fieldwork allowed for the collection and storage of large amounts of local knowledge. This local knowledge was use to create the digital GIS community maps for display and use in the GIST. The next sections compare and discuss the PPGIS process meetings and the PLA sessions in more detail.

7.4.5. PPGIS Process Meetings vs. PLA Sessions: Other Issues

The large number of negative issues and comments to come out of the PLA sessions can be seen as discouraging. Although not unusual for these types of participatory processes they do highlight local feelings of helplessness in the face of such widespread, long lasting and serious social problems and detract from a focus on the "doable". GIS and PPGIS are merely tools for the communication of geographic information. The solutions to the problems in many communities will come from within the communities themselves in the form of active and informed residents and activists. Many of these local actors will avail of support from top down government policies and grants and work within a network of NGOs, CBOs or volunteer organisations seeking to improve conditions.

PPGIS can collect, store, share and communicate many types of information including the solutions to problems. The ability of GIS to store qualitative and quantitative data is advantageous. A large amount of information can be easily stored on disk, moved from one computer to the next, modified, added to, incorporated into documents and otherwise transferred and communicated. PPGIS includes these functions and adds to them a process, which, under the right conditions can lead to networks of community actors contributing, local knowledge in a discursive, collaborative, community controlled process. Recognising this potential and finding a balance between the negative and positive aspects of the process can benefit the individuals, organisations and communities that choose to use PPGIS.

7.4.6. PPGIS Process Meetings and PLA Sessions: A Comparison with Other Methods

The PPGIS process meetings and the PLA sessions studied in the fieldwork for this research represent two methods for the collection and display of local knowledge and

formal data. The literature review and theory chapters have discussed a large number and variety of other public participation and data collection techniques and storage methods including, Vindasius' "*Public Participation Techniques and Methodologies: A Resume*", (1974) which examined the large number of long established and traditional methods and the work of Shiffer (1998, 1999 and 2002), who has concentrated his research in the areas of multimedia and planning.

These other methods can be broadly categorised as traditional and high technology techniques for public participation as described by Vindasius and Shiffer, respectively. In comparison with PPGIS and PLA methods the traditional techniques can be criticised as top-down in nature and as such not fully supported by local populations. This is revealed through problems with these types of projects that include "participation for legitimacy" and a lack of long-term sustainability. Additionally, the limited use of new technologies such as GIS and ICTs is also seen as a weakness in the traditional approaches to participation, for example in Planning for Real exercises (Kingston, *et al.* 2000).

The high technology and innovative participatory techniques currently employed have much in common with the approaches employed by PPGIS in this research, however, there are several weaknesses that should be explored. The problem of "technological determinism", as described by Campbell and Masser (1995) and exemplified in the works of Shiffer (1995 and 1996), Kingston (1998) and Al-Kodmany (2000) is evident. A concentration on the technology takes away from the process, the information collected and the participants. Additionally, these approaches can also be seen as top-down in nature, as a legitimisation of the planning process (Towers, 1997) or as research for publication (Harris and Weiner, 2002). Finally, issues of sustainability are raised as the technology and the process are usually well funded initially with little thought to their long-term viability.

The PPGIS approach attempts to combine the strengths of the traditional and high technology approaches in a community led, collaborative process. This combined, more "organic" approach addresses several of the shortcomings of a strictly traditional or technological approach. PPGIS as designed and implemented in Tallaght employs GIS and ICT technology in a bottom up, organic and collaborative approach in an attempt to

solve many of the difficulties revolving around issues of legitimacy and sustainability as described previously.

7.4.7. Conclusions to Research Question Three: PPGIS vs. PLA

In conclusion, the fieldwork involving the PPGIS process meetings and the PLA sessions proved a useful means to tease out community issues and get people to look at problems in their area in a different way. Both the PLA sessions and PPGIS process meetings were useful methods to collect a variety of local data from multiple sources, using small and large group consensus building techniques. Additionally, they served to broaden out the scope and increase the interest in and usability of the grassroots GIS introduced in Tallaght.

The lessons that were learned during the fieldwork with regards to GIS technology and data collection techniques were applied to the implementation of the GIST. They helped determine that the ArcView version 3.2 GIS was well suited for the storage of the local knowledge collected during both the PPGIS process meeting and PLA sessions. These lessons also served to increase the applicability of PPGIS in the context of community development particularly through the refinement of the data collection methods and network building attributes of the PPGIS.

Finally, the importance of the contributions of the community coordination team cannot be underestimated. The logistical difficulties in coordinating the many participants of the PLA sessions were large. This approach was valuable as it allowed for a wide variety of perspectives from the individuals representing the variety of groups to be included. This aided in the broadening of the overall GIST and contributed substantial and unique information. On the other hand, the PPGIS process meetings were conducted with smaller numbers of participants and single or only a limited number of groups. Although easier to organise and facilitate, the PPGIS process meetings contributed data specific to those participating, which is a potential weakness. It is only through the combination of both approaches that the GIST or other models of PPGIS stand to benefit.

7.5. RESEARCH QUESTION FOUR A

The ability to address the questions of support and empowerment is made possible through the implementation of the grassroots GIS, which took the form of the GIST project. The implementation of the GIST incorporated the data that were collected and the lessons learned from both the PPGIS process meetings and PLA sessions and combined them within a truly grassroots, community led implementation of grassroots GIS. The answers to the first three research questions have shown that GIS and PPGIS technologies have the ability to collect, store and represent formal and informal data on community issues quickly and easily in comparison to other methods. The next sections seek to answer parts A and B of research question four regarding the support and empowerment of individuals and community groups through the use of GIS technology, respectively.

7.5.1. Research Question Four A: The Components of the GIST

Prior to the implementation of the grassroots GIS in the form of the GIST, the necessary theoretical and practical components were put into place. These components are:

- **Appropriate Computer and Inexpensive "off the shelf" Desktop Software**
- **Appropriate Data both Formal and Informal**
- **Local Community Network of Contacts and Contributors**
- **Simple, Specific Issues**
- **Physical Facilities Location**
- **Committee Structure**
- **GIS Champion**
- **Community Impetus and Initiative**

7.5.2. The GIST: Supporting Individuals and CBOs Through Specific ICT Initiatives

The support that the GIST provided to individuals and CBOs was described in the Results Chapter. The specifics of this support is examined and discussed in the next sections as it plays an important part in future applications development and the long-term sustainability of the GIST. This section examines specifically the type and extent of the support that the GIST provided to individuals and CBOs in Tallaght.

Several specific initiatives were undertaken by CBOs during the fieldwork for this research. Some were more successful than others in using the resources of the GIST, such as the DART organisation, which applied GIS to the development of applications to directly support their activities. Conversely, the initiatives of the FYHP, specifically the development of an information brochure, had little need for GIS support. However, this initiative can be described as a specific ICT related activity in that the development of a high quality, marketing product used computer graphics, design and digital photography. These and other specific ICT initiatives are discussed in more detail in the next sections.

7.5.3. The GIST and Support: Tangible Results

Some of the tangible results of the use of ICTs to support the operations of local CBOs occurred as the result of the development of the FYHP information brochure (Appendix F). The digital photographs of the facilities, participants and horses were altered to provide clear and impressive views. These substantial efforts to promote and sell the project are a reflection of the competitive pressures that are now being placed on many local CBOs in the struggle for funding. Also, the creation of something tangible that the individual members of the FYHP could point to and claim as their own should not be underestimated. It remains to be seen, however, if these efforts will result in positive funding outcomes.

Another example of tangible results can be seen in the case of the practical applications developed by the DART organisation. These practical applications were described in detail in the results of the fieldwork. The ability to use GIS to collect, store and analyse the data of most importance to the DART organisation demonstrated in a practical way the support that GIST can provide. Additionally, it is ironic that one of the practical "real world" applications of the GIST is realised through the development of a "virtual community". This counter-intuitive concept involves a virtual space taking the place of "real" world connections and is worth discussing.

One of the potential benefits and "real world" applications of the GIST for the members of DART with disabilities was the development of an Internet forum and virtual community where information on accessibility issues could be collected, stored, discussed and acted on. The potential benefits and drawbacks of such virtual community information systems

were listed in Table 4.3 in Chapter Four. With regards to the DART organisation, some of the more relevant points of an Internet presence are:

- **The Internet allows access to a variety of information, funding sources, and government agencies**
- **People do not need to attend meetings to communicate. This is suitable for dispersed populations (Kingston, 2000) or disabled persons**
- **Additional efforts and costs. The technology does not replace traditional methods of communications**
- **Training, support, update and maintenance are required**

The creation of a website is something tangible that members of CBOs can use to support their efforts. Using the technology to map issues regarding the physical and spatial characteristics of a community like accessibility and housing provides an important resource for an organisation like DART. The literature is replete with cases of similar types of organisations using GIS technologies for such varied support purposes from natural resource management and mapping in remote regions (Harris and Weiner, 2002 and Ball, 2002) to promoting quality of life and urban design agendas in the largest cities (Al-Kodmany, 2000).

Finally, the GIST project is something tangible. It exists on the Internet and on the computers of the Tallaght Partnership and West Tallaght Resource Centre. Although the GIST is ostensibly in a digital format when transferred to a CD-ROM, it provides the community with a PPGIS that can be placed in the palm of the hand and transported. This represents a tangible and transferable community information system, which includes photos, video, text and all the associated formal and informal information on the community in one location. In the right hands the GIST, when combined with the software and hardware tools to access it and the PPGIS process to implement it, can represents a means to affect positive change in the community.

7.5.4. The GIST and Support: The Internet Site

The GIST project as it currently exists on the Internet can be viewed at the following website, http://www.eiretek.org/index.php. Local activist David Brophy undertook the development of the Internet site in cooperation with the GIS technician and others. Digital

Maps and other data were extracted from the GIST "standalone" databases and incorporated into the GIST website. The site contains a summary of the existing GIST contributors and also acts as a platform on which to seek additional community support and participants. The "screen grabs" of the GIST Internet site are contained in the Results Chapter.

The creation of the GIST Internet site was made possible primarily through the efforts of a local resident. The technical skills required to design and complete the site were held within the Tallaght community before the arrival of the GIST project. The GIST acted as the catalyst and started a process where local residents could bring their own skills to the table and make valuable contributions to the communication of community information. The site is a tangible result of local community support and effort. The future will tell to what extent the technology, both the Internet and GIS, are appropriated by the community and for what purposes.

7.5.5. The GIST and Support: Future Uses

The GIST project is actively seeking additional partners to use and support the GIS technology, community data collection and community networking process. The potential future uses of the GIST project currently involve the support of the DART organisation's efforts to develop practical GIS "accessibility" applications. This support also includes grant applications and meetings with local residents, community workers and the representatives of local government to gather support.

The ultimate goal of these activities is to improve the quality of community life for the people living in Tallaght. The large number and variety of local actors and the network of volunteers, CBOs, NGOs and governmental organisations is a positive characteristic of the Tallaght community. The future bodes well for a project such as GIST that is inclusive and flexible enough to take advantage of funding and support opportunities that are presented. The future uses of the GIST will be determined by the needs, resources, skills, hard work and applications required to support the agendas that the participants bring to the table.

The GIST activities and practical applications discussed in the above sections can aid CBOs and NGOs involved in community development activities. However, in order for these technologies to reach their full potential, both the support and the empowerment of individuals and communities needs to take place. The next sections discuss the empowering potentials of the "organic" PPGIS process and the GIST project and associated and related technologies in more detail.

7.6. RESEARCH QUESTION FOUR B: THE GIST AND EMPOWERMENT

The nature of empowerment in general is ill defined, as discussed in previous chapters. The basic construct of empowerment, for the purposes of this research, involves the conversion of ideas and discussions into organised action to affect positive change in the Tallaght community. People may feel that they are empowered through the collection, input and sharing of information or by merely participating in a process and networking with others. Some may feel empowered in a group or through committee work, meetings and community development initiatives, while others will demand much higher standards in order to feel empowered, including actually seeing the tangible, physical and concrete results of their efforts. Therefore the answer to the question "How can PPGIS empower local residents and CBOs?" must come from those engaged in the process.

The fieldwork identified a DART actor who stated that the GIST was an "invaluable" tool, with great potential to empower local groups. He said:

> "I think that the GIS and the use of spatial references is an invaluable tool for local groups. It gets people thinking in a different way. The maps and computer data are something that people are not familiar with... they are interested in what it can do for them..."
>
> (*DART Actor*)

Similarly, Tulloch identifies a change in "cognitive and analytical processes" with the integration of GIS technology into the activities of NGOs (Tulloch, 2002: 199). He cites Kaiser (1999) who stated that the technology has expanded the ability of NGOs to consider less traditional boundaries to problems through the ability of the GIS technology to

integrate data from many sources to facilitate more meaningful representations (*Ibid.*). Facilitating more meaningful representations through the use of GIS technology can aid discussions and attract participants to the process. Shiffer, stated that multimedia technologies can promote experimentation and exploration that might result in the identification of related issues or aid in the generation of new alternative approaches to problem solving (Shiffer, 2002: 317). A Dart actor stated:

> "It (GIST) will bring like minded people out of the woodwork and to the table... People who are interested in computers, web design and technology in general... People who want to learn something new, something from a different perspective will participate."
>
> (*DART Actor*)

One of the PPGIS process meeting participants also recognised the potential of the technology. She stated,

> "GIS shows people how their community looks...and how they want it to look...it gets people involved."
>
> (*Fettercairn Resident*)

This demonstrates the importance of the GIS technology and of the collaborative processes that can be established through its use. These processes are akin to the collaborative planning approaches of Healey, (1998: 1). Grassroots GIS can, like Healey's plans set forth the "collective social construction of strategic organising ideas, stories, images and so forth" in a GIS as a key component in the process of "place making". In Tallaght the grassroots GIS rather than the plan are the means to, as Healey stated, "present images of what places in their settings could be like, both their spatial and institutional dimensions." (*Ibid*). The statements of the PPGIS participants support this assertion:

> "The computer, GIS and the information...it's the combination of all the different elements... the coming together of all the elements."
>
> "The GIS gets people to look at the issues in this community in a different way."
>
> "Immediately ideas started popping into my head... GIS was

helpful in coming up with a plan."

"It allows good ideas to grow"

(*Fettercairn Residents*)

These comments describe a process as opposed to a product, outcome or technology that leads to the empowerment of individuals and communities. The grassroots GIS as implemented in Tallaght can provide the technological tools as well as the processes of community empowerment.

7.6.1. The GIST: The Process of Empowerment

The process involved in the design and implementation of the GIST can be said to have empowering characteristics. The process involved:

- **The development and provision of a base map to facilitate a more consultative future planning process**
- **Spatial story-telling involving, local history, newspaper archives, photos, tourism sites, feel good projects and local actors and "characters"**
- **The development and provision of a resource in the form of a community tool allowing for the integration of information that individuals and groups have on the community**
- **The development of training for the community members in operating and maintaining the technology and in community consultation techniques such as PLA**
- **The development of "real world" practical applications and the analytical abilities to take advantage of the available data both formal and informal**

The importance of these activities cannot be underestimated. It is widely recognised in the PPGIS literature that the process itself has intrinsic value. According to Craig *et al* the technical applications themselves are "overstated" and the outcomes of projects play less important roles than the participation of the public in the overall process (Craig, *et al.* 2002:368). Meredith, *et al.* state that the, "process is the product – that is, by the time the public has become involved in generating or understanding a system, the educational and analytical benefits of public participation may already have been achieved." (Meredith et *al.* 2002: 206). They go on to state, "Programs that bring the public into the new medium

change the public, and the 'message' of PPGIS is received *de facto*." (Meredith *et al.* 2002: 216). Interestingly, according to Meredith *et al.*, "In fact it may not matter if the system never does get up and running. The process of building local capability and motivation - a process that is part of setting up a PPGIS – may be the very product we are hoping to produce." (*Ibid*).

Similarly, Jordan concludes that PPGIS can produce useful information but that it can be viewed as "extractive in nature". He notes, "Any technology which requires data to be taken away for analysis rather than encouraging people to undertake their own investigations and analysis limits participation to some extent." (Jordan, 2002: 241). To resolve the "alienation between participants and their information", Jordan posits PPGIS as decision support tools that should be incorporated into a process that, "starts with the public participation procedure and intrinsically involves feedback to, and from, the FUG (Forest User Group)." (*Ibid*). In this research the two-way communications flows, analysis or "feedback to and from" the GIST, has been achieved.

During an interview a DART Outreach actor made an interesting point. He stated:

> "The funny thing with the GIST was that when I saw the DART information like the mission statement and objectives on the website it really focused me and reminded me why I got involved in the first place and what DART was all about..."
>
> (*DART Actor*)

The availability of organisational information in a convenient location, collected in a collaborative process and shared between participants provides the potential to reinvigorate and empower users.

7.6.2. The GIST and Empowerment: A Community Led, Inclusive and Multi-Dimensional Project

ICTs have been identified in the literature as a means to provide for and increase the empowerment of individuals and communities using them, see for example, Aoyama, (1999), Shaw and Shaw, (1999) and Ramasubramanian, (1999). GIS and PPGIS are also

widely cited as empowering technologies, (Harris and Weiner, 1998, Ghose, 2001, and Elwood, 2002a). However, these authors are unclear as to the specifics of how empowerment actually takes place through the use of the technology. The research in Tallaght has shown that the community must lead in the process initiated through a grassroots GIS. Additionally, once the process components are in place (Section 7.6.1) it is important that momentum not be lost. Outsiders cannot push the process along and the community itself must lead and promote such projects, invest their time and resources and take advantage of the networks, good will and political capital that they have built.

The ethos of the GIST as implemented in Tallaght can be described as inclusive and multi-dimensional in nature. These characteristics describe a broad process, which has the potential to attract a wide variety of participants. An "open door" policy can buy good will among other groups operating in a community, as does the sharing of information, resources and contacts. The bringing together of assets such as technology, information, contacts, resources, websites, facilities and time in a "multi-dimensional", community led and inclusive process is the key to the empowering nature of grassroots GIS.

7.6.3. The GIST: Positive and Negative Aspects of the Technology

All technologies can generally be described as value neutral. It is the uses that technologies are put to that determine if they are either empowering or disempowering to communities. The dual natures of GIS technology can benefit and empower some organisations and disempower others. Table 7.7 outlines the duality inherent in the GIST as identified during the fieldwork component of the research in Tallaght.

Table 7.3. Outline of the Duality of the GIST

Positive / Empowering	**Negative / Disempowering**
Total Acceptance / Approval of the GIST	Visceral Dislike of the GIST
"Great Potential"	"No Practical Value"
Broad Based, Variety of Users	Like Minded Individuals
Broad Perspectives / Multi-Dimensional	Limited Viewpoints / One Dimensional
Two-Way Communications Flows	One-Way Communication Flow
Bottom-Up	Top-Down

Internal Consensus Building	Internal Debate / Conflict Generation
Informal / Local Knowledge / Qualitative	Formal / Scientific / Quantitative Data
Flexible	Inflexible
Community Assets / Positive Attributes	Social Pathologies Listed
Advantageous	Exploitation
Altruism	Self-Interest
Active	Passive
Solutions Presented	Problems Ranked

The dual nature of the GIS technology was recognised in many ways. With regards to the participants, there were several individuals that can be described as having a visceral dislike of the GIS technology and for the applications to which it was applied. Others, however found the technology intriguing and of "great potential" for use by CBOs in Tallaght. Although there were no discernable patterns to this divide among the proponents and the detractors of grassroots GIS in Tallaght in general there appeared to be an age divide. The older community development workers in general had less favourable impressions of GIS and of computers in general. This may reflect a lack of knowledge or experience with information technology and fear or opposition to change and the unknown among that group.

With regards to the personal motivations of the participants in the PPGIS process as a whole, it can be said that the majority have purely altruistic reasons to take part in the process. Many of these people are long-term residents interested for the most part in seeing the quality of life in their community improve. Some are also interested in the possibility of learning something new relating to computers and ICTs, including GIS. The altruistic motivation to contribute to, work in and participate in a process that has the potential to affect positive change in one's own community is appealing to many.

Additionally, like-minded people can be attracted to issues and activities in the community that they identify with. However, this can skew and limit the results of the analysis conducted on community issues as participatory exercises attract only those interested and willing. An open, inclusive and balanced process will help to ensure that a wide variety of viewpoints are heard and taken into account, not just the loudest voices, during decision making. From the late 1960s the theories of public participation and the importance of

"sharing in the formulation of policies and proposals" (Skeffington, 1969), have promoted open and inclusive pubic participation processes. The designers of PPGIS can avail of these strategies and processes in an effort to affect positive change in the communities where they are implemented.

With regards to the dual nature of ICT technologies, the fieldwork on the FHYP organisation in particular is of interest. The dual nature of the technology as well as the process itself, something that has not been identified in the literature, is revealed in this case. The "process" is always held as intrinsically beneficial. However, in the case of the FYHP, the process of the development of the information brochure and the presentation of a "public face" to the project precipitated heated debate. The process of arriving at a common vision caused consternation, stress, conflict and upheaval within the organisation. This process had the potential to tear the FYHP organisation apart from the inside.

The process caused disruptions to the normal operations of the organisation, its internal and external alliances were altered and the procedures for pursuing funding and marketing strategies changed. Traditional avenues were bypassed or altered and new channels were established altering the situation. The existing status quo in the relationships of those in the FHYP was disrupted as individuals grappled with the new technology and its implications. This caused consternation in some and enthusiasm in others in a process that galvanised supporters and invigorated the organisation with fresh debate, ideas and energy.

7.6.4. The GIST: Practical Routes to Empowerment

It is important to discuss the pragmatic use of the GIST technology and process to achieve "empowerment". The introduction of any new technology has the ability to disrupt the status quo, to rearrange alliances and to "stress" organisations, particularly less hierarchical organisations, as actors struggle to make sense and take advantage of changing circumstances. Internal debates, conflicts and the generation of strife can be the unintended consequences of PPGIS implementations. The less hierarchical organisations involved in community development activities may be impacted to a greater extent by such forces as relatively more individuals contribute to decision making. This can be a practical method for changing an organisation for the better and empowering participants and communities.

Alinksky called for a similar process in his research on community organising in the U.S. The first two steps in his method for getting the residents of communities to become locally active are to agitate and aggravate them. Many of the issues that can have this effect of raising eyebrows and causing concern among participants are contained in local knowledge and formal data. Unemployment and poverty rates, relative disadvantage, crime, substandard housing, slum clearance and other issues that are unique to communities can be used to agitate and aggravate. Grassroots GIS has the ability to attract participants through the process of the collection and representation of local knowledge and issues and thought the display of formal data.

Alinsky's next practical steps are to educate and organise the local residents. The communicative and networking potential of GIS technology is widely recognised. The advantages of grassroots GIS as opposed to traditional or purely technological participatory approaches have been described previously. Grassroots GIS has the potential to agitate, aggravate, educate and organise communities, which can lead to the increased participation of residents in community development activities. This is the process of empowering individuals and communities.

7.6.5. The GIST: Exploitation of Communities

The issues of exploitation revolving around grassroots GIS are many-fold. GIS have been identified as technologies that are easily misappropriated for use against the interests of communities (Towers, 1997). PPGIS technologies and processes have also been shown to be potentially culpable in the exploitation of natural resources and indigenous peoples (Walker, *et al.* 2002, Laituri, 2002 and Kwaku Kyem, 2002). They have also been described as being used to legitimise planning and development processes (Kingston, 2002) and in other potentially unethical ways (Lupton and Mather, 1996). Attempts have been made with the grassroots GIS to reduce some of the exploitative and disempowering characteristics of the underlying GIS technology, such as limiting rational scientific arguments, exclusionary verbosity and technical restrictions found in other cases.

Studies by Innes and Simpson, (1993), Lupton and Mather, (1996), Kent and Klosterman (2000) recognise the importance of the "social construction" of GIS and that this should not be underestimated in relation to the exploitation of communities. The GIST through its

grassroots design and implementation in Tallaght was socially constructed to aid, support and empower residents and community development workers. This grassroots GIS has the potential, through its "social construction" to reduce issues of exploitation and exclusion with regards to the use of GIS. The use of GIS by local residents and community development workers can reduce exploitation in the relations between communities, local government and society in general.

The potential exploitation of the community by researchers involved in PPGIS and other community development processes, such as PLA, needs to be addressed. The practice of "research for publication" as described by Harris and Weiner (2002: 248) and the "professionalisation" of the PRA and PLA processes (Chambers, 1992) are considered to be problems of exploitation. Measures were taken in the GIST to address these issues. These measures involved ensuring that the residents and community workers controlled and took the lead in the process. Additionally, all the participants in the GIST were informed that they were subjects in a research experiment. Finally, the unintentional raising of expectations was countered in all possible circumstances through the explanation of the dual natures of the technology. Participants were informed of the known positive and negative potential implications related to the use of the PPGIS technology as described in Table 4.1.

Several of the participants in the PPGIS fieldwork expressed an interest in using GIS technology to promote local activist causes. Nyerges *et al.* state that as PPGIS come into use, it is recognised that their power rests in their ability to, "allow non-sophisticated users to perform analyses equal to those performed by agencies... levelling the playing field amongst alternatives." (Nyerges *et al.* 1997: 233). This is empowerment through the active promotion of alternatives using GIS technology and PPGIS processes. The identification of alternatives and thusly the countering of those who may wish to exploit communities for their own purposes, including developers and the local government, is possible with PPGIS. It is clear from the responses of several participants in Tallaght that they have identified this as a potential use of the grassroots GIS.

With regards to the local participants in the GIST process, an important observation to come out of the research is that certain individuals may choose to participate for reasons other than altruism and the betterment of their community. Some may get involved purely

for selfish reasons such as personal financial gain. This also reflects the dual nature of the technologies involved. The potential to gain personally involves the training and skills that are acquired through access to computers, the Internet and even GIS. Several participants recognised that these skills are normally taught in formal, fee-based courses. Others can potentially benefit from these skills through a heightened standing among peers or members of other community groups. These trends can be considered the reverse exploitation of PPGIS, where researchers, planners and community development activities are used and exploited to meet the ulterior motives or agendas of certain individuals within the community.

This reverse exploitation is an unexplored phenomenon, something that is not identified in the research literature. Exploitation has the potential to work both ways. The PPGIS process may be more aptly described as a "two-way street", or as a symbiotic relationship between the numerous parties, involved in the overall process. Residents, community, development workers, planners, politicians and researchers all stand to benefit through such processes. That is the nature of "community development", something that cannot be ignored if the successful design and implementation of PPGIS is the goal to be achieved.

7.6.6. Conclusions to Research Question Four

The ability of the grassroots GIS to empower is realised through the activities of the participants. Taking a problem, discussing it and converting these talks into concerted action to deal with planning, the environment or quality of life issues is the most difficult part of the process. The empowerment of those involved in the process can occur if tangible benefits are realised. Residents and community development workers are empowered by educating themselves, establishing contacts and acquiring the knowledge and the means to take advantage of the technological tools presented to them. Finally, not being dependent on or taken advantage of by technology or outside actors limits potentially disempowering situations. The tools, data, knowledge, processes and support frameworks are in place for empowerment to take place. It is up to the individuals in the Tallaght community to recognise and take advantage of this.

7.7. RESEARCH QUESTION FIVE

The answer to the research question "how effective are "organic" and "bottom up" approaches to grassroots GIS as compared to other methodologies?" is found through an examination of the issues of applicability, appropriation, legitimacy and sustainability of the PPGIS process and technologies relating to community development initiatives. Grassroots GIS were compared to both the more traditional participatory methods and technology based approaches in section 7.4.6 revealing that the grassroots GIS as designed and implemented in Tallaght have advantages over other methods, such as formal participatory, top-down or research and technology driven exercises.

It has been noted that with regards to GIS, many optimistic beginnings to implementations in the grassroots are soon tested once the reality of the systems and their capabilities and limitations come to be understood. The unsuccessful and limited GIS usage and uptake by community groups (Macnab, 2002) and the overstatement of opportunities (Barndt, 2002), were examined in the literature review. In the case of Tallaght, specifically in the TIA organisation, it was also observed that individuals viewed the technology optimistically to begin with, however, when the level of effort and time needed to implement the technology became clear much of this interest evaporated. The success or effectiveness of grassroots GIS as opposed to other methodologies can be determined by the applicability of the technology, its appropriation by users and issues of legitimacy and sustainability.

7.7.1. The GIST: Applicability, Appropriation and Legitimacy

There are a large number of techniques and technologies to support participatory processes in community development and planning. This research revealed that the grassroots GIS using an innovative, organic, bottom up and community led approach to involving community members proved the applicability of the PPGIS process and GIS technology in community development activities. The DART organisation is currently expanding the GIST project through the appropriation of GIS to facilitate an accessibility audit. DART committee members have recognised the value of GIS and have recently taken the decision to fund a "GIS accessibility" audit in the Tallaght community.

One of the community development workers with the Tallaght Partnership stated:

> "The members of DART recognise the potential of the GIS. They want to get the funding in place to move forward with the audit... There are funds in several DART accounts for this and we're approaching the council..."
>
> "If they pay you then they'll be in control... you're the expert and you'd do the work but... they'd have you then."
>
> (*Community Development Worker*)

In this case the GIS technology and the GIS technician are being applied and appropriated for the purposes of a locally controlled, grassroots, bottom-up, community development initiative. This does not occur in traditional top-down participatory activities or innovative technology driven approaches where the technicians and experts hold all the keys, namely, the funding, technical skill and overall project control.

Another important issue raised in this case is that of legitimacy. One of the critiques of traditional participatory methodologies and technological techniques to involving communities is that they are illegitimate because they are top-down or led by planners and researchers. Many of these efforts are mandated by law or lavishly funded through research projects designed to explore new technologies in "participation exercises". They can also be used as crass legitimatisation exercises with no real decision making power being placed in the hands of the community. It might be said that the only truly legitimate community development exercises are those initiated and controlled by community members themselves.

The majority of participatory planning approaches do not ask participants how, when, where and in what circumstances to use GIS and other ICTs. These attempts are not legitimate because the decision making power is in the control of the planners, funding sources and researchers. Additionally, biases that the "experts" bring to the process affect the results of these implementations as community members seldom have a say in the types of data collected, displayed and analysed and the final output or products of the project. When this occurs the projects are rarely sustainable, as the community has not invested in the design of the participatory exercise, GIS or PPGIS.

7.7.2. The GIST: Sustainability

The long-term sustainability of the grassroots GIS is an important component of the GIST project. In the case of the GIST, its continued use and expansion are considered vital for it to be considered sustainable and empowering. Issues regarding support, such as, funding, training and maintenance have to be addressed if the GIST is to be sustainable. Ideally, as Meredith, *et al.* postulate, sustainability is achieved through the creation of a "self steering sequence of events" (Meredith, *et al.* 2002: 206). Similarly, Ball calls for the development of "Unassisted Public Participation Geographic Information Systems" (UPPGIS) to ensure the long-term sustainability of the technology in local community settings (Ball, 2002).

With regards to the efforts to create self-steering activities for the GIST, a user committee structure was established as the means to achieve this. The committee allows for impetus and initiative to come from the community itself. When a local actor who had an interest in and experience with web design pushed for a community based website project, the GIST committee was able to assist with resources and support. His concept to share the costs of homepages for local groups and create efficiencies in technology training and the sharing of information was appealing to the GIST committee. With more than 250 groups in the Tallaght community identified as potential beneficiaries, (See Appendix A) the GIST was recognised as potentially providing a missing piece to the puzzle of community development in Tallaght. The DART organisation is one of more than 250 groups in the Tallaght area. Each of these groups has the potential to appropriate, apply and sustain the GIST project for their own purposes.

The GIST offers a means to organise local groups, based on physical location as opposed to political affiliation or funding and place them on a website and a digital map. In this case the digital map can be linked to other information and queried or placed on the Internet for wider accessibility. Several residents and community development workers have expressed an interest and willingness to participate in this concept, allowing for the long-term sustainability of the project to be addressed. This is in contrast to the results of many other "participatory" planning exercises or research only focused projects (Kingston, *et al.* 2000).

What appears to be the case with many PPGIS is that GIS technicians or planners produce single applications and complete systems to meet their own preconceived notions of what a community needs. Community members are then called on to legitimise the process and results. When the research ends or the funding dries up, the projects cannot sustain themselves as there has been no real community input, control or investment in the process. A critical assessment of PPGIS, both the technology and the process, needs to occur to ensure that this does not happen. The community itself needs to establish the grassroots GIS, build the system from the ground up and sustain it. In summary, the design and implementation of a truly grassroots, community initiated, supported and controlled grassroots GIS will address issues of sustainability.

Finally, with regards to the sustainability of the GIST many of the factors influencing project success may be beyond the control of the community participants. Staff turnover in CBOs and NGOs has impacted the grassroots GIS. On two occasions committed, enthusiastic and GIS trainned staff have left participating CBOs for employment elsewhere. This is a problem not uncommon to the community development and non-profit sectors generally. Finally, cutbacks "across the board" in the community development sector in Ireland have had a detrimental impact on many local initiatives, including those in Tallaght participating in this research. A lack of funding has diminished efforts and narrowed the focus of many CBOs and NGOs to core requirements. Taking on new and innovative projects is not a priority for many groups. It is in this type of environment that grassroots GIS will be at a disadvantage to traditional top-down participatory exercises.

7.7.3. Conclusions to Research Question Five

Organic, bottom-up and community led grassroots GIS approaches as compared to other more traditional participatory techniques can be considered effective in some circumstances. Issues such as applicability, legitimacy, appropriation and sustainability are addressed through the very nature of the process. When the tools, data, knowledge, processes and support frameworks are in place for CBOs to take advantage of the technology to meet their own needs then grassroots GIS will be more applicable, legitimate, sustainable and empowering than other methods. The final point to consider is that these approaches need not be mutually exclusive. As Kingston *et al.* state, "these

systems are seen as ways to enhance, not replace, current methods" (Kingston *et al.* 2000). When combined with traditional and purely technological methodologies for seeking community involvement a community led and bottom-up grassroots GIS can support and empowerment local communities in long-term sustainable projects. It is up to individuals and CBOs in the Tallaght community to recognise and take advantage of the existing mechanisms of participatory planning as well as the new and innovative tool that the GIST represents.

7.8. CONCLUSION TO THE DISCUSSION

In conclusion the grassroots GIS was found to be a suitable technology for the collection, storage and display of local knowledge and formal data. Deploying these types of technologies, in combination with the appropriate data, in a discursive process can aid organisational effectiveness and enhance the operations of a variety of CBOs. However, there are still limitations and weaknesses in the model introduced into Tallaght in the form of the GIST with regards to both data and the overall process itself. The problem of creating empowerment through the conversion of meetings and discussions into practical applications, tangible results and noticeable improvements to the community remains to be solved.

Establishing a broadly based community information system with many linkages can cater to a variety of individuals and organisations in a way that traditional single focus activities cannot. The geographical focus of a grassroots GIS, imbued with Internet functionality for the display of spatial information, is an ideal mechanism to support the types of multi-dimensional endeavours undertaken by CBOs. Spatial awareness and analysis contributes a new dimension to these types of efforts and opens up new ways of recording and storing information, thinking about issues and devising strategies and approaches to deal with local problems.

Exploring the spatial components of a community is a necessary step towards the transfer of information and knowledge between GIS researchers and community residents and activists in a two-way flow of information. The researchers collect and gain understanding of the issues and spatial points of interest in the community and the community gains understanding of formal data and the ability to represent local knowledge within a

grassroots GIS. Participants can also come to understand how their own knowledge is represented in information systems and the advantages and disadvantage that may incur as a result of this. This describes the mutually beneficial, supportive and empowering process of the new model of grassroots GIS.

CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS

> *"We need to invent, calculate, think, fight and work to turn the extraordinary opportunity of information technology into the promise of a more humane society based not on social exclusion but on shared community."*
>
> (Castells, 1999: 39)

8.1. INTRODUCTION

Grassroots GIS as designed and implemented in the form of the GIST can offer residents and CBOs the ability to collect and store large amounts of formal data and local knowledge. However, citizens cannot effectively utilise this knowledge without accurate, relevant and up-to-date information about their community and the technical abilities to undertake PPGIS related activities. As NGOs, such as the Tallaght Partnership, take a greater role in the allocation of resources at the local level, tools such as GIS, PPGIS, multimedia databases and Internet communications can provide invaluable assistance. New approaches are needed in the processes of collecting, accessing and disseminating information in the contexts of community development and planning. Grassroots GIS as designed and implemented in this research offer one such approach. Grassroots GIS are one type of ICT that offer the promise of support and empowerment to their users. It is up to those users to *"invent, calculate, think, fight and work"* to affect positive change in their own communities.

This empirical research on the Tallaght Grassroots Geographic Information System, an examination of spatial information technologies in the local community context, has presented a new model of GIS implementation. This Grassroots GIS introduced ICTs including the Internet, GIS and PPGIS technologies and associated spatial data, into community development processes in the Tallaght area and addressed the limits and restrictions placed on "two-way" flows of information. Grassroots GIS has the aim of empowering participants through the "two-way" flow of information in new GIS processes used to collect and store local knowledge provided by citizens for use by other citizens and facilitate the exchange of information between citizens and community development workers and planners. This research provided an ideal opportunity to put the theories of

Grassroots GIS into practice, extending the existing body of literature in the fields of GIS, Planning and Community Development.

This chapter contains the final conclusions to the research undertaken in this dissertation. An overview of this research, the final summary of the findings, recommendations and the final conclusions are contained in the next sections.

8.2. OVERVIEW

This research was a longitudinal study of the design and implementation of a grassroots GIS. The fieldwork spanned three years of regular observations of local residents and workers for grassroots organisations engaged in various community development activities and initiatives. This research observed ten different organisations and more than sixty individuals interacting with the GIS technology. Some of the cases observed were found to have no significant use for PPGIS, GIS or ICTs, while others placed considerable value on the technology. The majority of the participating organisations fell between these two extremes with many showing an interest in GIS and experimenting with the technology, "to see what it could do for them".

In the cases where the use of the PPGIS or ICTs were extensively undertaken by CBOs, detailed observations and structured interviews where conducted. The results of three of these cases are described in the implementation of the GIST in Chapter Six. The cases of Tallaght Intercultural Action (TIA), the Fettercairn Youth Horse Project (FYHP) and the DART-OUTREACH organisation (DART) were important subjects that allowed for the careful checking and monitoring of grassroots GIS design, implementation and applications development. These cases also enabled this researcher to gain an understanding of the intricacies and contextual complexities of ICT use in CBOs.

The wider implications for PPGIS implementations in the grassroots and the impacts of the use of and development of GIS and ICT applications are also important outcomes of this research. Finally, this research contributes to the fields of GIS, community development and planning by providing a new theoretical and explanatory framework for the complex interactions between local actors and new innovative information technologies and processes, specifically grassroots GIS.

8.3. SUMMARY OF FINDINGS

In summary the findings of this research are:

- The grassroots GIS as designed and implemented in Tallaght is an improved tool for the collection, storage and communication of formal data and local knowledge. In comparison with existing participatory data collection techniques and technologies the grassroots GIS has several advantages. Several of the individuals and community groups that undertook to invest time and resources in the GIST support this finding as useful applications for GIS, multimedia and Internet technologies were identified to support of their agendas.

- There are a wide variety of collaborative methodologies available for the collection of informal data and local knowledge. This research conducted PPGIS process meetings and PLA sessions in an attempt to broaden out the type and content of the local contributions to the GIST. Both approaches had their advantages and disadvantages. However, the PPGIS process meetings proved a more balanced, less expensive and more easily organised approach in comparison with more traditional techniques, such as, Vindasius (1974) or other innovative methodologies such as those implemented by Shiffer (1998 and 1999), Kingston, *et al.* (2000) and Al-Kodmany (2002).

- Local communities are "qualitative landscapes" and as such an emphasis needs to be placed on local knowledge and informal data and not on the quantitative and formal data requirements of local and national governments. These types of qualitative data needs can effectively and easily be addressed in PPGIS and grassroots GIS design and implementations.

- Issues of technical, organisational and regulatory restrictions as well as contextual complexities and other unforeseen consequences can negatively impact the effectiveness of PPGIS implementations. Additionally, many of the positive attributes of the GIS technology were in certain circumstance counteracted by negative and counter-productive effects of the technology such as organisational stress and infighting. This reveals the nature of PPGIS and ICTs in general in particular their

"dual natures" and ability to have both positive and negative impacts on the individuals and organisations implementing them.

- Not all of the organisations studied had use for GIS, Internet, networking or the analytic capabilities of grassroots GIS. Some groups found even the most rudimentary mapmaking tasks unfeasible using grassroots GIS. However, although the use of GIS was limited for many organisations, the majority of users recognised the potential inherent in the technology, both as a practical community development tool and as a potential means to empower individuals, organisations and entire communities.

- PPGIS and grassroots GIS can be limited by factors outside of the control and remit of the local community and system designers. Costs, funding, copyright and licence regimes, support, training and other considerations such as time restraints and staff workloads were all factors that limited the uptake of GIS and the implementation of the GIST.

- The Tallaght community can be considered a "data poor" or restrictive environment for the acquisition of formal data. The local and national governments have imposed severe restrictions on the availability of quality digital spatial data, relative to other jurisdictions. The price, copyright and licence regimes of many data providers are incompatible with the budgets and technical capabilities of CBOs and NGOs working in the Tallaght community. This finding corresponds with those of other U.K. based researchers conducting similar PPGIS projects (Kingston, *et al.* 2000). These types of restrictions can adversely impact PPGIS implemented in grassroots contexts.

- In Ireland easy access to digital spatial data, government data and public records is not the norm. Recently the Irish government has been severely criticised for "filleting" the Freedom of Information Act (FoI Act) by "introducing fees and weakening its provisions" and drawing down a "veil of secrecy" over its operations (Burton, 2003). The potential to implement successful PPGIS projects in such restrictive environments is curtailed. Craig and Elwood attribute the success of PPGIS projects to be, "based on easy access to public records. Where this is not the case, success may be much harder to find and community groups may be less successful in meeting the needs of their constituents." (Craig and Elwood, 1998: 103). Leitner, *et al.* (2002: 38) also recognise

that groups often depend on the openness of government agencies and freedom of information regulators for obtaining data.

- The research in Tallaght revealed that the long-term sustainability of PPGIS and grassroots GIS is an important consideration. The literature has also identified the problem of research for publication and participation for legitimisation, which severely limit the duration of PPGIS exercises. To be "sustainable" PPGIS require talented and dedicated local actors trained in the use of GIS. These local actors must be willing to lead, provide data and build a supportive local network. Ideally, this will occur under circumstances that include a supportive regulatory framework, which this research has categorised as a "Type 1" PPGIS as described in Figure 7.2, the Data Context Matrix.

- The grassroots GIS is a tool that demonstrated the abilities to both support and empower the individuals and organisations implementing it. The level of support and empowerment that the technology afforded depended on the time, effort and resources that participants put into it and the training that they received. The investment of time and resources specifically in data collection served to broaden out the scope and increase the interest in and usability of the GIST.

- The ability of PPGIS to support and empower individuals and communities is also dependent on the uses to which the technology is applied. The ability of the technology to aid in the collection, storage, analysis and communication of information cannot be denied. However, this functionality is not empowerment. When organisations active in local causes incorporate PPGIS into their operations then the potential to empower is there. When these same local organisations design "real world" GIS applications for use in affecting positive change in their communities, then empowerment can be said to have occurred.

- Meredith, et al. stated that the, "process is the product" with regards to PPGIS implementations. Public participation "in of itself", through the collection of data, the sharing of local knowledge and the understanding of GIS has "educational and analytical" benefits that change the public. This change in the public is empowerment, through the PPGIS process, a process that is an effective way to make positive changes to a community. When local residents, activists and community development workers

employ the "process" of Grassroots GIS for their own purposes, which can take many different forms, then the technology can be said to be effective. This is a much more expansive notion of successful GIS project implementations than orthodox GIS practice has suggested to date.

- Public participation is an important consideration in any PPGIS and is recognised in this research and generally as an evolving concept that is clearly shown to be a complex subject with issues that are rarely clear-cut (Coppock, 1977: 203) and which is surrounded by wider relationships of power and politics in society (Campbell and Davies, 2004). While it is acknowledged that PPGIS initiatives will always take place within the wider patterns of power and politics in society, it was not the aim of this Ph.D to address these wider politics in depth.

- The design and implementation of the GIST as a whole proved a useful means to tease out community issues and to get people to look at problems in their community in a different way than traditional top-down participatory methods. Both the PLA sessions and PPGIS process meetings were useful methods to collect a variety of local data from multiple sources, using group consensus building techniques and single focus meetings, respectively. Finally, the implementation of the grassroots GIS is a worthwhile undertaking for any community willing to commit to the technology and processes entailed.

8.4. RECOMMENDATIONS

Several recommendations can be made with regards to the design and implementation of PPGIS and grassroots GIS in the local community setting, these are:

1. **It is recommended that PPGIS focus on small, detailed areas and address the "micro" issues in neighbourhoods.**

For the designers of PPGIS and grassroots GIS, the issues of data coverage and scale are important. Having the right data, at the appropriate scale and quality is vital to system design and performance. In Ireland the problem of lack of participation by the public in development plans has been partially attributed to inappropriately large area plans (Lawlor, 1996: 166). Citizens cannot identify with the larger areas covered, the number of

issues and the complexities that this introduces into the discussions. Local concerns and issues are of most importance to residents and community development workers. Bigger is not always better for successful PPGIS and community development strategies.

2. **It is recommended that the scale of PPGIS be increased to focus on smaller areas and a decreased number of issues. Additionally, if the applications are limited to simple, specific and "doable" exercises the success of PPGIS in local community development contexts can be obtained.**

Simple gains, small accomplishments and positive results will attract additional supporters and build a network of contributors to grassroots GIS. This process will help accrue the needed resources and technical capabilities to support and empower individuals and CBOs as they express their views, state preferences and affect positive change in their communities. Focusing on simple and specific issues is just one of a number and variety of factors that have been identified in this research and the literature as important to successful PPGIS implementations. Sieber (2002:161) summarises other research into municipal, county and state government GIS implementations in the U.S. It is recommended that these six organisational imperatives of successful GIS implementation be considered by the designers of PPGIS and grassroots GIS:

- **Long-term upper management commitment to the project**
- **Sufficient allocation of resources**
- **Adequate staffing**
- **Timely and sufficient training**
- **Someone called a GIS champion to "sheppard" the system**
- **Organizational communication to "smooth" the transition to full implementation**

3. **It is recommended that PPGIS design take into account several additional factors revealed and discussed in this research:**

- **PPGIS should have a broadly based and inclusive ethos to data collection, system design, and use**
- **PPGIS should have numerous and multi-dimensional data sources and uses**
- **PPGIS should have a flexibility of data types and uses with formal and informal, quantitative and qualitative and multimedia data capabilities**
- **PPGIS should be communicative, discursive, collaborative and local network building**

- **PPGIS should be used in conjunction with other activities of importance in the local context issues such as housing, planning, development, environment, pollution, crime and transportation as local context specific and dependent applications are vital**

- **PPGIS should include "Issues-Oriented Organisations" (Kwaku Kyem, 2002: 228) who can be essential contributors and participants in the PPGIS process**

- **PPGIS should fundamentally be designed to collect, access, identify, educate, solve, disseminate and communicate information**

- **PPGIS should be designed to be Internet ready**

- **PPGIS should be designed to be sustainable**

- **PPGIS should be supported by local, regional and national "GIS data champions", "clearinghouses" or "service providers"**

The last point regarding "data champions" is also recognised by Barndt (2002: 353). He posits that both a "clearinghouse operation" and a "service provider" are needed for the successful workings of local information systems. He states,

> *"A Clearinghouse operation, likely to be independent of data providers, that can guide the creation of a community information system, acquire data from all sectors, serve as a reliable custodian of confidential data, work through the technical problems of data organization and linkage, archive and consolidate data, generate summaries, trend lines and indicators, co-sponsor cross-sector research and support access by others to public data."*
>
> (Barndt, 2002: 353)

Barndt describes the "service provider" as, "a technical resource to less technical organisations – providing consultation, education, and product to others on demand." (*Ibid*).

4. It is recommended that a data clearinghouse for local information users in Ireland be established.

In Ireland a local and national effort is needed to provide data clearinghouse operations and technical support services to NGOs and CBOs. These services can be affiliated with a university or non-aligned independent research body such as the Royal Irish Academy (RIA) or the Economic and Social Research Institute (ESRI). There are clear demands for such services in Ireland. A cost recovery mechanism linked to a not-for-profit organisation could have great potential to address this demand.

In other jurisdictions such organisations have been incorporated to meet these needs. These support organisations can be broadly classified into three categories:

- **University and Private Research Initiatives**
- **University Government Collaborations**
- **Government Agencies**

University research initiatives that typify such PPGIS data, training and support operations include the University of Minnesota's Center for Urban and Regional Affairs (Elwood: 2002b: 87) and the University of London's Centre for Advanced Spatial Analysis (CASA). In Ireland the support and funding for this grassroots GIS research came through Trinity College Dublin's (TCD) Department of Geography, the Faculty Development Fund and a Trinity Award. Many universities and colleges have "public service remits" that call for such activities to be undertaken by staff and students. The College of Urban Affairs at the University of New Orleans has one such public service remit. Research into PPGIS has also been privately funded. For an example of a privately funded PPGIS see the research undertaken by Kwaku Kyem (2002: 219) in Ghana, supported by a grant from the Rockefeller Foundation based in New York.

University and government collaborations are exemplified by the Atlanta Project's Data and Policy Analysis group (DAPA), which played an important role in government efforts to share expertise and resources with community organisations and initiatives to assist Atlanta's inner-city poor (Sawicki and Burke, 2002: 89). An example of a "quasi-state" organisation engaged in similar community outreach and development activities in New Orleans is the Louisiana Urban Technical Assistance Center (LUTAC). Affiliated with the University of New Orleans' College of Urban and Public Affairs this organisation provides data and technical services to non-profit organisations, NGOs and CBOs throughout the state of Louisiana.

Finally, many government agencies actively support access to data and the provision of technical capability to NGOs and CBOs engaged in community development activities. The work of Tulloch describes a prime example of such an agency. The New Jersey Department of Environmental Protection (NJDEP) acting through the New Jersey State Mapping Advisory Committee (SMAC) published a series of CD-ROMS to provide a

variety of data including, "transportation, land-use/land cover, soils, public lands, open spaces, coastal areas, wetlands, and floodplains, as well as legislative districts and state, municipal, and county boundaries." (2002: 197). Additionally, the NJDEP also began distributing "specially attained 'free' licenses" of ESRI's ArcView GIS software and training to local government agencies and environmentally oriented NGOs. Two hundred such licenses have been granted to date in New Jersey (*Ibid*). Ireland needs a similar approach to data access, software and training. The obvious candidate to implement such a strategy as that employed in New Jersey in Ireland is the Irish Environmental Protection Agency (EPA).

Addressing the data, service provider and technical support issues will help level the planning field for CBOs in Ireland and bring the data context more in line with more progressive jurisdictions such as those described in the U.S. More progressive public policy guidelines will help provide the conditions in which PPGIS can be designed, implemented and sustained with vigour. In many instances, it is outside factors and forces, which prohibit the successful design, implementation and long-term sustainability of PPGIS. Removing the price, license and copyright roadblocks to PPGIS will serve the interests of individuals, organisations and communities in Ireland and other locations.

8.5. AREAS OF FURTHER RESEARCH

Several recommendations can be made with regards to further research. In Ireland the wider implications of the price, licence and copyright restrictions imposed on spatial data by the OSI and CSO should be examined. Anecdotal evidence revealed during this research suggests that many CBOs are experiencing difficulties accessing public datasets. Research in this area involves understanding recent changes to the Freedom of Information Act (FoI), privacy legislation and a myriad of other laws and government policies that impact the collection, storage and dissemination of data in Ireland.

With regards to wider issues and concerns that this research invokes, there are several that stand out as prime research topics. These are:

- A comparative analysis should be undertaken with regards to government data access policies internationally. A wide range of public policy is in evidence and should be

examined. The public domain and open access policies of the U.S. contrast strikingly with those of the Netherlands, where the collection of all metrics or formal census data on persons has ceased due to privacy concerns. This is especially important as society enters the "information age".

- Research into the implications of various supportive versus restrictive data access contexts in which PPGIS and other community based ICTs are implemented would be of considerable interest to geographers, GIS and ICT developers, planners, community development researchers and other social scientists. Figure 7.2, the Data Context Matrix, provides a basis upon which further research can build. A more complex and explanatory matrix needs to be developed to account for the more numerous and multi-dimensional contexts of PPGIS implementations.

- The appropriation and use of new and innovative ICT tools for the purposes of community development, particularly with regard to the Internet, should be studied in greater detail. ICTs have been widely recognised in the literature as having both positive and negative attributes and impacts on those using them. From military beginnings to commercial exploitation and uses in public administration and government, ICTs are now being adopted widely by the non-profit and NGO sector. The trends of rapid uptake and adaptation by organisations are continuing as the technologies involved evolve at accelerating rates. The Internet, as the fastest diffusion communications medium in the history of mankind, needs to be studied intensively and urgently in these regards.

- Finally, a long-term ethnographic study should be undertaken on the introduction and adaptation of ICTs in the Tallaght community. The changing nature of ICTs, GIS and PPGIS and their applicability in the local context is a research topic of particular interest. Geographers, planners, sociologists, community development theorists and practitioners and information system developers all stand to benefit from increased understanding and insight into what is going on in practice as the new and evolving information technologies are introduced into the local context.

8.6. FINAL CONCLUSIONS

Participatory planning exercises as they are currently implemented have been described as token gestures aimed at the placation of citizens rather than the true sharing of information, decision making and power. Many citizens, planners and other stakeholders involved in community development processes view participation as a consultative process, which can be considered as "placation", "therapy" and even "manipulation" (Arnstein, 1969). The parochial nature of the relationship between many local governments and grassroots organisations and citizens, especially in certain jurisdictions, can further exacerbate these suspicions.

Craig, *et al.* state, that, "there is no universal PPGIS model, and place-based methodologies that navigate local politics and production relations should predominate." (Craig, *et al,* 2002: 370). However, this strategy of "navigation" fails to take heed of some of the activist and community organising principles of researchers in fields outside of GIS. Alinsky, (1972) has shown that agitation, aggravation, education and organisation are all legitimate methods to increase community participation in support of local causes. Rather than navigating local politics and production relations in place-based methodologies, Alinsky suggests going against the currents and the status quo. The grassroots GIS as implemented in Tallaght attempts to accomplish this through the establishment of less hierarchical relationships within a discursive, cooperative network of local actors and contributors.

Paradoxically, it may be in "data poor" and restrictive regulatory contexts where grassroots GIS can realise their greatest potential. These environments can provide a "pent-up" demand for information, social progress and "issues oriented" community activism. Empowerment, through agitation and organisation, is attainable where there are multiple, simple and specific issues that can and need to be addressed. Grassroots GIS implemented by issues oriented CBOs, at the right time, and with the right resources, funding and training can develop practical applications for ICTs, affecting positive change in the quality of life for the residents in socially excluded and disadvantaged communities.

The DART organisation studied in this research is involved in place specific, political struggles revolving around accessibility activism. Grassroots GIS as implemented in the

GIST is uniquely situated to aid this organisation. When the technical applications of grassroots GIS coincide with political and organisational cultures that provide funding and support for the technology, then the potential for affecting positive change are "virtually unlimited". These are the determinants to answering the question, "Do PPGIS support and empowerment the individuals and organisations using them?"

Grassroots GIS are one of a number ICTs that combine tools and data to accomplish tasks that have the potential to empower users. It has been established in this research that it is vital that the community lead the PPGIS process, through the utilisation of components put in place by "GIS experts". These components include a variety of local knowledge and multimedia data, formal data and Internet capabilities. Grassroots GIS provide an extra dimension to the process of community development. They can be seen as a catalyst needed to start a process, when certain conditions are met, that can lead to community initiative, activism and change in the status quo, or in other words, empowerment.

The importance of the data in a grassroots GIS is that they can, in theory, give legitimacy to a process, empower certain viewpoints over others, increase and maintain organisational expertise and shape debate and influence choice in the support of local causes. Grassroots GIS can empower those using the technology, enhance their effectiveness and make users better enabled to operate in both data rich and data poor environments. For the organisational users of grassroots GIS, correct data selection and use can aid them in becoming more versatile and powerful proponents of local causes.

The importance of relevant and up-to-date information on local communities and the processes to facilitate public participation in decision making should be held as a priority. However, their importance can often be neglected or undervalued by citizens, community development workers and planners alike. PPGIS and ICTs have the potential to affect positive change in the flow of communications between planners, CBOs and citizens. The grassroots GIS introduced into the Tallaght community in this research takes full advantage of participatory techniques and new ICT technologies to support and empower citizens, community development workers and the NGOs and CBOs engaged in community development activities.

The detailed exploration of the access to and dissemination of digital spatial information by CBOs through the use of a grassroots GIS in this research has contributed to the fields of planning, community development GIS and PPGIS. The importance of accessing and disseminating information in the processes of community development and planning cannot be underestimated. Grassroots GIS, Public Participation Geographic Information Systems and Information and Communications Technologies have great potential to affect positive change in the communities and organisations using them.

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APPENDIX A: ORGANISATIONS IN TALLAGHT

Name	Phone	Fax
Abberly Court Hotel	4596222/4596000	4621000
Action Tallaght	4526098/4623535	
ADM	6613611	6610411
Advanced Communications (Burglar Alarm)	4595427/086-2244423	088-573730
Afterschool, Killinarden	4521273	
Alternatives Entertainments/Attitudes	4520611/4621067	
Am/Pm Supercourier	4642222	4640399
An Cosan	4628488	4628496
APSO	6614411	
Ark Buisiness (stationery supplies)	4600868/4730200	4600867
Arts Action	4522486	
Artsquad	4515909	
Astronomy Ireland	4598883	
Avonbeg After Schools Group	4512186	
Aware	6791710	
Aylesbury Office Servises (fax machine)	2980071	088-510124
Bank Of Ireland, Tallaght	4515399/4513520	
Barnardo's Bawnlea School Project	4598035	
Barnardo's Christchurch	4530355	4530300
Barnardo's Main St	4513894	
Barnardo's Millbrook Lawns	4525090	4621368
Blanchardstown Area Partnership	8209550	
Blessingston Community Centre	045 865970	
Blessington Women's Group	045 865970	
Bohernabreena Enterprise Center	4520685/4526291	
Bolbrook Enterprise Center	4145700/4620731	4621140
Bolger, Maria Price	4526917	
Bray Partnership	2868266	
Bridge House Hotel, Tullamore	50625600	50625690
Brookfield (Comm Co-Ordination Team)	4522545	
Brookfield Development Group	4519955	
Brookfield Enterprise Center	4623222/4523288	
Brookfield Health Centre	4624299	
Brookfield Les	4623475	
Brookfield Young Women's Group	4516322	
Bryan S Ryan	4524499	
Business Link	4597337	
CAN	8365595	
Castletymon Library	4524888	
Central for Ind. Living-Vantastic	8730998	8730998
Central Remedial Clinic	8332206	
Cert	8556555	
Chamber of Commerce	4599491	4599512
Cheeverstown Enterprises	4523244	4590216
Cheeverstown House	4904681/8332206	
Childcare Development Group	4597990	4597991
Childminding Network	4510688	
Church & General Insurance	7023000	
Clondalkin Enterprise Group	4578115	
Clondalkin Les	4571707	4577313
Clondalkin Partnership	4576433	4577145
Clondalkin Traveller Group	4575124/4577308	
Combat Poverty	6706746/4783355	

Name	Phone	Fax
Comhairle	6059000	
Comhlamh	4783490	
Community Arts Centre	4596488	
Community Centres Federation	5515075	
Community Initiatives	4522466	
Community Relations Officer	6776545	
Community Training Workshop	4525077	
Community Welfare Officer	4527019/4597200	
Community Welfare Officer Millbrook	4520666	
Concern	4754162/6681237	
Conlon, Sean (Accountant)	6771026/6771558	
Consumers Association	6612466	
Corporation (Local)	4512320	
Cultur Beo	4526917	
Cumann Gaelach/Dodder Valley Group	4520611	
Cyclorama	4610491	
Dail	6183000	
Daycare Centre	4590859	4590829
Dodder Valley Group	4520611	
Dolphin House	8725555 Ext. 244	
Donegal Local Development Comp.	7427056	
Downshire Hotel	045-865119	
Doyle, Gerry	4599491	
Draiocht	41466979 087-7970089	4146979/4146980
Drogheda Partnership Company	041-42088	
Drop in Arts Project	4520666	
Drugs Addiction Councellors	4513894	
Drugs Co-Ordinator (Maurice Farnan)	087-2212417	
E.S.B. Square	6040970	
Echo (48 Old Bawn Road)	4598513	
Echo Newspaper	4664505	
Echo Village Green (Advertising)	4621383	
EHB Castle Street	4757837	
EHB Crumlin Medical Centre	4542511	4542122
EHB Freephone	1800 520520	
EHB James's Street	6792611	
EHB Main Street	4515455/4515397	
EHB Millbrook Lawns	4520009	
EHB Stevens	6790700	
EHB West Charles Street	8725104	
Eircom Customer Support	1890-787337	
Employment Exchange	4527019	4516021
Enterprise Centre	4515804	
Enviroment Awareness Programme	4522202	
Eye Centre	4523252	
Fallan, Niall (Community Welfare Officer-Square)	4527019	
FAME (Fettercairn Adult Morn. Ed.)	4524669	
Family Support, 16 Main Road		
FAS Ballyfermot	6266211	
FAS Cookstown	4045200/4516411	4516021
FAS Square	4525111	
Fettercairn Community Centre	4527011	
Fettercairn Community Council	4527011	

Name	Phone	Fax
Fettercairn Resource Centre	4526411	
Fire Brigade	4571155	
FISC	6682044/6680400	
FLAC	6794239	
Flexible Training Unit	4625364	4625423
Forman, Jane	6266211	
Fox, Michael	6214114	
Fox, Michael (Disibilities int. Group)	4519378	
Gallaghers		4040293
Geaney, Michael	4525807	
Get Tallaght Working	4599159/4599160	4526708
Glenview Lodge Day Centre	4513878	
GTW	4599159/4599160	4526708
Home/School Liaison Parents Group	4525855	
Homeless Advise Unit	4048100 EXT421	
Hueston Station	8363333	
Incare	8730986/8790986	8730998
Index	8748444	
It's Nearly Lunchtime	4599159	4627541
J.I.D.P.	4597393	
JADD Tommy Wilson	4597756	
Jobs Club, FAS Cookstown	4610341	
Jobstown Community Centre	4521871	
Jobstown Community Playground	4597393	
Jobstown Resource Centre	4523595	
Joe Noonan	4610820	
Keg Killinarden	4526098	
Kenny, Brian	4962941	
Kerbside	4597677/4598561	4597678
Kev Kilnamanagh	4599341	
Killilarden Junior School Group	4524064	
Killilarden Senior School Parents	4524811	
Killinarden Community Centre	4526617/4596644	
Killinarden Community Council	4526617	
Killinarden Education Network	4621400	
Killinarden Resource Centre	4527143	
Killinarden Womens Group	4524064	
Killinarden Young Mothers Group	4516322	
Kilnamanagh Jobs Club	4623644	
Kiltalown House	4522466/4598341	
Knockmore Parenting Group	4596025	
KWRAC	4596644	
Language	4752366	
Leader (Rural Co. Dublin)	8780564	
Legal Aid, Tallaght	4511519/4511249	
LES	22747/4622748/4622749	
Liberty Lifts	4507971	
Lone Parents Network	4625045/4597990	
Magic Mats	2981611	
Mannering, Bill (Disability Interest Group)	4598561	
Mark Murray (Doggitts Printers)	087-2481363	
Marriage Counselling (Priory)	4515002	
Marriage Counselling Services	8720341	

Name	Phone	Fax
Mc Cabe, Noel	4599491	
Media Project (St Muirin's House)	4515867	
Mercier, Mary	4585700	
Molloy's (Maintenance-Richard/Keith)	4515544	
Money Advice and Budgeting (MABS)	4519630	
Motor Tax Office	8720077	
Murphy, Jim	4542511	
Murray, Ben	4510260	
N.S.S.B	6616422/6509000	
National College Ireland	4060500	4972200
NEB	4620444	
Nest Programme	4620731	
North-West Kildare Partnership	0405-32193	
NRB	4620444	4620494
Oak Partnership	4620444	
Obair, Village Square	4622747	
Old Bawn Clinic	4513207	
Optimum Belfast	04890-238930	
Ostinelli, Michael	4965962	
Pairtiocht Gaeltacht Thir Conaill	6656400	
Partnership Trainee	066-29544	
PAT (Parents Alone Tallaght)	4522486	
Phyllis Murphy	8723100	
Pigeon Couriers	8727755	
Pitney Bowes	4502252	
Planet Hilary Curley	055-22788	
PLATO	4599491/4620713	4621140
Plaza Hotel	4624200	
Priory, Tallaght Village	4515244	
Quinn , Joan	4521744/4521749	
Quinn Solicitors	4521744	
Quinn, Paul	0402-37835	
Rainbow-Michael Reynolds	4599159	
Rank Xerox	6616322/8301833	
Rapid		4670247
Refugee Centre, Cherry Orchard Hostipal	6264733	
Rights Commissioners	6608444	
Rourke, Stephen	8307645	
RTC	4598888	
Sacred Heart Ladies' Club	4526617	
Scoil Santain	4526917	
Scoileanna Tahmlachta	4518533	
Scoileanna Tamhlacht	4518533	
SDCC Community Enterprise Centre	4515804	
SDCEB	4525416	
Shanty	4582194	
Shanty Educational Project	4582194	
Sligo Leader Partnership	071-41138	
Snap Tallaght	4590445	
Social Science Department, UCD	7067104/7068245	
Social Welfare Dept. (Disibility)	6797777	
Social Welfare Dept. (Information)	8748444	
Social Welfare Main Switchboard	8748444	

Name	Phone	Fax
Social Welfare Square	4629400	
South Dublin Chamber Of Commerce	4622107	4599512
South Dublin Co. Council Com. Dept	4620106	
South Dublin County Council	4149000/4620000	4620106
South Dublin County Enterprise Board	4057073	4517477
South-Western Area Health Board	4542511	4542122
Spar	4590167	
Spawell	4901826	
Springboard Belfast	04890-315111	
St Aidin's Ladies Club	4598964	
St Anne's School Parents Group	4515850	
St Basil's Womens Club	4515292	
St John of Gods	4523231	
St Kevin's Drama Group	4523013	
St Mac Dara's School	4566216	
St Maelruan's Church of Ireland Parish	4515884	
St Mark's Parish, Springfield	4512143	
St Muirin's House	4523755	
St Thomas's Senior School Group	4597864	
St Thomas's Women's Group	4523708	
Syscom	4623438	
T.C.U.	4512523	
TACT	4596757/4514152	
Tallaght and District Credit Union	4514643	
Tallaght Arts Forum	4516322	
Tallaght Arts Squad	4515909	
Tallaght Centre for the Unemployed	4512983	
Tallaght Citizens Advice Centre	4515887	
Tallaght Community Arts Centre	4621501	
Tallaght Community Development Init.	4610820	
Tallaght Community Mediation	4515910	
Tallaght Community Playground Co-Op	4513233	
Tallaght Community Radio	4623333	
Tallaght Community School	4515566	
Tallaght Day Hospital	4516933	
Tallaght Disability Forum	4519378	
Tallaght Enterprise Centre	4590843	
Tallaght Garda Station	4511333	
Tallaght Hackney Cabs	4626000	
Tallaght Hostipal	4142000/4624000	
Tallaght Labour Exchange (Enquiries)	4527019/4527453	
Tallaght Labour Exchange (Inspectors)	4527711	
Tallaght Local Empl. Services (Obair)	4622747	
Tallaght Local Employment Services	4622747	
Tallaght Media Project	4512983	
Tallaght Mental Health Centre	4516933	
Tallaght Money Advice & Budgeting	4519736	
Tallaght NOW (Main St)	4596191	
Tallaght Partnership	4597990/4516322	
Tallaght South Chamber of Com.	4599491	
Tallaght Travellers' Support Group	4522486	
Tallaght Travellers Youth & Com.	4518717	
Tallaght Welfare Society	4515911	4510142

Name	Phone
Tallaght Welfare Society	4515911
Tallaght West Credit Union	4510811
Tallaght Youth Forum	4525492
Tallaght Youth Service	4516322
Tamhlacht Beo	4520611
Target	4623672
Tax (Personal Income Tax)	8780000
Tax (Retirement)	6689400
Tax Employee (PAYE) 577 Aras Brughas	8746821
Tax Employee (PAYE) 85 Lwr. Mount Street	
Tax Employee (PAYE) Hawkins House	6775811
Tax Office	8746821
Taxi	4622200
TCU Accounts	4626476
Teis	4600222
The Square, Tallaght, Courtesy Desk	4525944
Tracers	4521561
Tulfarris House	045-864574
VEC	4529600
Village Voice, Castlemon	4620884
Welfare & Probation Service	4623033
West Tallaght Resource Centre	4522533/4522486
YMCA	4596935

Appendix B: PLA Session One and Two Participants and Organisations.

Participants PLA One

Name	Organisation
Wendy Corbett	Lone Parents Centre
Joan Pierson	Lone Parents Centre
Paul Leavy	Youth Horizons
Phillip Tubman	Youth Horizons
Eileen Fitzgerald	Tallaght Travellers CDP
Smilja Muhadzic	Tallaght Intercultural Action
Paula Duggan	Partas
Margaret Byrne	Partas
Liz Burns	Tallaght Arts
Valarie Coyle	Fettercairn Disability Group
Declan Mc Loughlin	Tallaght Community Radio
Biddy Connors	After Schools Club
Name Not Available	Tallaght Youth Horse Project
Name Not Available	Tallaght Youth Horse Project

Participants PLA Two

Name	Organisation
Mary Keegan	Fettercairn Community Centre
Betty Sargent	Fettercairn Community Centre
Marie Mullligan	Fettercairn Rapid Representative
No Name	Lone Parent Centre
Mary Dalton	Jobstown CDP
Liz Sweeney	Health Board
Angela	Brookfield Resident
Mary	Brookfield Resident
Finean Smith	Brookfield Resident
No Name	Brookfield Resident
Valarie Coyle	Fettercairn Disability Group
Valarie Scully	Young Mothers Group
Name Not Available	Young Mothers Group
Name Not Available	Young Mothers Group
Name Not Available	Young Mothers Group
Ashling Crowley	Tallaght Youth Services
Grainne O'Kane	Community Coordination Team
No Name	PACT
No Name	Pride/Swan
No Name	TIA
No Name	Tallaght Radio
Micheal Gilligan	PARTAS

APPENDIX C: SEMI-STRUCTURED INTERVIEW SHEET

Name_____ **Organisation**_____
Residence_____ **Position** _____

1. In your opinion is the PPGIS a useful resource? Is it useful with respect to;

    - The collection, storage, dissemination and sharing of information?

_____

_____

2. In your opinion is the PPGIS useful in helping to capture and display;

    - Local community information?
    - Local community issues and concerns?

_____

_____

    - Official information about the community?

_____

3. How does the PPGIS compare to other forms of information handling?

_____

4. How would you use PPGIS?

_____

5. What would you add to the PPGIS?

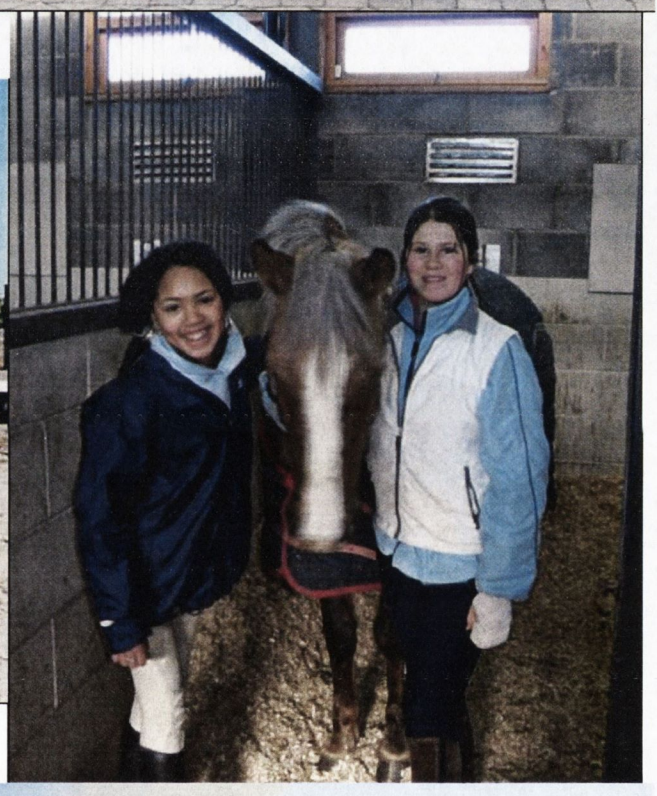
_____

6. What is your opinion of the PPGIS technology and process?

_____

Additional Topics

Additional Comments



Tallaght Intercultural Action

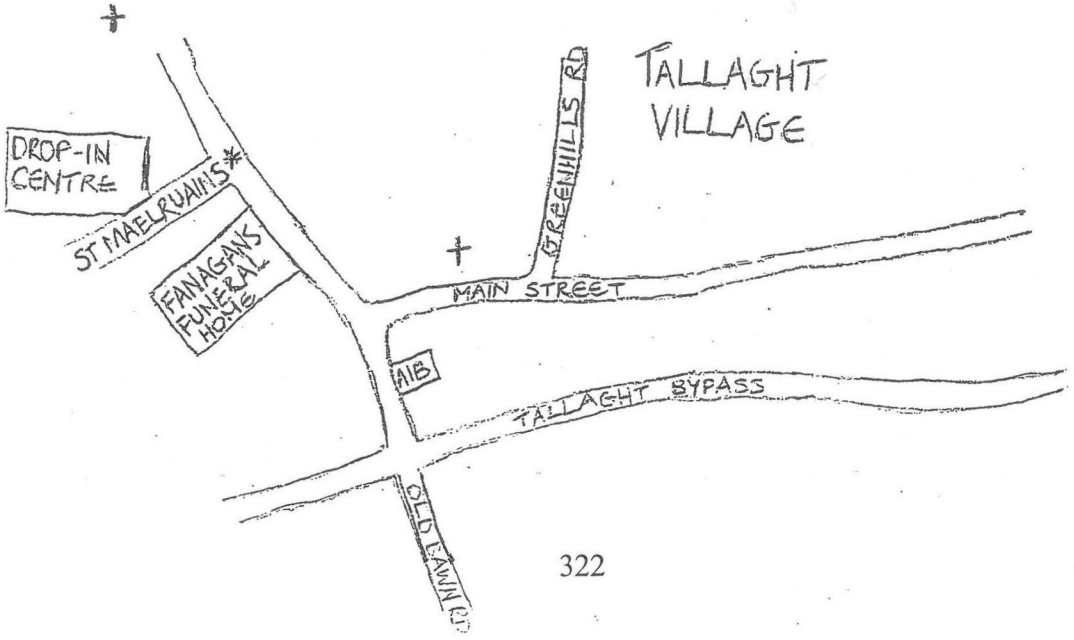
Drop-in Hospitality Centre

St Maelruains Parish Hall, Main Street, Tallaght Village, Dublin 24

We are open Monday to Thursday from 10am – 3pm

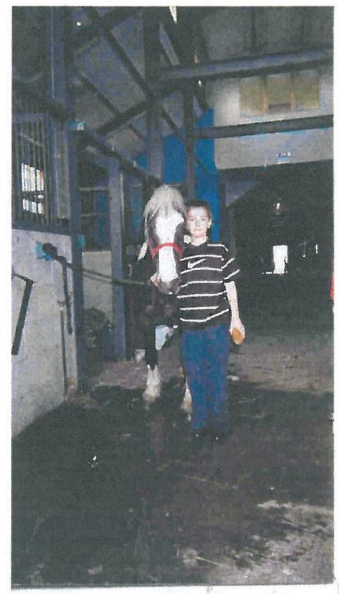
Are you isolated, lonely, have no-one to talk to, and don't know where to go? Do you have skills and talents you are not using? Would you like to meet new people and get involved in activities in the community you live in, e.g. parents groups, sports and programmes for children?

We would love you to visit us at our new Drop-in Hospitality Centre in Tallaght Village. We aim to provide information, support and advocacy in a friendly and welcoming environment to asylum seekers, refugees and immigrants living in Tallaght.



Fettercairn Youth Horse Project

Fettercairn Youth Horse Project (FYHP)



The project was established in the summer of 1995, on the initiative of a group of adults and young people in Fettercairn, Tallaght. By September of that year, the group was catering for 35/40 young people, aged between 10 and 21 years. The adults involved in this project want to ***help to channel youths' interest and respect for horses into a constructive community activity which would provide them with opportunities to develop personal, social and vocational skills.***

Horses have traditionally played an important part in Irish culture. They have had a key role in Dublin commercial activities for centuries and horses still hold an important place in the hearts of many inner city and suburban adults and young people. In order to control these urban horses, the Government has introduced legislation which is being implemented by Local Authorities throughout the country. The FYHP has had a positive impact on the general community and the environment, complying with and indeed complementing the Control of Horses Act.

FYHP is situated on a 7 acre area of disused land in Fettercairn, beside the Fettercairn Community Centre and the Markets in Fettercairn.

The land is owned by South Dublin County Council, who have provided the land for the use by the project.

A club member with her horse

"...The Fetterciarn Project is the model which we should develop and demonstrate as an achievable, low cost, no frills solution for others to follow"
John Sharples, (former) Director, International League for the Protection of Horses

Aims and objectives of the FYHP

1 **Create** an enclosed and controlled grazing and stabling facility for 20 horses in the Fettercairn area, which will be a prototype for the city
2 **Develop** opportunities for social, personal, educational and vocational development, and employment for young people in the equine industry
3 **Provide** the opportunity for young people to develop skills in relation to animal welfare, stable management and horse riding
4 **Explore** the possibilities for community businesses around the horse industry, e.g. saddlery/harness making ,blacksmith services, blanket making
5 **Encourage** the social, cultural, environmental and economic development of the Fettercairn community
6 **Develop Youth's** interest and respect for horses with personal, social and vocational skills in a community development framework

Club members with horse

ajor achievements to date

Community Based Project which has been in operation since 1995 with stables and American Style Barn opened on 21st December 200
Guinness Living Awards achieved by FYHP for Community Development in 1999
The project opened its 20 stable facility on a seven-acre site in Fettercairn, including an outdoor exercise arena, which has recently been re-laid, and training rooms.
This is the first project of its kind in Ireland.
The project is a registered company and has been granted charitable status
The Department of Agriculture / the South Dublin County Council, the RDS & the International League for the Protection of Horses have **endorsed** this project as a prototype for other communities
The project has successfully trained young people in Fettercairn in Tallaght in horse riding skills, animal welfare and horse management skills, Members of the project have accessed training and work opportunities at stables and equine events (including the RDS horse show and Punchestown Summer School)
The project has been accessed by hundreds of young people in the area since it was first established including a Saturday Club for youth.
A qualified Riding Instructress has been employed to teach young people both riding and equine skills
The project has received official sanction from the two governing Riding bodies established in Ireland namely: **The British Horse Society and the association of Irish Riding Establishments**

Club members enthusiastically complete their chores!

Activities and Achievements

- Youth training programme in the fundamentals of horse riding and care for horses to early school leavers and people with a learning disability
- Training modules are provided to local schools and local youth groups
- Accredited training programmes for young people who wish to embark on a career in horse riding instruction.
- Offical sanction from the two governing bodies established in Ireland The British Horse Society and the Association of Irish Riding Establishments. FYHP will be listed by The British Horse Society as a approved "Where to ride establishment"
- Riding and animal therapy to disabled young people in the area
- Training for Traveller groups and young people in the Tallaght area
- Extended membership of the Horse Project's Youth Clubs, providing horse care and riding opportunities to young people within a structured and disciplined environment

We would like to extend our thanks and appreciation to all our supporters and friends of the Fettercairn Youth Horse Project:

- Dept of Agriculture
- Dept of Tourism Sport and Recreation
- South Dublin County Council
- Royal Dublin Society
- John Magnier
- International League for the Protection of Horses
- Tommy and Sarah Gallagher
- Donald Keogh
- The Ireland Funds
- Roadstone
- Paddy Brennan

And those who wish to remain anonymous

"Working in the RDS was a great chance to see good horses, both Irish and foreign, good jumpers and good jockeys. It was a good experience and I learnt a lot, especially about how to space the jumps and how to prepare for the event. It was great to meet the President Dermot Forde, chairman of the RDS committee," Declan Phelan, Club Member

Funding

Funding for the operational costs of the project is required, on an ongoing basis. The project engages in fundraising and generates some of its own income, but providing its services is a costly exercise, and support is always required. The annual costs of the project include upkeep, salaries, equipment, training programmes, feed and care of horses. Our total annual costs are in excess of €130,000 per annum.
Funding options for companies who wish to contribute to the costs of the project.

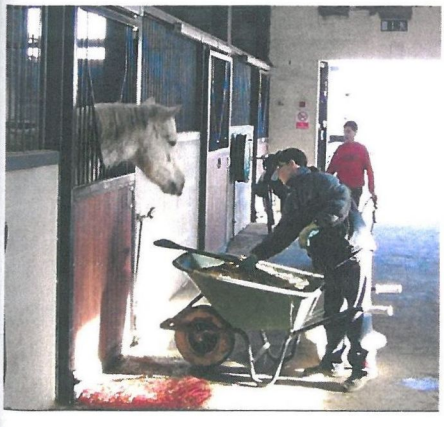
- Friends of Fettercairn Youth Horse Project (renewed annually)
- Sponsorship of a stable (renewed annually)
- Sponsorship of a horse (renewed annually)
- Fettercairn Youth Horse Project Training Fund
- Sponsorship of Tack, Jumps and Equipment

Should you wish to contribute or pledge support to the Fettercairn Youth Horse Project or indeed would like some more information, please contact the following:

Rebecca Fletcher Jones / Colette Needham
Fettercairn Youth Horse Project
Fettercairn Road
Tallaght
Dublin 24
Tel 00 353 1 462 7214 / 414 0214
Email: fettercairnyouthhorseproject@hotmail.com

The Fettercairn Youth Horse Project is a registered Charity – Chy No. CHY 13327
Donations made to the project by individuals or corporations of €250 or more are eligible for tax relief.

Your support will be gratefully received.



Member of FHYP Board of Directors

John Phelan	FYHP, Chairman
Noel Rochford	FYHP
Paul Byrne	FYHP
Caroline Byrne	FYHP
Viv HanlonFYHP	
Declan Phenlan	FYHP
Vincent Byrne	FYHP
Tony Schorman	ILPH
Dara Larkin	URBAN
Steering Group	
Michael McDaid	FAS
Sheilann Monaghan	Tallaght Partnership

Patrons of FYHP

Mr. Ted Walsh
Mr. Arthur Moore
Rev. Walter N.F. Empey, Archbishop of Dublin
Rev. Eamonn Walsh, Auxilliary Bishop of Dublin