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An Investigation into the Design, Development and Testing of a Tool to Improve the Accessibility of Access Information for People with Disabilities

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An Investigation into the Design, Development and Testing of a Tool to Improve the Accessibility of Access Information for People with Disabilities

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Abstract

Independent access for all to the built environment is one of the most basic of human rights. It provides social inclusion, integration and acceptance in communities. People with disabilities often encounter barriers to such access, barriers that can discriminate and marginalise to the extent that it prohibits independent living. Visiting the built environment becomes a lottery whereby inaccessible features may be present around every corner. People with disabilities deserve more than operating on a system of chance; they require a tool to make an informed decision prior to embarking on a journey. However in order to provide such information three distinct aspects must be considered, the individual, the disability and the built environment. Understanding and building upon each of these aspects holds the solution to the current gap in service provision for people with disabilities.

Considerate investigation into the meaning of disability and the requirement of the individual will help strengthen the credibility of any research undertaken to improve the status of people with disabilities. From this the built environment can then be suitably examined as to where accessibility does and does not exist. Once accessibility or indeed inaccessibility information has been collected a means whereby the information may be communicated to people with disabilities must be developed. This research aims to develop a concept entitled "LADDER" to meet this current gap in services. The use of a regulatory requirement as the access audit standard to collect data and a GIS as a communication tool broadens the application of concept not only to people with disabilities but also to key stakeholders who can advance their status within society. It is only through gaining a broad insight into legislative, structural and emotional requirements for access for people with disabilities can worthwhile research on this area be carried out. A multi-dimensional approach to the design of the research was employed. Preliminary research involved an examination of associated literature and surveys of key stakeholders to gain an insight into the determinants of access. Part one of the "LADDER" concept designed an access audit using the regulatory standard that was then tested on a defined research area to assess both the suitability of the legislation as an auditing tool, and to evaluate the effectiveness of the legislation in providing access. Part two then investigated how to best communicate such information to key stakeholders in a meaningful and useful manner using GIS. The result generated an exciting new tool that may not only reform how stakeholders use data and promote and improve disability access, but also change how a person with a disability plans and lives their life. This research was conducted in close collaboration with people of varying abilities as it is only through consulting with and understanding the needs of people with disabilities can society begin to create an environment that is truly accessible and inclusive to all.

Declaration

I certify that this thesis which I now submit for the examination for the award of Master of Philosophy, is entirely my own work and has not been taken from the work of others, save and to the extent that such work has been cited and acknowledged within the text of my work.

This thesis was prepared according to the regulations for postgraduate studies by research of the Dublin Institute of Technology and has not been submitted in whole or in part for an award in any other Institute.

The work reported on in this thesis conforms to the principles and requirements of the Institute's guidelines for ethics in research.

The Institute has permission to keep, lend, or copy this thesis in whole or in part, on condition that any such use of the material of the thesis be duly acknowledged.

Signature _____ Date_____

Candidate

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List of Abbreviations

ACE	Access Committee for England
ADA	Americans with Disabilities Act
BCA	Building Control Authority
BRAB	Building Regulations Advisory Board
CAE	Centre for Accessible Environments
CIL	Centre for Independent Living
CPU	Central Processing Unit
CRID	*Consorci de Recursos I Documentacio per a l'Autonomia Personal*
CSO	Central Statistics Office
CUA	Centre for Universal Accessibility
CRT	Cathode Ray Tube
DAC	Disability Access Certificate
DDA	Disability Discrimination Act
DFI	Disability Federation of Ireland
DIT	Dublin Institute of Technology
DOs	Disability Organisations
DOE	Department of the Environment
eg	For Example
EU	European Union
GIS	Geographical Information Systems
HMSO	Her Majesty' Stationary Office
IT	Information Technology
IWA	Irish Wheelchair Association
LCD	Liquid Crystal Display
mm	millimetres
NAD	National Association for the Deaf
NCBI	National Council for the Blind of Ireland
NDA	National Disability Authority
NRB	National Rehabilitation Board
PC	Personal Computer
Pro	Professional
Part M	Part M of the Building Regulations 1997
TACIS	Tactile Acoustic Computer Interface System
TGD	Technical Guidance Document
UCD	University College Dublin
UK	United Kingdom
UPIAS	Union of physically Impaired Against Segregation
USA	United States of America
VAS	Validated Accessibility Scheme
VDU	Visual Display Unit
WHO	World Health Organisation

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1.1 Introduction

The first comprehensive government led examination on the status of people with disabilities living in Ireland was commissioned by the Department of Justice, Equality and Law Reform which established the Commission on the Status for People with Disabilities in November 1993. The main objectives of the Commission included advising the Government on equal opportunities for people with disabilities and examining the current situation in relation to existing services for people with disabilities including access to the built environment. The Commission was also assigned the task of making recommendations on necessary changes in legislation policies, practices and structures. In the seventeen years since the adoption of this strategy many policy and regulatory changes have taken place. The question is have these changes tangibly improved the life of the individual with a disability? The latest figures in relation to the population of Ireland stood at 4,239,848 people of these 393,785 experience some form of disability (CSO, 2006). Estimations in the mid-nineties put this figure at 335,500 people, indicating that prevalence of disability in Ireland is continuing to rise. Although there is no current data available on participation of people with disabilities in services and leisure activities, membership of the labour force is a strong indication of their integration into society. In 2006, 77,800 people with disabilities were in full or part-time employment (CSO, 2006). Taking into account those who are not of an age to work and those with a physical inability to work, this still leaves a significant proportion of people with disabilities not participating fully in society. The question must be as to why these individuals are not fully involved in mainstream society?

From the submissions received by the Commission on the Status of People with Disabilities (over 600, of which 327 were from people with disabilities), many issues relating to social integration were identified, from which a report of 402 recommendations was developed. Recommendations to promote disability rights included: policy and structural changes; economic rights; social and civil rights and issues relating to vulnerable people with disabilities. In the area of social and civil rights, access to the built environment was one of the main issues highlighted.

This although somewhat dated document from the nineties remains today the main comprehensive strategy outlining the manner to improve the status for people with disabilities in Ireland. Recently the government has underlined its continued relevance and importance by implementing many of the provisions of "Towards Equal Citizenship". This policy document set out how to implement the recommendations originally set out by the Commission. However many of the recommendations set out in the document were either rejected or not implemented which gave an indication of attitude towards disability issues in Ireland at this time. However since this time there has been a steady emergence of both legislative and formal government strategies that combined together now place Ireland in a stronger position in relation to tangibly improving the status of people with disabilities. Almost 10% of the Irish population has some limitation in their ability to perform everyday tasks and accommodating their needs is never going to be a straightforward task. The first requirement in promoting such change and improvement to accessibility must be to firstly to understand who exactly this group is and what disability is. It is only then that advancement can be made on the development of more important elements of improving their status and integration in mainstream society.

Physical accessibility to the built environment must also be considered as one of the primary underlying factors contributing to the integration of people with disabilities into mainstream society. For the disabled community identifying areas accessible to their individual needs can be an unrewarding task often resulting in both physical and social exclusion. At present in Ireland there is no comprehensive, continually updated source of reliable accessibility information. The unavailability of accessibility information is preventing people with disabilities make decisions necessary to live an independent and inclusive life. Issues identified by the Commission and this gap in services that could possibly provide people with disabilities with greater social inclusion prompted the research of this project. This research hopes to assist people with disabilities to participate in society by providing them with up to date accessibility information that may empower them to live independently while also assisting key stakeholders to collect and convey accessibility information in a new previously unconsidered form.

1.2 Research Background

Growing up with a parent who has a physical disability permanently alters the perspective of the world that sometimes can be taken for granted. Integration into the social environment is entirely dependent on ability to access the facilities and services within. Daily life could never occur by chance and every element was carefully planned based on previous experience or word of mouth. There is no continuously updated easily accessible information source available to assist people with disabilities make decisions on their individual daily accessibility requirements. An individual with a disability could never decide spontaneously to visit a service for fear that it would not accommodate their needs. This gap in information communication prompted a desire to investigate this topic further.

Having worked on a voluntary basis with a disability organisation for many years an opportunity arose as part of the dissertation requirement of an undergraduate degree to study the area of accessibility for people with disabilities in greater detail. This undergraduate study examined the accessibility of a large rural town for wheelchair users and particularly the effects that urban renewal had on the streetscapes of a historic town that was restrained by multiple conservation orders. This study used an access audit technique to examine the accessibility of streetscapes for a wheelchair user. It was found that overall the levels of accessibility did not improve in areas where significant urban renewal had taken place. The result of this study posed more questions than it answered. Why were new footpaths and streetscapes not being made more accessible on redevelopment, why were people with disabilities not involved in the planning process, why were regulatory standards not being monitored, applied or enforced and why did people with disabilities not have access to accessibility information? These questions coupled with curiosity as to the level of accessibility of the buildings lining such streetscapes prompted this research. On completion of a B.Sc. degree in Environmental Health the natural progression was to combine the strong audit vein and regulatory enforcement component of the undergraduate degree with the findings of the researched dissertation.

Environmental Health in Ireland rests in the strong ethos of auditing against a regulatory standard in order to identify problems and solutions and communicate results with the objective of enlightenment and improvement of standards. This research endeavours to identify a means whereby information on detailed accessibility of the built environment could be collected, organised and communicated to people with disabilities in an easily viewed user friendly and accessible manner using a regulatory standard.

With the assistance of the National Disability Authority (NDA) a research scholarship was awarded and research commenced on this research. The objective of this scholarship was to support research on disability, rehabilitation and related matters in Ireland. The awarding of the scholarship was dependent on the findings of the research being transferred to the NDA to assist the progression of the disability agenda. The NDA would consider any systems or proposals developed in this research for future funding and further development to physically improve access. Upon the awarding of this scholarship a note of interest in the research was also lodged by the Irish Wheelchair Association (IWA) who at this time were commencing a new initiative entitled "Wider Horizons – Access for All". This initiative aimed to educate people with disabilities on accessibility issues as a measure to empower the individual as an advocate to promote change. The involvement in this scheme was to be integral in the shaping of the focus and outcome of this research. As a non-disabled researcher there is a danger of becoming over politicised into the examination of the civil and human rights issues surrounding access for people with disabilities. However, in order to understand the issues it is necessary to explore the nature and cause of disability in an attempt to make a connection between the individual with a disability and society as a whole. Work with MS Ireland, the IWA and the Wider Horizons programme has legitimised the researchers commitment of representing a voice for people with disabilities as they have been considered and consulted throughout every aspect of this research. The more we understand the experience the more adept we are at suggesting solutions for improvement.

The use of participatory research with Disability Organisations and the Wider Horizons group rather than for them not only provides more credible outcomes but also creates research whereby people with disabilities acquire ownership of the research by directly influencing and enhancing the design, implementation and evaluation of this research.

1.3 Rationale for Research

The rationale of this research lies in the lack of provision and the inaccessibility of information on access for people with disabilities to the built environment. It is clearly unacceptable that buildings can be inaccessible to people with disabilities, however what is also unacceptable but often overlooked is the lack of provision of accessibility information prior to visiting a building, particularly in this age of communication and information technology. At present the only means an individual with a disability has to accurately establish if a building meets their individual access requirements is to physically visit the building themselves. Many organisations and government bodies are in prime positions to collect and present such information. However to date what little information on accessibility of the built environment that has been gathered has become embedded in inaccessible hard-copy formats that become quickly dated. Modernising the organisation and communication of such information in a user-friendly format such as a map of their locality could be fundamental in assisting people with disabilities to live independent, integrated valued lives within society.

This research spans almost a decade of the disability movement in Ireland during which time both much and little progress has been made, making the gap in information provision palpable. Currently the main piece of legislation for providing physical access to the built environment is under review and due for publication in the second half of 2010. The implications to this research of such ground breaking legislative changes combined with the recent introduction of Disability, Anti Discrimination and Equality Legislation along side other substantial government led initiatives legitimises the timely and opportune nature for investigating this identified gap in service provision. Never has there been a more appropriate time for the key stakeholders to significantly influence and improve the status of people with disabilities living in Ireland.

1.4 Aim and Objectives

Issues identified that prompted this research were firstly the lack of detailed information on accessibility of the built environment for people with disabilities and secondly the failure of those who had acquired such information to communicate it to people with disabilities or other stakeholders to improve their status of in Ireland. This research will invent a new concept to be known as "LADDER" or **L**ive **A**ccessibility **D**atabase for **D**isability **E**mpowerment and **R**eform. This concept aims to "elevate" the status of people with disabilities by providing them with reliable up to date accessibility information that will not only empower them to live independently but may also reform current accessibility data collection and communication procedures to the benefit of all people with disabilities in accessing the built environment. This research is aimed at both people with disabilities and key stakeholders who have an influence over the status of people with disabilities such as regulatory bodies and organisations representing the needs of people with disabilities. The primary aim of this research is;

- **To design and test "LADDER", a tool to collect and communicate "live" accessibility information for people with disabilities to empower them in independent decision-making for daily activity planning.**

The investigation of this aim is supported by examination of three secondary objectives;

- To gain an insight into the interaction of people with disabilities with the built environment by working, lecturing, living and traveling with of group of people with varying disabilities.
- To investigate the opinions of key stakeholders into the barriers to the provision of access, the statutory requirement for access and access information for people with disabilities.
- To design, develop and test a systematic access auditing package and decision-making tool based around Part M of the Building Regulations, the statutory requirement for access for people with disabilities to the built environment.

The scope of this research involved the design of "LADDER" through pre-analysis of the subject area and attainment of necessary skills to conduct the research.

This was followed by the design and implementation of a process using participatory research to collect detailed accessibility information. This information is then manipulated and communicated in a "live" user friendly format to the extent whereby it becomes valuable and accessible not only to people with disabilities but to key stakeholders who have the power to improve overall status through both access promotion and regulatory enforcement.

1.5 Contribution to the Area of Research

This research hopes to contribute to the area of disability research by advancing awareness, understanding and use of access information. The problem lies in both the acquisition and communication of such accessibility information. This research hopes to address this problem in two distinct ways. Firstly to develop a new concept ("LADDER") whereby live information on accessibility can be measured and collected in an organised and standardised manner using a regulatory standard that can define individual bespoke levels of accessibility. The design of the proposed method of information collection and communication will be implemented in a manner that will allow ease of updating so that the system can remain "live". This will not only assist individual people with disabilities in accessing pertinent up to date access information specific to their disability but will also highlight breaches of legislation that may be enforced by the regulatory body thus improving overall access levels and promoting awareness. Secondly this research hopes to develop "LADDER" as a means of successfully condensing and communicating such data into a geographic based "living map". This may assist people with disabilities in making decisions on accessing the built environment and key stakeholders in improving their overall status in the community and the enforcement of the regulations. Through the design, development and testing of "LADDER" it is hoped that it will not only act as a decision-making tool to empower people with disabilities, but it will also advance their overall status through its application by key stakeholders in reforming the data collection and communication.

1.6 Research Project and Method

As mentioned detailed information on access is currently almost inaccessible in Ireland.

If an individual with a disability wishes to take a journey from their home to a particular service provider they require a degree of prior knowledge. This prior knowledge currently is through previous experience or word of mouth. There is no continually updated easily accessible live database in Ireland that provides current information of exact levels of accessibility to buildings and streetscapes in our towns and cities. Thus an individual with a disability has difficulty in making an informed independent decision on travel, activities or acquisition of services. The provision of such information would be of fundamental importance to empower an individual with a disability to live an independent, integrated life within society while also assisting key stakeholders improve overall existing provisions. The difficultly lies in the acquisition, storage and communication of such accessibility information. This research focuses on the practical aspects of this difficulty and it is designed around the development and testing of the "LADDER" concept. Once researched and designed "LADDER" will be evaluated through testing it on a typical built environment. It is hoped that this in turn will provide possible solutions for the research question while also highlighting issues for future consideration. Chapter 1 of this research outlines the background and rationale for this research and introduces the research aim and objectives and research outline. Chapter 2 introduces the methodology employed to investigate the stated aim and associated objectives. A two-part approach was adopted in designing the methodology for the development of the "LADDER" concept and is outlined as follows:

PART 1 PRE-ANALYSIS AND SKILL ATTAINMENT

The initial component of the methodology of this research was to conduct background research on literature relating to issues significant to disability access. The objective of the literature search was to consider three factors identified in undergraduate research as fundamental to the scope of this research; the individual, the disability and the built environment:

The Individual and Disability

It is only through the thorough examination of definitions or models of disability that a model can be adopted that will essentially shape the direction and hence outcome of any research project

The individual and disability were examined by investigating how disability is defined for an individual through the application of models of disability. Participatory research was also implemented throughout the design and implementation of the research through close collaboration with people with disabilities. The status of people with disabilities in 21st century Ireland is also examined and the manner in which they are accommodated in and by society through various legislative and procedural developments over the last fifteen years. This sets the scene as to the pertinent timing of this research and where it stands in relation to current state led initiatives. Chapter 3 examines the individual and disability and the contextual framework of disability provision in Ireland in 2010.

The Built Environment

The development and structure of the built environment is also considered in Chapter 3 through examination of the regulatory process in Ireland. This is then explored in terms of moving away from designing for people with disabilities towards designing for all through the concept of universal design. Once the fundamental factors on requirements for access are understood then the background research moves on to the elements necessary for the design and development of the "LADDER" concept. This included investigating the design of the method of data collection, which is access auditing and the proposed communication and decision-making element Geographical Information Systems (GIS) and how this and other similar systems have been applied in previous similar circumstances and previous work in this area. To build and develop upon the knowledge attained in the background research of these areas there was a requirement to attain many necessary skills to successfully and credibly implement the research. In order to design the "LADDER" concept based on the research aim it was imperative to gain background information into the challenges facing people with disabilities and many initiatives were undertaken to gain as much insight as possible into the subject area. Skill attainment was achieved in core subject areas of the research including Disability (e.g. "Access for All" programme initiating the participatory research element), Built Environment (e.g. access auditing) and Information Technology (GIS). With the necessary background research in place combined with the essential skills, design and implementation of the "LADDER" concept could progress.

PART 2 DESIGN AND IMPLEMENTATION

Combination of the three factors of individual, disability and built environment that are reflected in the background research are essential to the understanding, design and implementation of the "LADDER" concept. Once the knowledge from pre-analysis was consolidated with skills attained then design of the "LADDER" concept developed. Two core methodologies required concerted design, the survey of key stakeholders and the technical design of "LADDER" incorporating access auditing and thematic mapping.

Survey of Key Stakeholders

Surveys were carried out of the people who represent and legislate for people with disabilities in order to assess their opinions on access and the possible benefits of "LADDER". Disability Organisations were an essential link in this research as they were actively trying to promote and implement change in the built environment. Gaining an insight into their philosophy and experience could shape the future direction of the findings of this research. Building Control Officers were the second link as they are the only government body in Ireland who have a direct regulatory influence over access to the built environment. This methodology allowed for the comparison of the opinions of the controlling authority and other key stakeholders on accessibility, to the actual physical measured levels of accessibility of the built environment while also assessing the effectiveness of current legislative requirements. These opinions were gathered both at the commencement and the completion of this research to examine the variation in a timeframe of significant change. Chapter 4 examines the findings from these surveys and the use of participatory research providing an insight into the subject of disability and the individual with a disability. From this, the natural progression was to move on to the third element of the "LADDER" concept, the built environment.

"LADDER" Design

With an understanding of what disability is and how it affects an individual, it is necessary to then look to the environment the person inhabits. To the normal user the environment appears constant, a web of streets, footpaths and buildings. To an individual with a disability the built environment is fluid with every aspect requiring examination to ensure each facet along the way meets their individual requirements.

The collection of information on the built environment cannot be successfully achieved by observation techniques or surveys. The built environment contains an exponential amount of factors that either taken alone or combined could affect its accessibility. The method identified from undergraduate research to best acquire such detailed information is the access audit. Not only does the access audit acquire a large amount of detailed information in a manner that is easy to handle it can also provide a means of managing the data in a manner that reflects overall accessibility levels required in this research.

Many areas were considered for the implementation of stage one; the pilot test for the testing and demonstration of "LADDER's" capabilities. The area chosen was identified through examination of regional census data as being representative of a central business area of any Irish city or town. Services in the area included a library, shopping centre, post office, hotels, a college, swimming pool, pubs, a nightclub, restaurants, a school, a cinema, banks, a small shopping centre and many other small shops and services. This was considered as representative of each of the main service provisions an individual with a disability would require on a normal day-to-day basis. After completing a trial pilot test and revising the designed audit a comprehensive access audit was conducted on the entire research area, the findings of which are set out in Chapter 5. On completion of the access audit there was found to be an extremely large volume of data collected. This data was initially stored in an Excel spreadsheet format. In this format the information was ineffectual, reduced to thousands of numerical representations of door widths, handle locations and toilet dimensions. To extract a meaningful written report was impossible as the large amount of numeric data could not be interpreted or examined unless each data element was linked directly back to the measurement criteria applied. A user-friendly data organisation, manipulation and presentation tool was required. Therefore to implement stage two of "LADDER" a method was researched to extract and communicate meaningful information, the method chosen was GIS. Not only could GIS reduce the data to a manageable level it also offered the opportunity of displaying the data on a geographical plane that could bring the information to life in real time as a "living map".

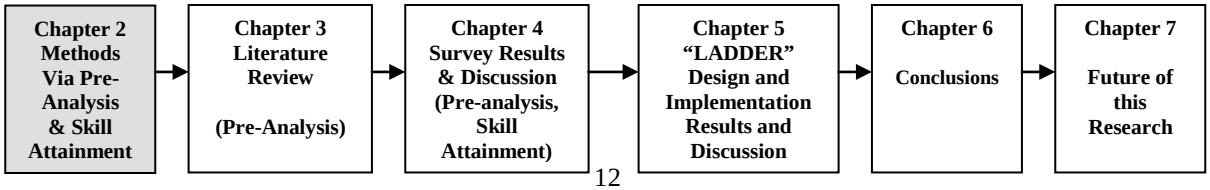
No other data management tool could offer such capabilities in a manner that makes the information easily manipulated while also allowing continuous updating and easy access in a user-friendly format. Chapter 6 identifies many possible uses of "LADDER" along side recommendations for its further development. The adoption of this methodology involved acquisition of many technical skills such as GIS software training, digitising, scanning, plotting and thematic mapping. The resulting combination of underlying factors of individual, disability and built environment with the two-part "LADDER" concept, (access auditing and GIS) is intended as the product of the outlined aim.

1.7 Research Outline

The academic challenge of this research is to investigate and construct a new and innovative system that empowers people with disabilities make informed decisions on their day-to-day activities and provide key stakeholders a structure to improve and reform disability status. Chapter 2 examines methods employed in the investigation of the overall aim and the reasoning and limitations of each of the methodologies chosen. As mentioned research of disability access cannot be undertaken without understanding the individual, the disability and the built environment and therefore Chapter 3 examines background literature in relation to the core foundations of this research. The literature review was designed with the objective of addressing the fundamental issues that affect disability access in a way that is pertinent to this research. Therefore topics elemental to the aim were identified and examined and include:

- Models of Disability and Disability Status in Ireland up to 2010
- Regulation of Access to the Built Environment and Universal Design
- Access Auditing and Communicating Accessibility Information via GIS

Chapter 4 examines the results and observations on the implementation of the Pre-analysis, Skill Attainment and Survey Methodology while Chapter 5 examines the results and observations of the Design and Implementation phase of the methodology along with their individual and combined significance. Chapter 6 highlights the main conclusions of this research along with summary conclusions of specific aspects of the research. Possible future directions of this research are also suggested.



2.1 INTRODUCTION

This research product combines the concepts of the collection of accessibility data through access auditing with the communication and decision-making capabilities of GIS in examining the primary research aim;

- **To design and test "LADDER", a tool to collect and communicate "live" accessibility information for people with disabilities to empower them in independent decision-making for daily activity planning.**

The investigation of this aim is supported by the examination of three secondary objectives;

- To gain an insight into the interaction of people with disabilities with the built environment by working, lecturing, living and travelling with of group of people with varying disabilities.
- To investigate the opinions of key stakeholders into the barriers to the provision of access, the statutory requirement for access and access information for people with disabilities.
- To design, develop and test a systematic access auditing package and decision-making tool based around Part M of the Building Regulations, the statutory requirement for access for people with disabilities to the built environment.

The scope of this research involved designing an access auditing tool based around the current legislative requirement then using that tool to collect detailed accessibility information required to empower people with disabilities to live independent lives. Data collected relates to accessing services in a typical urban scene, housing is excluded from the research. Data collected is then manipulated and communicated in a manner whereby it becomes valuable and accessible not only to people with disabilities but key stakeholders who have the power to improve their overall status. In defining this scope it is acknowledged that a considerable amount of background research must be carried out into the status of people with disabilities, key stakeholders and the legislative structure protecting their rights. The development of the "LADDER" concept is implemented through a multi-dimensional approach that has access auditing and GIS at its core. Numerous other skills and techniques were utilised in the investigation of the aforementioned objectives and the methodology employed was designed around a two-part approach;

Part 1 **Pre-analysis and Skill Attainment**

Part 2 **Design and Implementation**

This section will examine the two parts of this multi-dimensional approach, their significance to the research and the manner in which they were implemented. Figure 2.1 demonstrates the outline and flow of the chosen style of methodology.

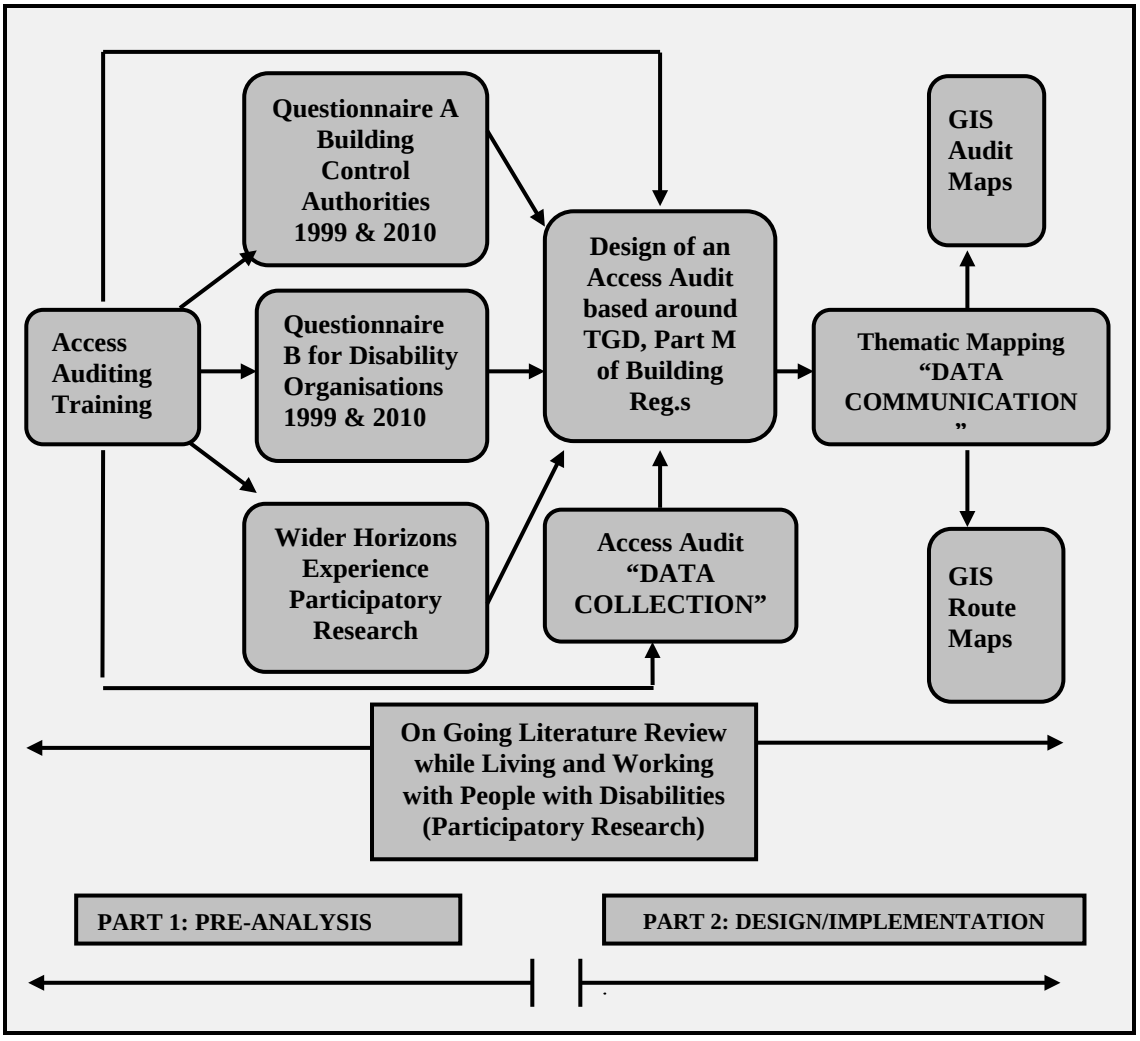


Figure 2.1 Outline of the Main Stages of Methodology

2.2 PART 1: PRE-ANALYSIS AND SKILL ATTAINMENT

2.2.1 Introduction

The initial component of this research was to conduct background research on topics relating to the issues to hand. To investigate the identified gap in services and to design the "LADDER" concept to assist, the three fundamental factors influencing access must be considered, the individual, the disability and the built environment. It was therefore decided that a broad literature review centred on these aspects would be conducted to gain an insight into these issues of direct association to this research.

It was also identified from an early stage that to conduct research about disability an appreciation of the needs of people with disabilities is required. For research in this area to be credible it must be conducted with rather than for people with disabilities, therefore an approach of participatory research that involved both people with disabilities and Disability Organisations was adopted to further an understanding in this respect. It was also acknowledged that a number of new skills would be required to implement the proposed methodology in a reliable manner and therefore training was undertaken in a number of key identified areas. The next section outlines aspects of pre-analysis and skill attainment critical in the investigation of this research.

2.2.2 Review of Associated Literature

Pre-analysis for this research warranted an in depth examination of literature centred on the core elements of the research, the individual, disability and the built environment. Consequently a number of representative objectives were identified for the literature examination presented in Chapter 3;

- Firstly to develop an understanding of the individual and disability recognised models of disability required examination. Models of disability play an integral part of disability research and are fundamental to the direction such research could take as they introduce often-unconsidered theories. Models have been adopted in the formulation of policies, legislation and access in Ireland and consequently an appraisal of current national strategies was also conducted and presented in Appendix I.

- With an understanding of the individual and disability research progressed on to examining the built environment. This examination assisted in forming the foundations of the design of the proposed "LADDER" concept for providing people with disabilities with reliable up to date accessibility information that will not only empower them to live independently but may also reform current accessibility data collection and communication procedures for key stakeholders. From literature reviewed it was found that designers tend to adopt regulatory guidance as their minimum criteria for including access, so therefore to make the tool both useful and acceptable to the design industry Part M was chosen as the measurement criteria.

Consequently this standard required review in relation to its development, enforcement and effectiveness in providing access. This was required in order to determine how the "LADDER" concept could not only be designed but how it could be accepted and further developed. When reviewing regulatory requirements it is also necessary to investigate best practice and the vision for the future and therefore a review was also required on the role of universal design in creating accessible environments. This design theory may provide a basis for future development of this "LADDER" concept.

- Finally to determine the practicability of utilising and understanding access auditing as a means of collating information to be used in "LADDER" and GIS as a tool for communicating such information in a live user friendly manner literature in both of these areas required examination. This assists the understanding of the design of the proposed "LADDER" concept.

2.2.3 Skill Attainment

2.2.3.1 Introduction

There were a number of techniques utilised in examination of the aim and objectives. The researcher comes not from a background of medicine, geography or social studies but environmental science. Therefore numerous new skills had to be acquired throughout this research in order to credibly perform the methodologies required. Skills acquired mirror the core elements of this research;

2.2.3.2 Understanding the Individual/Disability

It was acknowledged from an early stage in this research that to research the topic of disability an understanding in the needs and requirements of real people with disabilities (i.e. participatory research) is required. People with disabilities must have an input into the aims, methods and uses of research. Research must be accountable, a partnership. Kitchin (2005) identified that involving people with disabilities offers them both practical and social gains, as active involvement will reflect their needs, concerns and interests. Research can become enabling and empowering. This assists in breaking down barriers and removing suspicion of underlying agendas while also gaining trust.

Such trust is critical to the success of this research as the output; a map must provide confidence for users to a level where they can trust it to empower their independence. Rarely do people with disabilities have full control of research but they must be involved in critiquing the work and influencing its use. Linking this non-academic perspective to research allows the injection of a very different viewpoint. Ideally an individual with a disability who lives and experiences the built environment should carry out or perhaps lead this research. However with the absence of many students with disabilities in third level education and the specific nature of each disability it would be difficult to find the ideal research candidate. The compromise is to endeavour to involve people with disabilities ("Access for All" group) and those who represent them (Disability Organisations) at every available opportunity throughout the research in an attempt to gain an insight into the issues they face and experience they have. Combining these representatives with the enforcement body (Building Control Authorities) who act as a regulator for their access needs provides a mechanism in this research that allows inclusion and examination of often-disparate viewpoints from either side of the model divide. The expert on disability has to be the person who lives with it, experiences it and feels it.

An opportunity arose in the early stages of research to participate in an eleven week Wider Horizon's programme entitled "Access for All". This programme involved working and living with a group of people with disabilities over an eleven-week period with the objective of empowering the individual with the disability with the knowledge and experience to become access advocates in their own communities in attempt to promote change. Participation in this programme facilitated first hand experience of the barriers an individual with a disability faces in independently accessing the built environment on a daily basis. Living with, working with and teaching people with a wide range of physical disabilities allowed for a greater understanding of the issues to hand. The programme also required a long-term commitment to living with and assisting the group in Ireland, the UK and the USA. This programme involved the instruction and lecturing of 19 people with disabilities on an Access Advocacy Training Course. The course was implemented through a Northern Ireland and Republic of Ireland partnership, with implementation divided across three countries.

The programme took place through both theory and practical work in Dublin, Belfast and Pittsburgh, USA. It was decided to participate in this programme as only through understanding the requirements of people with disabilities that a valuable credible input to the subject area be made. The programme facilitated an examination into the interaction of people with disabilities with the built environment by working, lecturing, living and travelling with a group of people with varying abilities. No other methodology such as desktop studies or case studies could have provided such a valuable insight into the actual physical requirements for accessibility. This programme enabled the researcher to both reside and teach in an atmosphere where accessibility to the built environment was crucial to everyday living. The objectives for participating in "Access for All" were to:

- develop an understanding of the requirements for access that people with varying ranges of abilities have on a daily basis through living and working with people with disabilities over an eleven week period;
- develop and implement access audits in Dublin, Belfast and Pittsburgh;
- attend lectures on issues relating to access in the built environment including, Access Auditing, Professional Roles in the Area of Access, Building and Fire legislation, Design Concepts and Health and Safety;
- prepare and deliver lectures on Access Auditing in the built environment;
- give tutorials and advice on individual projects of the group members.

Adopting this programme as part of the multi-disciplinary approach of the methodology also required acquisition of other skills such as Disability Awareness Training, Sign Language, First Aid, Care Assistance, Manual Handling and Presentation techniques (specialising in presenting to those of varying abilities including visually and hearing impaired).

Limitations of Wider Horizon's "Access for All"

During the implementation of the aforementioned objectives unforeseen circumstances placed severe pressure on time and resources. One of the criteria for selection of participants for the scheme was that they could live independently. During the eleven week course participants were required to live away from their homes and communities.

It was found that while a participant lived relatively independently in their own familiar environments once they were required to live in unfamiliar environments that level of independence and confidence diminished dramatically. Consequently the two allocated care assistants were not sufficient to cater for the needs of 19 people with disabilities living and travelling in unfamiliar environments. As a direct result the researcher was required to act as an additional care assistant along with providing lecturing and tutorial requirements. This curtailed the amount of time available for investigation in detail of other aspects outlined objectives. This decline in independence due to unfamiliar environments is a significant outcome of this research and is discussed in greater detail in the examination outcomes in Chapter 4.

Further involvement of people with disabilities was also employed through the the survey of Disability Organisations and the demonstration of the "LADDER" concept to "Access for All" participants. Disability Organisations were surveyed twice once in 1999 and once in 2010 after a period of significant political and societal change in disability issues. The purpose of these surveys was to gain an insight into their opinions and experience in relation to barriers to access and provision of information on the built environment at a time of significant transformation.

2.2.3.3 Understanding Access to the Built Environment

During the initial stages of this research the researcher identified from literature reviewed that to credibly measure access accurately and successfully formal training in Access Auditing would be required. In the process of access auditing a skilled auditor with experience and expertise in terms of their understanding of legislation and standards, their experience of people with disabilities, their training and their previous work in the area is essential (NDA, 2002). It was therefore decided to participate in the Universal Accessibility Auditing Training course at the Centre for Universal Accessibility (CUA), University of Ulster, Jordanstown, Northern Ireland. This was an intensive training course that combined theoretical and practical aspects of access auditing. The main objective for participating in this course was to gain the level of skill required to both design and implement an access audit by combining knowledge attained relating to the social status of people with disabilities with technical standards and legislative requirements.

The course gave an insight into interpreting the concepts of universal accessibility identifying the medical and physical conditions which impact on accessibility and recognising obstacles and appropriate solutions to inaccessibility. The structure of the course allowed for theoretical training, practical workshops and participant presentations. Presentations were based on fieldwork participants were required to undertake that were based on a practical access audits carried out by each participant. The findings and recommendations of the access audit were compiled into an Access Action Plan and presented to the membership board of the CUA. Access Action Plans were also forwarded to the departments responsible for the management of the buildings audited in an attempt to influence change. This formed the basis for the understanding of the requirements for an Access Action Plan, a service that was offered to each premises participating in the access audit that was used to test the "LADDER" concept in later in this research. The course also provided a foundation in interviewing both people with disabilities in relation to access and building managers in relation to building use. Guidance was also provided for the development of instruments such as inclinometer. The achievement of a Certificate of Competence in Accessibility Auditing greatly influenced future aspects of the methodology as many valuable connections were made through fellow students many of whom worked in Building Control and assisted the design and implementation of access audit criteria and survey questionnaires.

2.2.3.4 Understanding Information Technology Utilised

Surveys of key stakeholders in the area of access to the built environment were considered critical to the understanding of the potential of the proposed "LADDER" concept. As this would involve the collection and subsequent analysis of large amounts of data training in statistics was undertaken. The design of the "LADDER" concept linked the results of access audits with a GIS process; therefore training in the fundamental elements of this process was required. GIS software training, digitising, scanning and plotting and thematic mapping modules were all undertaken through a MapInfo training course instructed by ESBI. This allowed for the conversion of tabular data (access audit results) into graphic data (thematic maps) for the design and development of the proposed "LADDER" concept.

The justification in selecting the aforementioned skills acquisition lies in the specialised nature of this research focused on three aspects of individual, disability and environment and therefore skills had to be attained in each core area. No other process could provide the diverse range of skills required to approach this sensitive area. Prior background research and analysis and preparatory work in the areas of disability awareness and access auditing were all vital in the treatment of the issues to hand and therefore formed the rationale for methods chosen.

2.3 PART 2: DESIGN AND IMPLEMENTATION

2.3.1 Introduction

There were two areas of the research that required comprehensive design prior to implementation and subsequent review. This section outlines these core methodologies, firstly the Surveys of Key stakeholders and secondly "LADDER" design, development and implementation. This section also highlights the reasons for their use and some subsequent limitations encountered upon their application.

2.3.2 Surveys of Key Stakeholders

2.3.2.1 Introduction

From literature reviewed it became clear that in order to improve the status of the people of with disabilities key stakeholders in the area of disability must be involved and therefore consulted. It was decided in consultation with the NDA (who provided scholarship for this research) to target Building Control Authorities within Local Authorities and Disability Organisations who had an interest in access to the built environment. Building Control Authorities were selected as they are currently the only enforcement authority that can regulate for physical accessibility of built environments and they have access to a broad range of accessibility information and regularly consult with government and other key stakeholders on alterations to existing legislative provisions. Disability Organisations were also selected for survey as although people with disabilities had been consulted during the research it was felt that participatory research element required expansion. Such organisations may have a more structured approach to improving the status of people with disabilities through their involvement as advocacy services and their monitoring of physical access and legislation pertaining to the built environment.

The future use and acceptance of the proposed "LADDER" concept could be developed by obtaining an insight into the opinions and policies and procedures of such key stakeholders in relation to accessibility information collection. Although other target groups could potentially have been considered for survey this combined focus group of approximately 100 representatives were considered to have the strongest status for the provision of pertinent information and influencing the acceptance and development of the suggested "LADDER" concept as they combine both the regulatory and advocacy requirements for the improvement to the right of access. Other parties such as designers may have an interest in the subject area but do not have noteworthy power for influencing change. The thoughts and opinions of each of the selected key stakeholders in the area of access to the built environment were obtained though the implementation of written surveys at two stages; in 1999 at the commencement of this research and in 2010 after a period of significant transformation in disability status. There were many options for obtaining such information such as face-to-face interviews, focus groups or workshops. The main reason for choosing the survey technique was the fact that this was a means whereby a large amount of valuable information could be gathered from research groups who have limited time and resources for taking time out to conduct interviews, other motives for the use of surveys are examined in Section 2.3.2.2.

2.3.2.2 Questionnaire as a Methodology

It was decided that using a questionnaire was the most practical, time and resource efficient means to obtain the desired information. Through discussions with a local Building Control Officer in the Building Regulations Advisory Board (BRAB) it was felt that potential participants did not have the time available and perhaps the perceived expertise in this area to meet with a research student to discuss these aspects in person. A similar reaction was found from consulting a member of the Irish Wheelchair Association (IWA) who also noted their desire to be publicly non-affiliation to specific universities. This method of using questionnaires to obtain information was chosen for a number of other reasons including;

- Prevention of bias; on such an emotive subject an interviewer present may sway an interviewee or an interviewee may feel a need to answer in a politically correct manner. Through a written survey with the option of anonymity the respondent is more free to express an honest opinion.
- Quick, time efficient method of obtaining much information from almost 100 different sources. Building Control Officers are very stretched on time and resources and trying to arrange suitable times to visit each one in 37 different geographical areas in Ireland would have taken much time out of research.
- The questionnaire was designed with assistance of colleagues of target groups and was therefore presented in a user-friendly and user relevant manner.
- Surveys can be completed at a time/times convenient to the respondent.
- Surveys are a cost effective way of obtaining information as no travel expenses are required on a regional/national level or other large expenses incurred.
- Protection of respondent's anonymity on individual level is possible.
- Easy to transfer results into statistical packages.
- Respondents had time available to collate statistics required.

Questionnaires allow examination of groups on local, regional and national scales and returned survey results can be easily managed and transposed into a statistical package for analysis. The method employed also reduces the chance of prejudice as respondents are more likely to be honest in a questionnaire as opposed to a face-to-face meeting where they may feel pressure to be politically sensitive/correct in such an emotive area. There are however clearly some limitations in choosing such methodology such as the inability to probe one word answers or the difficulty in establishing who completed the questionnaire, such issues are examined in greater detail in Chapter 4. Prior to the design of the surveys a number of objectives were identified in determining the scope of the questionnaire to be administered.

2.3.2.3 Objectives of Surveys

The main terms of reference of the questionnaire of Building Control Officers were to evaluate current Irish Building Control Authority operational norms in monitoring and enforcing compliance with Part M.

The total population of this group in Ireland is 37 and each of these was issued with a questionnaire. The survey objective was investigated by;

- investigating policies and attitudes of Building Control Authorities towards disability at Local Government levels;
- evaluating the Building Control Authority's operational norms in monitoring and enforcing Part M of the Building Regulations and;
- determining the level of use of access auditing, IT and GIS by Building Control Authorities and Local Authorities in relation to Part M, access and other issues.

Acquiring this information would provide a greater insight into the opinions of Building Control Officers into the requirements of Part M, and therefore assist in the development of the "LADDER" concept and associated access audit criteria based on the TGD to Part M. Disability Organisations are also ideally positioned to provide opinions on issues relating to access. However in order to gain an insight in to the wide varying nature of these groups it was decided to administer a questionnaire across a broad spectrum of Organisations who had an interest in access to the built environment. Opinions were sought from groups representing both physically and sensory impaired individuals. This made it infeasible to personally interview each of the 50 organisations suggested by the NDA and "Access for All" participants and therefore the method of survey by questionnaire was adopted for this and the other aforementioned reasons. The main objectives for conducting Disability Organisations questionnaire were to assess their opinions on access issues by;

- determining the existence, organisation, policies and activities of Disability Organisations who are concerned with access issues, on a national level;
- evaluating the relationship between these Disability Organisations and the Local Authority in their area;
- determining if the relationship between Disability Organisations and the Local Authority is indicative of the Local Authority's policies in relation to access and Part M of the Building Regulations and;
- investigating the use of Access auditing, IT and GIS by in relation to access.

As this research spanned a time period where there was considerable change and reform in the central piece of legislation (Part M) this research focused on, the survey was reviewed, revised and administered a second time in 2010 to these target groups.

The purpose of implementing the survey again after this significant time period was to gain an insight into how the key stakeholders viewed the reform of the statutory requirement and how the new legislation altered actual accessibility of the built environment. Questions were revaluated and additional questions were included to the second round of surveys reflecting changes in legislation and these alterations are highlighted in red in the blank questionnaires presented in Appendix VII.

2.3.2.4 Design of Questionnaires

Building Control Officers were located in each of the 37 Local Authority areas and Disability Organisations were dispersed across each county of the entire country. Both questionnaires were designed specifically for the intended recipients, Building Control Officers who have been officially designated as Access Officers within the Local Authorities, to oversee the implementation Part M of the Building Regulations and Disability Organisations whose primary aim is to improve access to the built environment. The names and addresses of Building Control Officers were located through the Building Control Section of the Department of the Environment. Contacts in Disability Organisations were located through the NDA and "Access for All" participants. Prior to the distribution of these questionnaires a draft copy was issued to a member of the BRAB who is a practicing Building Control Officer and a director of the IWA. The reason for this was to pilot the questionnaires and to assess structure and effectiveness. Both respondents felt their professions had limited time available to assist in research projects and as a result some questions were reformatted, shortened or rephrased to simplify the response process and make the layout more user friendly. The questionnaires consisted of a series of questions divided into four sections; General Information, Part M of the Building Regulations, Access Auditing and IT. Questions posed varied in style and included dichotomous questions that required a simple yes/no answer and polymorphous questions, which combine dichotomous and open-ended questions. These questions were easy to ask, understand, record and analyse and are useful for obtaining factual information. Open-ended questions were attached as a second part to such questions, where if a yes answer was given the respondent can give extra sometimes attitudinal information to the dichotomous question posed.

The questionnaires also consisted of multiple-choice questions that offered the respondent a number of alternatives and so permitted the collection of more detailed data. Broad open-ended questions that gave respondents complete freedom in answering were also included in this questionnaire to obtain subsidiary information while providing the respondent with the opportunity to include any further comments that they felt might be of relevance to the research.

2.3.2.5 Survey Administration and Analysis

A total of 37 of the final questionnaires were issued to Building Control Officers and 50 were issued to Disability Organisations in the first round of questionnaire in 1999. In the second round of questionnaires (in 2010 post legislative reform) 37 questionnaires were once again issued to Building Control Officers while 40 questionnaires were issued to Disability Organisations. Ten Disability Organisations had disbanded since the initial round of questionnaires and therefore were unavailable for participation. Questionnaires were delivered by post to the appropriate contact person that was designated as the Access Officer in each of these organisations. There was a cover letter explaining the project and the reason for the questionnaire and a pre-paid self-addressed envelope for responses enclosed in each questionnaire. The cover letter also offered the option of obtaining braille or an enlarged print versions of the questionnaire. Questionnaires, including cover letter are presented in Appendix VII. On return of questionnaires the responses were organised and coded to SPSS for Windows. The data was analysed in SPSS. Both qualitative and quantitative statistical analysis was carried out on the data, the result of which can be found in Chapter 4. The questionnaires also had some questions common to both. In order to see a cross-tabulated relationship between the two data sets, some common response rates were mapped to GIS to indicate where both a Disability Organisation response and a Building Control Authority response were received in the same Local Authority area. The use of GIS in this manner provides an illustrated introduction into of GIS and the resulting thematic maps are shown in Chapter 4.

Limitations of Surveys

A limitation of the Building Control Officer questionnaire was that it was administrated to Building Control Officers who had been designated as Access Officers. On receipt of the original questionnaire in 1999 eight of the "designated" Building Control Officers made contact to explain that they did not realise that they had been designated as such an officer and felt that it was neither part of their roles nor responsibilities as Building Control Officers. This led to some incomplete questionnaires and questionnaires being unreturned. This lack of recognition of the roles and responsibilities within Building Control Departments hinted to the lack of commitment and interest in the subject area by Local Authorities as a whole. This however was not found to be the case upon re-administration in 2010 where all acknowledged their role. A separate limitation was however found in the administration of the second round of questionnaires in 2010. In early 2010 Local Authority personnel commenced industrial action that effectively initiated a "work to rule" campaign. Consequently some Building Control Officers refused to undertake work that was not specified in their terms and conditions of employment. Cooperation with student research does not fall under their official contract of employment and therefore some respondents returned blank questionnaires apologising for their inability to complete the survey due to their union direction. This impacted negatively on the response rate from this target group. A limitation identified of the Disability Organisation questionnaire was that certain Organisations had since disbanded due to various reasons, which included lack of finance, insufficient government support and wavering interest. This reduced the size of the sample group. Some of the Disability Organisations were no longer solely concerned with access issues, and did not feel that the questionnaire was entirely relevant to them. Such limitations are further explored in Chapter 4.

2.3.3 "LADDER" Design, Development and Implementation

2.3.3.1 "LADDER" Overview

To design and develop the proposed "LADDER" concept a multi-dimensional approach was adopted. With pre-analysis and skill attainment complete the prerequisites necessary to the design and develop the "LADDER" concept were in place.

From this point the design and development of the "LADDER" concept expanded. The access audit was designed and tested in order to both collect accessibility data and test the legislative requirement. Collected accessibility data was then transferred to a GIS to examine the potential for its use as both a decision-making and communication tool for both people with disabilities and the identified key stakeholders. The following schematic aims to outline the interaction of the multi-dimensional approach to "LADDER" design, development and implementation;

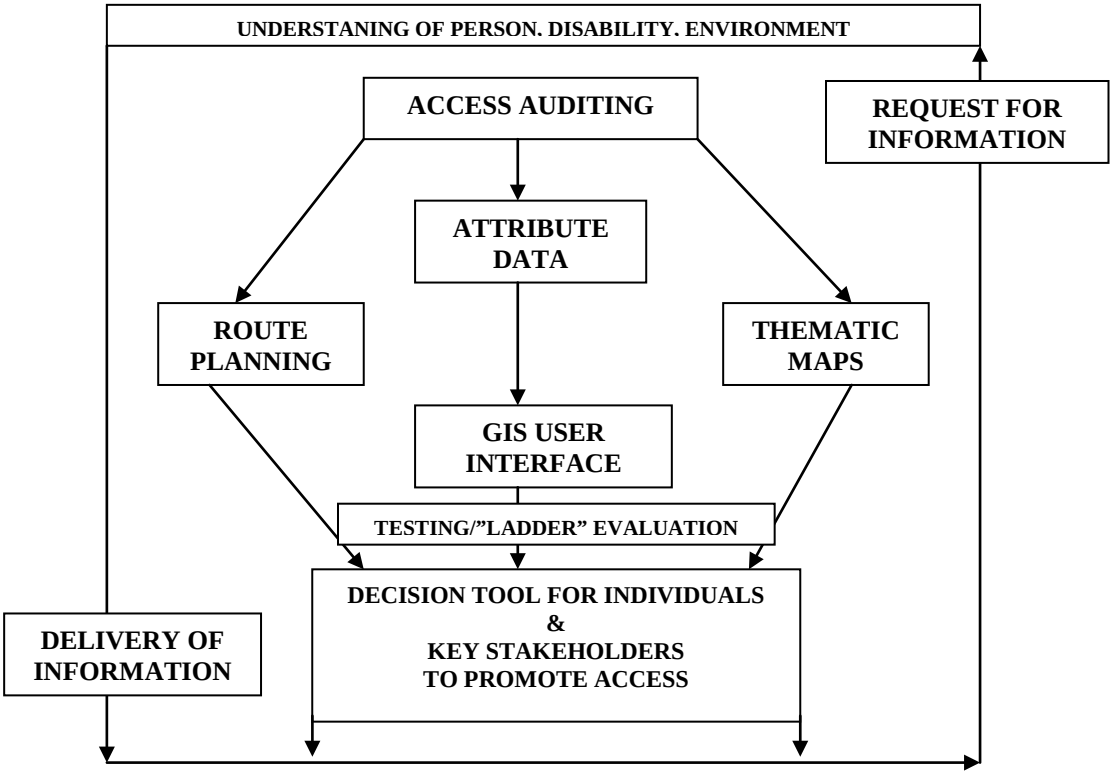


Figure 2.2 Outline of Multi-dimensional Approach to Design, Development and Implementation of "LADDER"

Other options in the design of the "LADDER" concept were considered such as using cartography instead of GIS. As demonstrated in Appendix VI there have been many cartographic representations of access information, however if this information is not linked back to an easily accessed comprehensive access audit database the individual user cannot make an informed decision specific to their needs. The adoption of Part M rather than universal design criteria may also be contested however it was identified from literature reviewed that designers and architects accept legislative guidelines as operational norms and therefore for the "LADDER" concept to be useful and accepted it is more desirable to utilise Part M rather than an aspirational guide.

In this way legal enforcement can also be applied to its application thus improving access on a tangible level. Following the consideration of the previously mentioned prerequisites the development of the "LADDER" concept progressed utilising two distinct techniques;

- Access Auditing for Data Collection and;
- GIS for Data Communication

2.3.3.2 Access Auditing for Data Collection element of "LADDER"

a) Objectives of the Access Audit

The main aim of this research was to design and develop "LADDER" to collect and communicate accessibility information for people with disabilities to assist them in daily activity planning. Although the surveys administered did not materially affect the choice of Part M as the auditing tool, they did provide a very useful insight into the understanding and application of the TGD on a realistic regulatory level, this practical aspect is further examined in Chapter 5. The access audit used for the purpose of this research was an Analytical Audit, as explained in Chapter 3. This audit was modelled on previous experience gained through the CAE. It consisted of a series of 106 queries on loose-leaf pages in checklist format. Once a set of accessible design criteria has been decided upon to determine access in the audit a list of measurement criteria can be developed. Measurement criteria in this instance were based around the TGD to Part M. The objectives of the access audit were to:

- design and implement an access audit based on the TGD to Part M
- organise the results of the audit in a manner suitable for use in a GIS
- assess the effectiveness of the TGD to Part M in providing access

Exclusively for the purpose of the physical measurement element of the audit the definition or model of disability adopted was strongly influenced by the social or architectural model as this is the model adopted by the TGD used at the time of implementation. The proposed "Supportive" model outlined in Chapter 3 forms the underlying model adopted throughout the fundamental philosophy of the research. This social definition was chosen at this stage of implementation as it relates to physical audit work carried out. In this instance people with disabilities are,

> "People who have an impairment of hearing or sight or an impairment which limits their ability to walk or which restricts them to using a wheelchair".
>
> (Building Regulations 1997, Part M, page 3)

b) Selection of Pilot Test Area

The access audit was tested on area that was chosen following examination of regional census data. The area selected was felt to be representative of any central business area in any Irish city or town. Services in the area included a library, shopping centre, post office, hotels, a college, swimming pool, pubs, a night-club, restaurants, a school, a cinema, banks, a small shopping centre and many other small shops. The population served by this pilot test area is approximately 15,000 people (CSO, 1996). From investigations carried out by the Commission on the Status of People with Disabilities in 1996, 10% of the population are disabled at any one time, therefore in the case of the chosen pilot test area approximately 1,500 people served by the area may have a disability. This does not take into account other temporary ways by which individuals are disabled by the environment for example a person pushing a pram, on crutches or carrying heavy loads. The Development Plan for the pilot test area had access provisions that included, parking, building entrances, sign-posting, pedestrian routes, changes in level, street furniture, vertical circulation within buildings and other amenities, for example toilets and phone boxes. It is an area that was zoned "to provide for and improve mixed service facilities".

The area chosen for this research has on request of the participants been kept confidential to protect their anonymity. It was therefore agreed that photographs would not be included in order to encourage participation and protect identity. The buildings that were chosen for the audit were buildings whose entrances or approaches to their entrances were on the street edge. Only ground floor use was considered in the audit. Although a smaller pilot test area could have been selected it was considered that in order to get a true reflection of the application of the "LADDER" concept every audit criteria required testing for each of the disabilities covered by the TGD and therefore a broad multi-faceted test area was required. This provided a valuable source of intricate data that could then be utilised in the testing of the decision-making and communication capabilities of the "LADDER" concept.

c) Access Auditing Technique

The access audit utilised measurement criteria designed around the TGD to Part M. Each of the requirements set out in the TGD were examined and converted into audit criteria. Two "cut-off" points were arbitrarily selected, one at either end of the pilot test area in a manner than encompassed as many services (rather than housing) as possible. Within the selected "cut-off" points were a total of 157 buildings. The access audit involved the inspection of each of the 157 buildings chosen from the pilot test area. Each inspection commenced with a request of permission from the manager/owner to firstly conduct an interview with them and to secondly, conduct the audit on the public areas of their premises. The technique incorporated a pre-audit interview, development of audit equipment, pilot testing, implementation and organisation of results.

- **Pre-Audit Interview**

The purpose of carrying out an interview with each of the owners or managers of the premises in the pilot test area was to establish any extra provisions or other relevant factors that were not apparent from a visual or physical examination. On arrival at each of the premises a meeting with the owner or manager was requested. On receipt of permission to continue with the research the researcher interviewed the manager in accordance with a set of pre-assigned questions, which could be altered depending on individual premises and situations. These interviews investigated provisions for people with disabilities, including evacuation in the event of an emergency, staff training as well as some general questions on frequency of visits by people with disabilities and the types of limitations visitors may have. The results of the interviews are located in Chapter 5 and questions posed during the interview are available in Appendix VIII.

- **Auditing Equipment**

On completion of the pre-audit interview each of the premises were issued a letter requesting their permission to continue with the physical audit. On receiving permission each premises was audited using the required equipment which included:

(i) Access Audit Checklist

The access audit checklist consisted of a series of 106 questions pertaining to the accessibility of various features of the built environment. These questions were designed by the researcher through examination of requirements of the TGD to Part M of the Building Regulations 1997. The audit criteria to be assessed were inputted into a mobile hand held device. A tick "Yes" or "No" in the appropriate box or actual measurement figures were requested as responses. Questions pertaining to access for people with sensory disabilities were highlighted using red font to assist final interpretation of results. The audit criteria were divided into the following eleven sections A to L and are shown in Appendix V.

A	**Approach**	**G**	**Internal Stairs**
B	**External Steps**	**H**	**Use of Facilities**
C	**Ramps**	**J**	**Hotel/Other Guest Rooms**
D	**Access into a Building**	**K**	**Sanitary Conveniences**
E	**Internal Circulation**	**L**	**Audience/Spectator Facilities**
F	**Lifts**		

(ii) Measuring Equipment

A two-metre measuring tape was used to record the dimensions required by some of the questions in the access audit checklist. This type of tape was chosen as none of the measurements outlined in the checklist exceeded two metres. A sonic measuring device (Sonin 60 PRO) was also utilised in the access audit for measuring longer distances. This device did however have a distinct disadvantage. It can only measure a point between solid objects therefore if glass or a thin medium (e.g. the leading edge to a door) is an element of the measurement required, inaccurate results may be found. In this case a two-metre tape was more suitable.

(iii) Inclinometers

A Stanley Midas 180 adjustable spirit level was used in conjunction with an inclinometer developed by the researcher to measure gradients encountered for example ramps or inclines. The Midas spirit level had an adjustable bubble in oil so different angles could be measured. These angles were then converted into gradients. This inclinometer is depicted in figure 2.3.

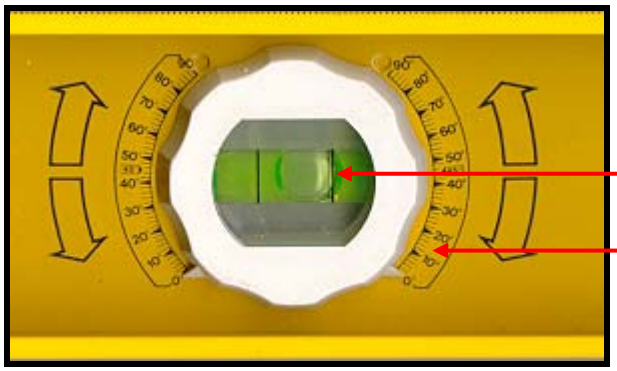


Figure 2.3 Scanned Image of a Section of Spirit Level used as an Inclinometer to Measure Gradients

The access audit criteria required a fixed gradient that did not exceed 1 in 12 for ramps. The researcher developed a separate "fixed" inclinometer as no such instrument was available in a cost efficient manner at this time. This consisted of a spirit level attached to a section of wire fixed at the correct gradient. This fixed inclinometer was permanently set at the required gradient of 1:12. Any ramp that did not meet with this set gradient was subsequently measured using the Midas 180 Spirit Level. Both instruments were calibrated prior to commencement of the audit by comparison with known gradients. Inclinometer developed is shown in figure 2.4

Figure 2.4 Scanned Image of the Fixed Inclinometer used to Measure Gradients

(iv) Psion Series 3c Palm Held Computer

The queries from the access audit checklist were inputted on site during the audit into a Series 3c Psion. The spreadsheet capabilities of the Psion were used to initially store the results from the audit. The Psion has the advantage of saving time on data input, and allowing for results to be inputted on site thus decreasing discrepancies and reducing the need for call-back. The Psion also had a range of optional connections to communication devices including printers, fax, modem or e-mail system. PsiWin software was used to transfer the result files into Excel on a personal computer (PC).

(v) Force Metre

The TGD to Part M has a requirement that doors fitted with self-closing devices be suitable for operation by people with disabilities. As this requirement is open to individual interpretation a known standard was selected by the researcher. The Americans with Disabilities Act Checklist for Readily Achievable Barrier Removal (1995) recommends a torque of no greater than 5 Llb (2.27 kg.) for opening internal doors. The use of a spring scales was therefore incorporated into the access audit. This technique was recommended by Accessibility Development Associates (Pittsburgh). This instrument was calibrated using scientific weights. This allowed the user to evaluate whether or not the self-closing devices on doors were suitable for operation by people with disabilities (Figure 2.5).

Figure 2.5 Scanned Image of Force Metre used to Measure Torque

(d) Pilot Test and Implementation of Audit

The auditing technique developed by the researcher was tested on 10 random buildings in the pilot test area prior to its application on the entire area. This allowed for any discrepancies to be adjusted or corrected before commencement of the audit of the entire pilot test area. Once modified the access audit was implemented on the entire pilot test area (157 buildings) using 106 audit criteria. This provides an indication of the volume of results collected in such research and the need for a system versatile enough to handle and present the complexities overall findings.

(e) Organisation of results

Results were inputted from the spreadsheet in the Psion hand held computer into Excel using PsiWin Excel, spreadsheets. Data collected was then broken down into the following categories for the purpose of data organisation and management:

- Eleven Sections of the Access Audit, A to L.
- Access for Wheelchair Users, Mobility Impaired and Sensory Impaired
- Four Building categories; Recreation, Education, Commercial and, Business;
- Street Access and Pedestrian Access

2.3.3.3 GIS for Data Communication element of "LADDER"

(a) Overview

As mentioned the access audit was implemented on the entire pilot test area of 157 buildings using 106 audit criteria measurements and three categories of disability thus creating an exponential amount of valuable accessibility data. Other tools such as tables, graphs and basic cartography were considered for the second stage of the "LADDER" concept; communication and decision-making utilising acquired access data. It was discovered that none of these processes had the organisational, presentation or manipulation attributes required to create a tool that could provide a decision-making and data communication process specific to an individual's and key stakeholders' requirements. The communication of information element of such tools were neither aesthetically acceptable nor detailed enough to be of interest to key stakeholders and the "live" nature of the GIS made it the most viable option. Once the results from the access audits were organised to a manageable level in Excel they were imported into a GIS for storage, manipulation, analysis and display. The use of GIS in this research involved both the use of bespoke hardware and software.

- **GIS Hardware**

The hardware utilised in this research included an "Imagestar" scanner, and a "True Scan" large document scanner to scan maps necessary for digitising. A 100 MHz. Pentium Siemens Nixdorf 5H PCI with 16 Mb RAM and attached mouse was used to run MapInfo version 3.0 and later the upgrade to version 5.0, Microsoft Excel version 5.0, Microsoft Word 2002 and SPSS version 6.1. A HP Deskjet 850C printer and ENCAD Cadjet 2 plotter were used to print, text, maps, graphs and tables.

- **GIS Software**

The GIS software that was initially used was MapInfo version 3.0. During the period of research it became possible to upgrade to MapInfo version 5.0, which increased both the speed and accuracy of the GIS. However upgrading required the researcher to re-learn how to use the software. MapInfo is a Windows '95 based package, which can accept files from Microsoft Excel, dBASE, Lotus 1-2-3, FoxBASE, delimited ASCII and, database files which can be used within MapInfo.

This software package provides the processing power of databases, the visual power of maps, charts and graphs, and is a strong tool for analysis. It gives multiple views of data in the form of map windows, browsers and graph windows. These views can be seen simultaneously with updates to a view automatically updating all views. MapInfo can store graphic and non-graphic data, in raster or vector format and tables respectively. Non-graphic data can be displayed using points or thematic maps. MapInfo is capable of performing most basic GIS functions, although it does not have a powerful statistical tool. MapInfo was used to store map data and attribute data (access audit and survey results), coding of data using geo-coding functions, and the production of thematic maps based on specific queries. The attribute data was imported into MapInfo version 5.0 from Microsoft Excel version 5.0. Excel was also used for graph capabilities for interview results.

(b) Implementation of GIS

The implementation of a GIS for use as a tool for decision-making and communication of accessibility information involved a number of steps. Data Identification, Collection, Input, Manipulation and Storage each interlink to make up a GIS. The following is a brief summary of these activities.

- **Data Identification and Collection**

Data identification and data collection was previously examined in section 2.3.3.2 whereby the pilot test area was selected and the access audit was designed and implemented to identify a suitable research area and collect accessibility information.

- **Data Input**

(i) Digitising of Maps

The format of data determined data input. Data was originally in the form of hardcopy maps and excel spreadsheets. An Ordnance Survey composite map of the pilot test area was scanned using a True Scan scanner. This map was then imported into Paint Shop Pro for cleaning and resizing. This map was at a scale of 1:1000. The hardcopy map was converted to digital form and was opened as a raster image in MapInfo version 3.0. This was the base map to be used for digitising. Four control points were entered onto the map in a process called image registration.

Image Registration places the map within a geographical co-ordinate system. Manual digitising was then performed on the base map. The relevant lines on the raster were traced using the mouse and the traced line was then converted to an area or polygon that is linked to a building or footpath. This process of digitising converted the raster image to a vector image. The digitised map is shown in figure 2.6. A limitation of combining two or more polygons in the digitising phase led to the appearance of 158 rather than the actual 157 premises (Figure 2.6).

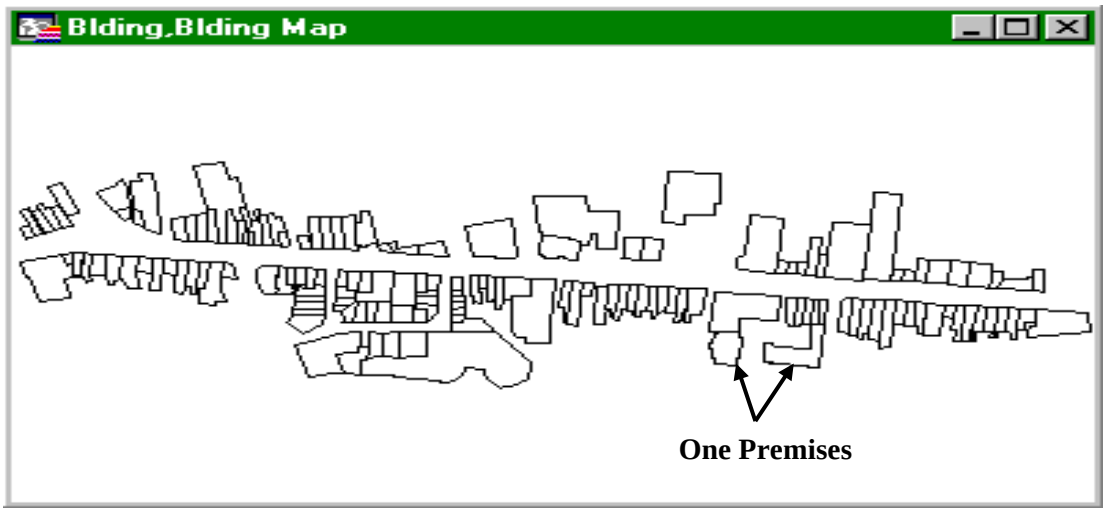


Figure 2.6 Digitised Map of Pilot test area

The attribute data (results from the access audits) was then imported from Excel, which after organisation and modification, could be directly imported into MapInfo. Maps were reproduced with permission from the Ordnance Survey of Ireland.

(ii) Coding of Data

After access audit data was imported from a Psion palmtop computer into Excel a coding system was developed for the database. Each building was given a different identification number and the data was then coded according to four building categories, “Recreation”, “Education”, “Commercial” and “Business”. This coding system was developed for two reasons, firstly as this was a confidential audit a coding system preserved confidentially of the system, and, secondly the design eased consistency in mapping and statistical analysis.

- **Data Manipulation**

The digitised map and data in Excel tables are opened in MapInfo in the form of tables. Each of these tables was made up of rows and columns.

Rows contain information about a geographical feature and in this case rows contained information about individual buildings in the pilot test area. Columns contain particular information about items (buildings) in the table and these tables are saved as "Browsers" that can be mapped in MapInfo. A browser is a window for viewing and editing data and graphic objects (Digitised Map) are displayed as maps. Once data from the audit has been opened in MapInfo they can be modified, this allows the user to change the order of fields (columns in the browser window), add or delete fields and, adjust field information (character/integer). Thematic maps were made for combinations of the various features outlined in table 2.1

Categories of Buildings	Audit Criteria	Disability
• Recreation • Commercial • Education • Business	• Entrance • Approach • Usage of Facilities • Sanitary Conveniences • Audience/Spectator Facilities • External Steps • Ramps • Stairs • Hotel & Other Guest Rooms • Internal Circulation • Lifts	• Wheelchair • Mobility • Sensory

Table 2.1 Organisation of Access Audit Data for GIS Thematic Mapping

- **Data Storage and Maintenance**

The scanned raster map was stored as a .tif. (Tagged Image File Format) image. This map was then registered in MapInfo, digitised (vector map of the pilot test area) and stored in table format. The 11 sections of the access audit were firstly stored in Excel and then transported into MapInfo for use in the thematic mapping process, where they were stored as tables. Thematic maps allow analysis and visualisation of data in map format. In databases, spreadsheets and hardcopy files it is difficult to clearly see patterns or trends in data, whereas using a thematic map and thematic shading reveals required data clearly. Queries were then devised using structured query language and stored as tables. Queries visually demonstrate the decision-making and information communication element of "LADDER". Layout windows from these queries were stored as Workspaces and examples are shown in Chapter 5.

Thematic mapping enhances a map according to a particular theme, for example audit measurement criteria. The following schematic (Figure 2.7) illustrates how data is manipulated through thematic mapping for the purpose of the communication of data and the decision-making element of the "LADDER" concept.

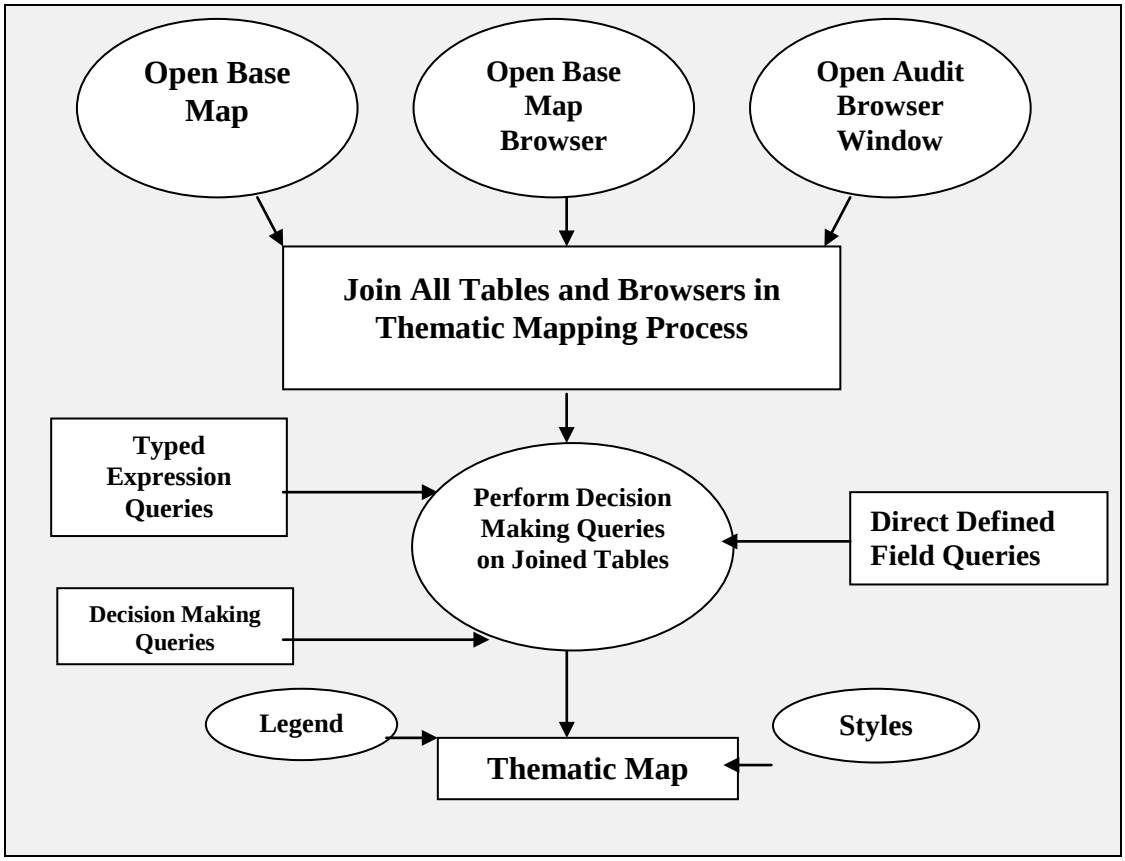


Figure 2.7 Outline of Decision making Function/Thematic Mapping Process

2.3.3.4 Evaluation of "LADDER" through Survey Follow Up and End User Narratives

a) Survey Follow Up

Testing of the "LADDER" concept was carried out through its implementation on a pilot test area typical of an urban centre. In order to gauge preliminary opinions of the end product/"LADDER" concept two methodologies; a follow up survey and end user testing were employed. In the original questionnaires issued to the Building Control Authorities and the Disability Organisations a question was posed to each group as to their opinion on the benefits of combining access auditing with GIS. As a follow up to this another questionnaire was issued to both groups. The aim of this follow up was to illustrate on a practical level the concept that was initially introduced and therefore it was important to demonstrate the systems capabilities.

Many Irish Local Authorities had little or no experience in the use of GIS at this time so it was decided to present the system in its most practical end user format, a thematic map. A printed map was presented to each Building Control Authority and Disability Organisation with a brief questionnaire to evaluate their opinions on the effectiveness of this system. This questionnaire consisted of a dichotomous question that was linked to a GIS thematic map that was a working example of how such a system would work. The question that was included in this follow up related to the accessibility of the entrances of all buildings in the pilot test area to wheelchair users. The buildings that did have accessible entrances were highlighted in deep purple, and the entrances that were inaccessible were illustrated in lilac. A "yes" or "no" answer was requested from the survey groups as to whether this system was beneficial in displaying, storing and analysing accessibility data for people with disabilities. The questionnaire was administered to each of the respondents of the two original questionnaires (i.e. 17 Building Control Authorities and 35 Disability Organisations). Although one-dimensional significance of this questionnaire is examined in Chapter 5. This questionnaire including the sample thematic map is shown in Appendix IX.

b) End User Narratives

Two of the participants of the "Access for All" programme were also contacted to assess their opinions of the system as potential end users. It was identified from an early stage that any research into the area of disability must take into account the opinions and needs of the target group. These participants were provided with a practical demonstration of the "LADDER" concept on a PC and asked their opinions of the system. Their opinions and observations at the time were documented and examined with transcribed narratives located in Chapter 5.

Narrative 1: Subject A an individual with a mobility impairment that limits the use of her left leg and left arm. Rose walks with the use of a walking stick.

Narrative 2: Subject B an individual confined to a wheelchair with upper body strength that allows manual propulsion.

Both were shown the decision-making functions of the "LADDER" concept and asked to express their opinions on how useful this would be in their daily activities in independently accessing services individual to their needs.

Limitations of Access Audit

The assessment of some of the parameters set was a subjective measurement, which can vary with individual interpretation. For example the assessment as to whether or not door closers were suitable for operation by people with disabilities is a subjective measurement to the researcher. The audit was restricted to people with physical disabilities and individuals with cognitive or mental disabilities were not considered. The definition adopted for people with disabilities for the purposes of the access audit was taken from Part M of the Building Regulations 1997 and does not include people with cognitive or mental disabilities. Housing was excluded from the pilot test area. The implications of these limitations are further examined in Chapter 5.

2.3.3.5 Development of "LADDER" through Route Mapping

All of the footpaths, pedestrian circulation routes and pedestrian crossings were audited in the areas surrounding the buildings in the pilot test area. This was beyond the scope of Part M but was required for mapping access routes that were deemed essential to independent access. This provided an interesting perspective of the potential of the "LADDER" concept for path finding or "Route Mapping". Although data attained during the access audits of individual buildings was very valuable in identifying accessibility options of individual buildings this did not give the user an informed depiction of the circulatory space between these buildings. Therefore although a user may be satisfied they could use a building internally it may not have been possible to use the streetscape approaching the building. It was therefore decided to further analyse the data to map circulation routes around the external areas of buildings in the pilot test area. Providing combined accessibility data on both circulatory space and individual buildings could provide a seamless tool for identifying accessible and inaccessible urban centres to promote improved independent accessibility. The access audit assessed the accessibility of the streetscapes and footpaths adjacent to the buildings using the audit criteria for "approach to buildings" (Appendix V). As the pilot test area consisted of buildings side by side correlating all approach information together gave a seamless representation of accessibility of all approaches and hence the entire external circulation space. Attributes examined are shown in Table 2.2.

Aspect	Areas Considered
Footpaths	Dishings, Width and Height of footpaths, Location of Manhole Covers Lamp Stands, Telephone Boxes or Booths, Bus Shelters, Bollards, Hoardings, Tactile Pavings, Slippery Surfaces, Uneven Surfaces, Parking Meters, Signage, Post Boxes, Dustbins, Railings, Pedestrian Crossings and objects which project into Pedestrian Traffic route.
Pedestrian Crossings	Tactile Indicators, Audible Indicators, Visual Indicators, Railings, Allowed Crossing Time

Table 2.2 Areas Considered in Access Auditing of External Environment

To investigate the potentials for mapping these routes the data relating to circulatory accessibility of the pilot test area was analysed using GIS. Due to the large quantity of data collected it was decided to examine route mapping in relation to accessibility for wheelchair users and mobility impaired users only and the needs of those with sensory disabilities were not considered at this time. The detailed nature of such data also required some further limitations to be applied to its analysis. Data was analysed in two ways, firstly the entire pilot test area was broken down into 59 sections or zones of footpath, each approximately 100m in length. These 59 zones were firstly taken as a whole with general accessibility queries performed on the area. Three queries that were performed on this data were;

- **overall accessibility of all footpath widths** (not including obstacles; the measurement criteria for this query were taken from the TGD to Part M, where a clear unobstructed width of 1,200mm is deemed to be accessible. 1,200mm was deemed by the TGD to be the minimum width required for an independent wheelchair user to travel trough the space unimpeded).

- **all impeding obstacles** (Obstacles that were considered impediments were those that could reduce the clear unobstructed width of the route of travel of the footpath. These obstacles included phone boxes, bus stops, lamp-posts, railings, hoardings, dustbins and dishings. Some of these obstacles were permanent structures such as lamp-posts while others were transient such as sandwich board advertisements. Both classes of obstacle would create a significant obstacle to access if located in an unsuitable location).

- **surface conditions of the area** (Surface conditions were taken into account in a subjective manner. Conditions highlighted as being an impediment to access included manhole covers (may act as a slip hazard), uneven levels in footpath finishes, and cracks in concrete. These conditions were identified as hazards during the period spent living and working with people with disabilities).

The second way in which the data was analysed was through the examination of a smaller section of the pilot test area in order to observe data in more detail. This route consisted of twelve of the 59 100m zones of the entire pilot test area. Figure 2.8 depicts the section that these twelve zones are contained within. These twelve zones were examined using the same aforementioned criteria as the entire pilot test area except in the case of accessibility arising due to obstacles where each of the sections were examined according to specific obstacles present. As the queries were built, more of the obstacles to accessibility were included. In order to demonstrate decision-making it was necessary to create a potential route of travel and four points, A, B, C and D were assigned to various parts of the zones of the selected area. This allowed for the planning the accessibility of the route from for example A to C, taking into account point B. The location of points A, B, C, and D (in zone Z-1, 6, 9 and 12 respectively) are denoted by the letter location as shown in figure 2.8.

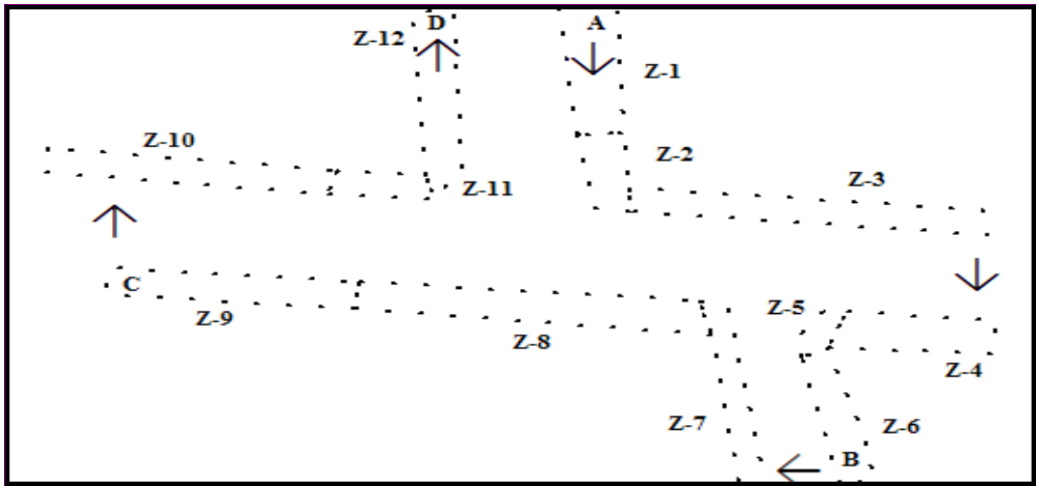


Figure 2.8 Location of A, B, C and D in Selected Section of Pilot test area

The data from these queries demonstrated the potentials of using "LADDER" for presenting data for decision-making in route mapping. As mentioned these results were outside the scope of Part M and therefore acted as a development of the theory to assist key stakeholders in improving data collection and communication. The results of these findings area reported in Chapter 5.

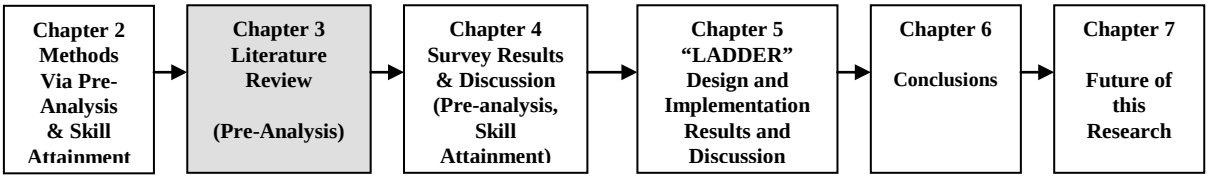
Limitations of Route Mapping

It was found that if one aspect of the route was determined to be inaccessible, for example a wheelchair could not access a footpath due to a kerb not being dipped, then the entire route was inaccessible. This limitation is acknowledged however it could be argued that for an independent wheelchair user such an inaccessible feature may render an entire route inaccessible to them. The implications of this limitation are further discussed in Chapter 5.

2.4 SUMMARY

A two-part approach was employed in the design and implementation of the multi-dimensional methodology chosen to investigate the research aim and associated objectives. Part one of Pre-analysis and Skill Attainment involved a comprehensive literature review of the subject areas important to this area of research. Topics reviewed were important to both the conceptual framework (including understanding individual, disability and environment) and the elements necessary to design, implement and develop the "LADDER" concept (legislation, access auditing and GIS). The knowledge attained was then combined with the required skills to progress the research on to part two; Design and Implementation. This part involved the design of questionnaires, access audits and thematic maps as core attributes of the over all decision-making and communication functions of the "LADDER" concept.

The methodology involved a multi-dimensional approach that provided a cohesive process that progressed naturally in the investigation of the aim of this research. Chapter 3 considers literature relating to the elements that were identified as being critical to the development of this research that is the individual, the disability and the built environment. Chapter 4 examines the results and observations on the implementation of the Pre-analysis and Skill Attainment methodology while Chapter 5 examines the results and observations of the Design and Implementation part of the methodology.



3.1 INDIVIDUAL AND DISABILITY

3.1.1 Introduction

In developing a conceptual framework to the core focus of this research; collection and communication of access information for the empowerment of people with disabilities, three underpinning subject areas were identified as being fundamental in considering and improving accessibility information provision. The identified areas are "the individual", "the disability" and the "built environment" and each will be considered in detail in this chapter. This chapter is divided into three sections the first section examines disability in terms of the individual and disability through detailed assessment of models of disability. The second section examines the built environment and how current legislative requirements have designed the current built environment and the concept of universal design as a proposal for improving access into the future. The third and final section introduces and assesses elements vital to the success of the proposed "LADDER" concept; access auditing and GIS. Both individually and combined the examination and combination of these factors could greatly influence the status of people with disabilities in Ireland. The collective examination of each of the core aspects the individual, the disability and the built environment forms a cohesive approach to investigating the main aim and associated objectives of this research.

THE INDIVIDUAL AND THE DISABILITY

This first section examines what disability is and how it manifests for an individual. The method chosen to investigate this aspect is through the examination of current defined models of disability. There are many approaches to defining disability each of which are relevant to the motivation for addressing the subject area, a definition is required to understand a concept. Failure to coherently link a definition directly to a study can result in a study of limited relevance. People may be designated disabled by one definition but may not fit into another definition, creating gaps in service provision if not considered carefully (EC, 2002). Rather than adopting one unified definition a definition should be decided upon based on the issue to hand. Some researchers have chosen to ignore the influence of models of disability in implementing disability research and decide to adopt a common accepted definition without investigating alternatives.

This approach is untenable as it neither takes into account the true causes of disability nor the individual, without confronting these issues educated determinations cannot be recommended. A general challenge to protecting individuals under a national framework has been defining what constitutes a disability and therefore who a person with a disability is (ERT, 2008). This ever-changing debate has divided many as to whether a person has a disability, impairment or both. There are many viewpoints that could be adopted in the investigation of this problem. Firstly the issue of the individual and the disability, can the two conceivably be linked? Many argue that there is no such thing as a disabled person: it is society that disables by not providing a society accessible to all. To understand the individual and the disability the definition of disability must be examined in detail. For example from submissions received by the Commission on the Status of People with Disabilities (1996) which prompted the initial interest in this subject, it was felt that the term "disabled" was demeaning. In using this term, the disability is seen first, rather than the individual. It was suggested that the term "people with disabilities" is more appropriate. To be seen as an individual rather than a disabled person is probably one of the most challenging obstacles to be faced. The Commission recommend that people with disabilities be defined as:

> "Children or adults who experience any restriction in their capacity to participate in economic, social or cultural life on account of a physical, sensory, learning, mental health or emotional impairment".
>
> (Commission on the Status of People with Disabilities, 1996, page 153)

As this research was inspired by the findings of the Commission's report it would be easy just to adopt this definition and continue the research without considering alternatives. This definition aptly sees the individual first and the limitation second, seeing the disability first put the individual at an automatic disadvantage. If the obstacles to ability are seen as the problem rather than the design of the built environment in which the person circulates, it is society that disables. But does removing the limitation or medical condition from the accessibility equation really provide an accurate model for disability? To answer this both models need examination in greater detail.

Smart (2009) felt that models of disability form the rationale for research as they influence a person's perception of disability and response to people with disabilities. The quality of life for people with disabilities is determined by models of disability as to deal with the problem it must be firstly defined and understood. Definitions of disability vary greatly depending on the model selected. Each model mirrors the agenda of its subscriber and therefore a level of bias will always be evident and as highlighted by Smart (2009) such bias could greatly influence research direction and outcomes. All models will have their strengths and weaknesses and hence limitations. There are two common opposing models generally used in defining disability, the medical/administrative model and the social/architectural model. Normally those involved in the subject area adopt one model as their ethos in contributing to the debate. In examining both models it is clear that acceptance of either may significantly affect the outcomes and success of projects designed to create more inclusive societies.

Models of disability assist the understanding of the subject, providing a tool that facilitates analysis from contrasting viewpoints and allow unconsidered theories to develop. The first noted model of disability was the moral model; this model is now largely outdated in western culture as it directly links disability to sin (Kaplan, 2000). Some cultures felt a profound shame and embarrassment in having a member of their family with a disability, sometimes to the extent that they were locked away and socially excluded. It has also been referred to as the religious model where it was believed that God had chosen the person to have the disability for a reason or punishment. In his examination of the moral model Devlieger (2005) felt that God endorsed the cultural rationality of the moral model meaning that the responsibility did not lie with society to address disability. However this model was of no assistance to the understanding of disability or how to improve the status of people with disabilities. Due to its ineffectuality the moral model slowly evolved into the medical model as people with disabilities moved from be perceived as evil or punished to being special having brave characteristics to cope with the challenge placed upon them.

People with disabilities now required assistance. The following sections examine both medical and social models of disability and their impact on the accessibility for individuals with disability.

3.1.2 Disability – Medical Model

The medical model views the person with a disability as being sick and requiring rehabilitation to cure their inaccessibility into society. It was developed initially for war veterans returning with disabilities to provide them with hope that they could potentially be rehabilitated (Devlieger, 2005). This model portrays disability as being the relationship between the individual and their impairment as it is a particular illness or impairment that disables a person. Whether it is a lack of physical mobility or having a sensory impairment the medical model adopts the "defect" as the sole reason for the person being disabled. With the emergence of the medical model in the 19th century people with disabilities began to be "treated" for their shortfall through the intervention of medical aids and advancement in medical technology (Kaplan, 2000).

The fundamental attributes that underpin the medical model incorporate the rehabilitation of the person with a disability combined with the physical aids available to them to make life more "manageable". There may also be the requirement for personal assistance to ensure the cohesion of these aspects. Issues such as independent living although not considered in its early use has gradually formed part of the medical model in more recent years. In the early years of rehabilitation the main focus was to assist a person in personal care and basic daily activities, independence was not the primary concern. Auxiliary aids such as wheelchairs, walking canes and hearing aids all "dealt with" the problem of disability. This thinking allowed society redeem itself in moving away from the moral model. If society tried to cure them and found space for them they have dealt with the "outsider" who is excused from the normal obligations of society. This is the antithesis of what the person with a disability desires. They wish to go to school, get a job and contribute to society, all as independently as possible.

Instead a dependant life of rehabilitation in an institutionalised environment awaited allowing policyholders to treat this as a purely medical rather than environmental issue. Figure 3.1 outlines from the viewpoint of this research the main contributing factors that go towards the construction and rationale of the medical model.

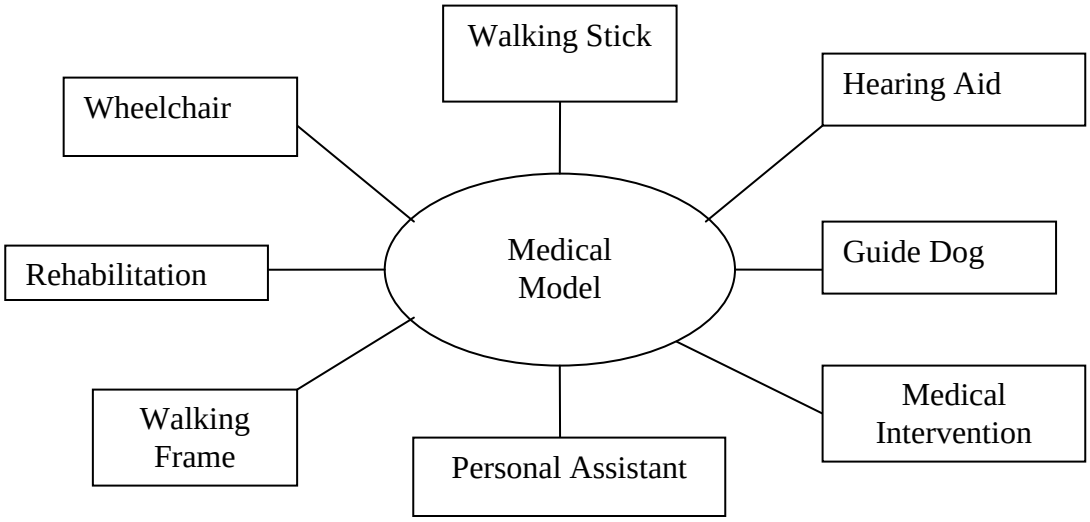


Figure 3.1 Fundamental Attributes of a Medical Model of Disability

A variation of the medical model, the functional model was examined by Smart (2009) and is largely defined by the individual not being in a position to fulfill functions or roles in their lives and society. Rehabilitation and technical aids may in this model remove the disability in its entirety. The individual can adapt to the extent that they can fulfill their roles in their daily lives. This model is also said to be an interactional or ecological model mixing disability, person and their role. This is a very positive model that looks to strengths rather than weaknesses in allowing people to become independent contributing members of society. This model has however been criticised as it reduces the disability to its economic value in terms of work output versus accommodation required again discriminating against those with a disability (Smart, 2009). Although progressive by nature this model requires the subscriber to have the specific knowledge and skill to assist the individual. Conversely, is it really conceivable that all individuals can achieve total independence in society regardless of disability? In a utopian society all people regardless of ability would have the same opportunities to access services such as education and leisure activities. Is this not the most basic human right? Should it be a given that all people have the same entitlements and prospects as everyone else?

The medical model clearly endeavours to improve the status of people with disabilities, but little reference is ever made to whether the improvement is independent; the priority is to deal with the problem. The concept of universal design (discussed later in this chapter) attempts to resolve such conflicts in its firm focus of providing access for all regardless. Universal design has its basis in neither social nor medical models but a combined approach that reflects the philosophy of a "Supportive" model proposed in this research that is fundamentally human rights based.

Since the inception of the moral model people with disabilities have been seen as dependent and requiring assistance. The level to which a person is disabled was matched to the level of assistance they require to access the world around them. What disabled the person was not always the impairment but the response of service providers to that impairment. As the disability rights movement gained momentum the concept of independent living emerged and activists demanded independent living as a human right regardless of ability. Barnes (2007) outlined how the concept of independent living appealed to disability activists as it was deeply rooted in the premise that people regardless of their limitations or ability are equal and therefore should be afforded the same opportunities as everyone else. The core of this concept is what the real meaning of "independent" is? It can never be viable that an individual who is disabled to the extent that they are totally paralysed can independently access all services in society. Barnes (2007) described the key to independent living is "empowerment", through empowerment an individual gains access to a full range of human experiences and rights. If it is not physically possible for a person to access services on their own then support must be provided to empower their basic human rights. Knowledge is power and providing individuals with access information to empower to live independently is a key focus of this research. Barnes (2007) explained that for empowerment to be independent it must be organic and allow people to empower themselves without feeling controlled. Provision of reliable accessibility data facilitates such empowerment. Allowing people with disabilities to plan their own services, make their own decisions and take part in research and policy formulation creates such empowerment and as a result independence.

The British Disability Rights Commission (2002) in their mission statement defined independent living as:

> "All disabled people having the same choice, control and freedom as any other citizen – at home, at work, and as members of the community. This does not necessarily mean disabled people "doing everything for themselves", but it does mean that any practical assistance people need should be based on their own choices and aspirations".
>
> (British Disability Rights Commission, 2002)

It is clear that a basic human right is to live independently in the community. It is not sensible to adopt the literal definition of independent and thus by technical and community based support essential rights can be restored. Without empowerment people with disabilities cannot fulfil their roles and responsibilities, as is the basic human right of other citizens. This empowerment must span the lifetime of the individual into old age and a personalised response to the individual impairment will maximise opportunity and integration. Although this approach has its origins in the medical model of disability, to be truly effectual it must be taken in a social context bearing in mind how the impact of society and the built environment will influence its success. The "LADDER" concept proposed by this study is strongly based on the facilitation of independent living through empowerment by the provision of reliable up to date access information. Human rights movements were extremely active in the mid-nineteen nineties and promoted a surge in disability rights activism demanding the right to independent living.

> "The right to independent living as proclaimed by the disability community is not limited to the mode of social service for disabled persons but covers all aspects of life, be it housing, education, work or politics and culture."
>
> (Degener & Koster-Dreese, 1995 page 15)

Models of disability became widely debated to identify which approach would assist the advancement of the disability movement beyond mere provision of social services. A new politics of disability slowly emerged developing forward thinking objectives for improving and prolonging life for people with disabilities.

Such objectives have gradually developed and now include civil rights, equal status, independent living and equal access to the built environment (Barnes and Mercer, 2010). Barnes and Mercer (2010) identified how the attainment of such objectives has slowly lead to the mainstreaming of key services such as education, leisure and employment, factors critical to social inclusion and independent living. Barnes and Mercer (2010) criticised how the reliance on the medical model may have slowed this progression as over reliance on medical rehabilitation led to the exclusion of change in other key areas such as the built environment. Acceptance of the medical model limits human rights and locks the user in the concept of abelist norms and anything beyond this is by default deemed abnormal. Medical expertise is continually challenged therefore redirecting the focus of the fault or the problem elsewhere. The medical model perceives that through medical intervention and rehabilitation of such faults a person with a disability may be brought closer to the accepted "norm". The medical model identifies the medical condition as the reason for a disadvantage and therefore the cause of marginalisation or exclusion from mainstream society (ERT, 2008). Through this reasoning medical intervention could theoretically remove the disability completely and allow for full integration and participation in society restoring all human rights regardless of the environments the person inhabits.

Although simplistic this approach has led to a number of jurisdictions adopting this model in many legal frameworks in attempts to improve the status of people with disabilities. Smart (2009) assessed the acceptance of the medical model by such jurisdictions and criticised its representation as being a direct result of malfunction within the person. This model can be clinically diagnosed and categorised according to the malfunction and upon diagnosis a system of rehabilitation can then be initiated irrespective of the world the individual wishes to inhabit. The medical model completely ignores social interaction and integration and there is a strong tendency to see the individual as the diagnosis (Smart, 2009). Although the medical model can clearly improve the quality of life for people with disabilities it greatly depends on crude aspects of availability and cost to a healthcare system and little or no focus is placed on the person's right to live independently.

Smart (2009) also identified that this model casts the person into a category such as wheelchair user or mobility impaired that allows a person to be discriminated against by virtue of their individual malfunction, their disability defines them as a person. This makes the person the "problem" of medical practitioners and therefore relieving society of the duty to provide for them (Smart, 2009). Consequently society continues to ignore the environmental factors and social policy decisions as factors in causing disability. Society also continues to fear disability as it commits the person into a life spent in an institutionalised medical world where they become buffered from becoming a valuable participant in society.

The medical model divides society into people with disabilities and people without, a strong divide between both groups allows the privileged to enjoy the benefits of a world designed to meet their needs while disregarding the rights of those not so fortunate. Acceptance of this definition adopts a "they know no better" attitude, the impairment or handicap is the barrier to an all inclusive society and the person with a disability requires some form of intervention to improve their quality of life and bring them closer to being normal, their abnormality being the true cause of their disablement. It is not society that has taken their human rights it is their disability. Devlieger, (2005) expanded on such theories and he felt there was a social and cultural construction of disability. He viewed the medical model as the most dominant model as its technical superiority strives to find a solution. He also felt continual questions and craving of understanding make this model stronger and more attractive as the power lies within the individual who controls their rehabilitation and the improvement of their quality of life. The issue of technical superiority must be argued as the many advances in the design industry through concepts such as universal design surely match the innovation of rehabilitation supports? If technical advancement is his sole reasoning for the medical model achieving dominance then why has such motivation yet to see absolute resolutions to the problem? In this technological age rehabilitation should have progressed to a level whereby independent living is readily achievable, people with disabilities could be "made normal" without an attitudinal shift in society and its provision for them.

Another factor of the accessibility and integration element of the medical model is that it does not consider the built environment and its relevance to the marginalisation of people with disabilities. Technical medical development is at an advanced stage and has not achieved "normality" for people with disabilities therefore surely the missing link, the built environment, must be addressed and entered into the equation? But before the built environment is considered what about the issue of so-called "normality"? To categorise an individual into "normality" poses the question of "abnormality". Do individuals who do not fit into the definition of "norm" by default become abnormal and hence disabled? Impairment may cause a person to experience difficulties in their daily lives, but is it the relationship between the individual and the disability or the individual and ever-changing environment the cause of the disability? The built environment is designed for "the norm" this compounds the "abnormality" of disablement. To say out loud that people with disabilities are "abnormal" would cause outrage. But are we mutely saying this every day in built environments designed for "the norm"? But does this concept go far enough? Disability and the built environment are to the forefront every accessibility equation, with little deliberation as to where or why the difficulty originates.

Assessment of opposing models of disability assists in identifying the source of the difficulty and consequently a potential successful approach to resolving it and progressing the disability agenda. It is interesting to note that observations by key figures of the disability movement such as Sutherland (1981) still bear relevance. Sutherland (1981) felt the most useful basis for a definition influenced by a medical model is stigmatisation itself and he proposed a model based on ability rather than one based on discrimination and denial of human rights. In doing so perhaps more progress can be made, progress that could empower the person. As predicted by Sutherland (1981) models and definitions of disability slowly began to evolve to the extent whereby the European Commission (2002) decided a comparative study on the social and medical models of disability was required. The medical model was determined to be an individual problem caused by disease or accident that could be improved by rehabilitation.

The social model by contrast was seen as a product of the individual's social context and environment, and the construction of society and its beliefs. The user of this model investigates disabling situations rather than disabled people (EC, 2002). This results in an influential model that encourages creation of policies that remove physical barriers and prevents future disabling situations though awareness and innovation. For this reason the medical model has largely been rejected of late and many EU institutions in policy formation have endorsed the social model. However to be fully successful this model must be used beside equality and anti-discrimination structures.

In Ireland government departments have been required to adopt models of disability for effective policy making and currently there have been three core policy provisions for people with disabilities that each adopt a different model approach. Policies relating to inability to work and allocation of disability benefit and invalidity pension are firmly rooted in the medical model and require a medical review assessment. Policies relating to employment adopt the social model and provide grants, support schemes and training to allow people with disabilities to integrate into mainstream society. Finally policies relating to assistance adopt the combined model whereby provision is both made for rehabilitation and personal development along side use of the built environment. For example the Disabled Drivers scheme allows easier parking and access to financial support to assist driving. Such polices are examined in more detail in Appendix I and mirror the Commission's reference to the Social Welfare Model that sees a physical impairment immediately resulting in disadvantage that must be mitigated by benefits from the state (EC, 2002).

Summary

The research model adopted in any study on disability or policy formulation must not be disablist or take advantage of the person with a disability their rights or their experiences. Disability research must be carried out in a manner that is sympathetic by understanding and experiencing the issues that greet people with disabilities on a daily basis. Experience brings knowledge and if carried out appropriately also brings understanding.

Adoption of a model such as the medical model limits the scope of research in this area to the individual and their disability no account is taken of the third factor required for integration, the environment. The medical model can lead both to overt and covert discrimination that has historically hampered people with disabilities' participation in a meaningful way in wider society (ERT, 2008). People with disabilities need to distance themselves from the medical model so they could move on from seeing themselves as the problem. The social model or as Kaplan (2000) described it disability model, is starting to gain notoriety as the model is firmly based in human rights, disability rights and equal opportunities. It centres on the concept of normal. At some stage during every individual's lifetime they deviate from what is normal, whether through, accident, injury, pregnancy, short-term illness or old age and infirmity. If society embraced all these factors into the paradigm of normality then a society more inclusive for all could develop. Examination of either end of society identifies that there is the normal and by default the abnormal, what lies between is the majority of society that is inadequately catered for ironically through its own social construct. Such social construct can only be understood though the closer examination of the social model.

3.1.3 Disability – Social Model

People with disabilities devised the social model of disability. This interactive model places the emphasis on the person and society and the interaction between the two. The social model portrays disability as being the relationship between the individual, then their disability and then the environment. The person must always come first. The social model was first developed in 1976 by the Union of Physically Impaired against Segregation (UPIAS) is still in widespread use today:

> "Disability is the disadvantage or restriction of activity caused by contemporary social organisation which takes little or no account of people who have disabilities. This excludes them from taking part in mainstream society. Disability is not caused by an individual's particular impairment, but by the way society fails to meet their needs"
>
> (UPIAS, 1976, page 3)

The UPIAS definition is still used widely today due to the fact that it addresses the role the built environment plays in impacting on integration and independent living. Those who have examined such definitions have very convincing arguments as to why such a radical approach should be adopted. Humphrey, (2000) highlighted why there is a need for a model and in his opinion a social model has a foundation in civil rights. He felt that such a progression away from the medical model towards redefining disability in terms of human rights forces society to address the "disabling environments" it has created. These new responsibilities are the first steps in beginning to overcome disablist spaces. After emerging from being defined by the medical model of disability (through rehabilitation or technical aids) into the social model, a person with a disability may become increasingly frustrated by the lack of opportunity. Disability is connected to people and the choices they make and the choices available to them in their lives. Such choices may be severely limited if the environment that has been built up around them and does not afford such choices to them. Shakespeare, (2002) examined the historical approach to the social model of disability that saw people with disabilities as being oppressed, the oppression being distinguished from the impairment. His opinion that oppression is socially inflicted and constructed and does not originate from the impairment itself does not go far enough to address marginalisation.

Shakespeare (2002) highlighted how viewing the physical and social environment as the sole reason for oppression is untenable. Ideally all people should be in a position to independently live in society however even with the advancement of technical aids and sensitively designed environments many are still not in a position to leave their beds let alone their homes. So can the built environment ever truly be accessible to all? This manifestation of disability as a social construct allowed for a political anti-discrimination strategy in the nineteen nineties through the promotion of barrier removal rather than the rehabilitation of the physical limitation. This allowed for the liberation of people with disabilities as they were no longer seen as the problem and self-pity could now transform into anger. However Shakespeare, (2002) also believed that the success of the social model has become its own weakness slogans like "disabled by society not by our bodies".

Such mottos epitomised the social model and began a strong disability rights activism movement that denied the relevance of the body to disability. Mercer (2004) examined how the social model exerted a dominant influence on disability research literature as those who felt they had a right to be heard did so in a manner that made others take notice. Researching disability in relation to the built environment alone without any cognisance of the abilities of those who use it could never solve the accessibility equation. Adoption of such a prescriptive model may in fact have contributed the continued oppression or disempowerment of people with disabilities. A new form of "emancipatory" disability research has emerged that validates knowledge by insisting on the participation of disabled people throughout the research process. As this research method has evolved so too has its acceptance by governments, service providers, and disability organisations into declaring their support for a social model. However these declarations got trapped in social and health care initiatives that again broadened the divide.

Mercer (2004) described how people with disabilities felt they had a right to be directly involved in disability research as they felt it enhanced the quality of outcomes, however their involvement from a social model background may in fact have negatively influenced the outcome of such research. Although the involvement of people with disabilities is key to the credibility of any disability research, it must be carried out through less prescriptive agendas. A holistic approach to disability research taking into account all the factors that affect their status must be paramount to credible research. Figure 3.2 portrays societal barriers that may contribute to disability in a social or as it is often referred to barriers model of disability.

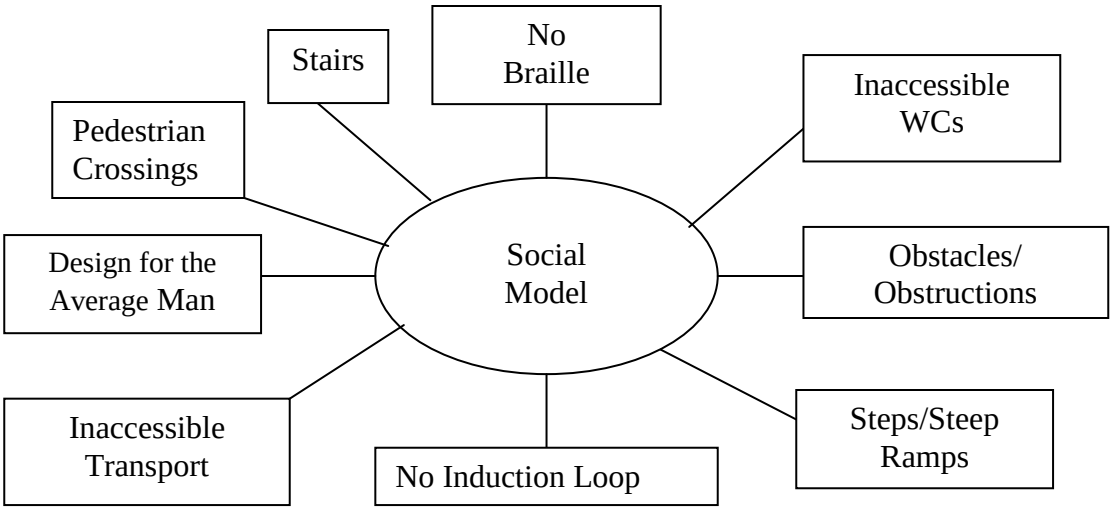


Figure 3.2 Fundamental Attributes of a Social Model of Disability

Goldsmith (1997) was one of the instigators of the promotion of barrier removal in the nineties, he believed that the social, or as he refers to it, architectural model of disability portrays disability as a means by which people with disabilities are disabled because of socially imposed barriers that must be removed. Societal institutions exclude them, as do architectural and other impediments, which place them at an immediate disadvantage. Once disability is approached from a social or architectural rather than a medical model in relation to the design process, the barriers to access will be seen as the problem rather than the disability itself (Goldsmith, 1997). This tendency to view disability as a physiologically imposed barrier is unsustainable. It is clear that whether consciously or not society has erected barriers to integration, but entirely disregarding physical limitations will never significantly progress the status of people with disabilities. A combined holistic approach intertwining all relevant factors is the only plausible means of progression of the agenda of improving basic human rights. Over the last number of decades people with disabilities are for the first time living into old age through advancement in medicine, rehabilitation and technological development. They have become a new demographic in society called "aging with physical impairment" (Putnam, 2002). This demographic requires new services; rather than rehabilitation that will allow access to employment, education and independent living. They require care management by lessening the burden of disability medically, financially and socially.

In the context of the social model Putman (2002) perceived disability as a dependent variable that results from a gap between an individual's capabilities and the demands of the environment, both independent variables. Interlinking these essential variables identified at the beginning of this research provides a more comprehensive approach to the problem. Although Putman (2002) suggested alternative variations on social and medical models (such as functional limitation model based on individual impairment, the disability process model resulting from demographics, lifestyle or behaviour, and the enabling-disabling process model linking the person and their environment), are any of them far-reaching enough to provide a solution to the problem of disability access?

Prescriptive models may in limited instances enhance disability research for example in the area of developing technical aids and it is understandable a medical model should be adopted. Shakespeare (2006) believed that prescribing to models like the social model is shackling the disability movement into inertia by severely limiting disability research. The models proposed by Putman (2002) each restrict the user to a greater or lesser extent. Research will not look to the life of the individual just the environment they interact with if social or enabling-disabling process models are adopted. Shakespeare (2006) believed this inadequacy in the social model means it should be now put to one side and reinvented as currently it creates more problems than it solves. He promotes an alternative model that entwines society and the body. Individual difference cannot be ignored or denied especially as impairments are so varied by nature. If the individual's body were not part of the problem people would continually risk their personal safety, as no effort to avoid impairment would be necessary. Shakespeare (2006) posed the logical question, where does the impairment (body difference) end and the disability (social creation) begin? There is no real solution to this problem as both of these variables are unique and continually changing. Although Shakespeare declares we must move on from the limitations of this approach he does not propose a viable alternative. He does suggest foundations such a model could be forged upon. Firstly disability and impairment are not dichotomous, but aspects of a different experience that must be examined individually. Secondly processes within the medical model must be challenged but not to the extent that they fall purely under the social model.

Finally levels of intervention must be distinguished on both personal and environmental scales from disability aids to accessible design. These foundations could form the basis for a radical approach to disability research that promotes the holistic view necessary to address all the relevant attributes critical to social integration and inclusion.

The use of social models of disability have however had their advantages as they allowed research on disability to broaden its focus from rehabilitation of the individual to their role in the workplace, the community and society. They make clear distinctions between physical impairment, functional limitation and disability. Physical impairment is a personal characteristic, functional limitation is performance of a body part in a given situation and disability is a situational variable (Putnam, 2002). She highlighted that disability is not a personal characteristic or permanent attribute, a person does not have a disability they experience a disability. To differentiate in this manner means the environment must adjust to the person rather than the other way round and the responsibility is shared. The individual experience must be considered taking the environment as a tangible role in shaping the disability experience (Putman, 2002). Mercer (2004) identified that there has been a broad consensus that mainstream social research has failed people with disabilities, as it has not improved their quality of life to a material degree. It is only when individual and environmental modifications are examined as interconnected variables in research that the social value of people with disabilities can be improved. This coupled with civil rights movements, innovative architectural design, assistive and medical technologies can all have a positive influence on the quality of life of all individuals experiencing disabilities.

Disability research needs to challenge traditional research methods by reversing the role of researcher and researched. The social model has traditionally been viewed as disability being constructed by barriers (social oppression) (Mercer, 2004). The divide between disability and impairment clouded disability research agendas leading it in the continual direction of an oppression led problem. Mercer (2004) felt a different approach was required one whereby people with disabilities are no longer seen as a defined group but as distinct individuals each dealing with impairment differently.

The aim of disability research should be to promote change whether through individual empowerment or social improvements. The success of such research hinges on acceptance by key players such as those who empower people with disabilities. Disability Organisations and Building Control Authorities are identified as the key stakeholders in this research. One key player may reject what may be of great benefit to a person with a disability (Mercer, 2004) so therefore it is important to examine both sides, especially those who adopt opposing models. As mentioned earlier models of disability are tools that facilitate analysis from contrasting viewpoints and allow often unconsidered theories to develop. One problem does however emerge from involving people with disabilities in disability research. Mercer (2004) felt that some groups might have become conditioned into a particular mind-set through their experiences with social providers and mainstream society thus creating a skewed viewpoint. People with disabilities may become locked within the constraints of a single model that may limit the success of improving their status. Ideally disability research should be carried out in full by a person with a disability however the multitude of barriers to overcome have left people with disabilities severely under-represented in third level education. No matter which model is adopted or what research is carried out, disablist views of social reality must be continually questioned and used to overturn social exclusion (Mercer, 2004).

Dewsbury, Clarke, Randall, Rouncefield, and Sommerville (2004) described the most efficient manner to gain a clear understanding of a situation or a problem was to develop a social theory on the subject, to locate the issue within society. In the arena of disability the social model is the predominant model currently utilised for introducing the topic. They described how this model draws from a "socio-political framework" based around a "social constructionist perspective". They identified how the social model is a political statement on human rights of a minority group. Smart (2009) referred to the social model as the "minority group model" or even the "independent living model". She believed this model is firmly based around a lack of civil rights where the solution to disability is the change in attitude or law. The cause and the solutions of disability no longer lie with the individual (Smart, 2009).

She also identified how this is the newest of the models stemming from civil rights movements and in some areas disability discrimination has become as more pervasive than race or gender discrimination. As it is society that has generated the disability responsibility is a collective concern that can be resolved though an interactive approach. However to this day people with disabilities still lobby official agencies demanding their basic civil rights indicating that the "collective concerned parties" have not interacted on a level that alleviates discrimination. This model does however have the advantage of not categorising the person into "wheelchair user" or "blind" and may assist in uniting all people with disabilities in fighting for their rights in a united front. However taking the approach as suggested by Smart (2009) and ignoring the individual may create a socially conscious society but will never create an all-inclusive society.

Dewsbury et al (2004) examined how the social model highlights the world as it "appears to be" or "the world how it really is". This practical approach ignores the invisible social constructs that have created the social environment. There is a wide gap between appearance and reality that society must acknowledge. There is also a vast difference between the manner in which society constructed the built environment and the manner in which this environment is understood. Each user has their personal interpretation. "Ordinary" people may have no inclination as to the presence of barriers. A model of disability is not required in identifying that a stairs is inaccessible to a wheelchair user but setting disability in a social context affirms the manner in which a solution may be derived. A designer, who whether consciously on not, adopted the social model would have provided a lift in a design for all approach thus empowering all users. Dewsbury et al (2004) chose to abandon the search for a logical pigeon hole to classify disability, they claimed the time for understanding the "appearance" has passed and it is not time to design for the "reality" in a manner that designs for the person, no matter who they may be and whatever disability or physical aid they may require. If people with disabilities continually meet with physical barriers to access, their disability then becomes a constraint; if the barriers were absent ability may no longer be limited. The built environment was designed without due consideration to all persons in society.

If a social model was adopted by all and more importantly acted upon could anyone possibly be disabled? No longer does the individual have to rehabilitate or find a miracle cure to increase ability as the environment would welcome every eventuality. Such an idealistic approach is unfeasible and unrealistic and could theoretically lead to people disregarding their health and safety as in every eventuality society could accommodate them.

Dewsbury et al (2004) went on to identify two separate approaches to disability. Materialist approaches to the social model look to the institutional and built environment barriers whereas a cultural approach will go further and look to attitudes and opinions. Whether it is materialist or cultural most people examining the social model identify societal barriers as the disabling factor. The problem is not the person with a disability but the lack of provision for their requirements by society. Society has constructed the disability and therefore every individual is responsible and thus has a responsibility. Shakespeare (2006) boldly stated that there can be no impairment without society but concludes that impairment alone is not the core component of disability it is the inherent nature of humanity. He feels impairment is a result of "social judgement". This suggests on a theoretic level that if society didn't exist and a person had no limbs they would be seen as normal active individuals. Shakespeare classifies impairments as a result of "social arrangements" or decisions such as going to war or poor health care. Rather than trying to link disability and impairment we should connect impairment with embodiment but this will only transpire through social change. It is only those who believe in a clear distinction between disability and impairment that sincerely subscribe to the social model (Shakespeare, 2006). Devlieger, (2005) reinforced this idea and saw the social model as resulting from social relations between people and their material conditions and environments. In recent years this model has evolved from a link between individual and environment to individual, environment and communication. Recent combinations of innovative assistive technologies, better designed environments and alternative modes of communication has not only improved the lives of people with disabilities but has injected dimensions into the living environment beneficial to all. The social model has begun to initiate cultural growth and renewal (Devlieger, 2005).

Such growth although important has lost some of its value due to the poor representation of information generated and this research aims to bridge this gap. The Equalities Rights Trust (2008) described how the social model responds to two assumptions of the medical model. One is that people with disabilities cannot work and two this incapacity is as a result of impairment. Immediate and practical interim solutions have slowly developed since the nineties one of which is the use in legislation of terms like "appropriate" or "reasonable". Reasonable accommodation places a positive duty on service providers to incorporate social and environmental factors into their service design to facilitate and integrate persons with disabilities (ERT, 2008). Accommodating accessibility can be a short-term solution to providing access until the concept of universal design is fully embraced. Accessibility through "reasonable accommodation" could be the solution for narrowing the disability divide - a type of meeting ground that combines the interests of each key player. Reasonable accommodation is becoming the cornerstone of legal regulation against the discrimination of people with disabilities (ERT, 2008). The social model views existing social norms (such as the built environment) as advancing the position of certain individuals while perpetuating negative social and physical norms. The adoption of this constraining model leads to disadvantage and marginalisation of persons with disabilities (ERT, 2008).

Legislative provisions through a clause of "reasonableness" or "adequacy" allow service providers to ignore the needs of people with disabilities if it appears to be an unreasonable imposition on them. This often limits the spirit of the legislation in accommodating accessibility. Such expressions form the basis of accessibility requirements in building control legislation in Ireland that underpin much of the methodology of this research. The "LADDER" concept proposed in this research takes the key legislative requirement for access, Part M and presents a tool for measuring the level of "appropriate" access that this standard aspires to. Undoubtedly this standard does not achieve universal access, but as an interim solution its merits must be considered for empowering people with disabilities and key stakeholders to improve access.

Summary

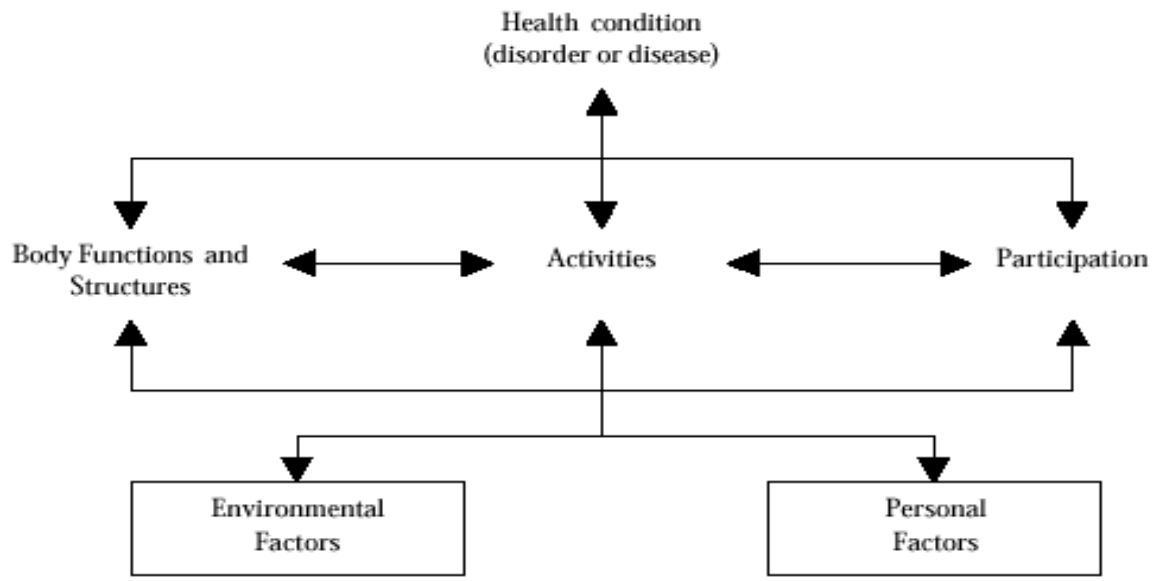
The merits of both social and medical models have been identified and one common objective stands out. Both models strive to achieve improved access for people with disabilities, both physically and socially, therefore both models require due consideration through the co-operation of key stakeholders. Imrie (1996) felt that the "vitality" of difference of people with disabilities should be celebrated and that society should not try to force them into the so-called normal behaviour through the constraints of either model. He believed society discriminates against people with disabilities by judging their impairment as being the factor that prevents them from gaining employment or access to services. The fact that a person with a disability has deviated from the norm has too often been given as the excuse for inaccessibility. Imrie (1996) abhorred this notion and feels that it is society that has created inaccessible environments by ignoring their needs. He puts forth the challenge that key stakeholders must think beyond this paradigm and create a more inclusive society by design with people with disabilities rather than for people with disabilities. The relationship between people with disabilities and those without must evolve from the current thinking that those without are the providers of assistance and access. Much research has been done and many debates have been deliberated on "dealing with" people with disabilities but can resulting improvements actually be seen or measured in today's built environments? Has the "problem" been sufficiently "dealt with"? It is only through the alteration of a mind-set to think beyond these constraining models of disability and working with people with disabilities in a more holistic approach that true improvements be seen.

3.1.4 Disability – Progression through a proposed "Supportive" Model

The detachment of the social model from the individual and the impairment is unaccommodating (Barnes, 2007); and the acceptance of the medical model to view the person the "problem" of medical practitioners relieves society of the duty to provide for them (Smart, 2009). Although each demonstrates strengths and weaknesses neither model addresses all the requirements of the three prerequisites for access and integration into society, the individual, the disability and the built environment.

Devlieger (2005) described how it is often thought that social and medical models of disability are juxtaposed however frequently they are intrinsically intertwined. While a subject may be viewed as a medical model aspects of the social model may also become engaged in the debate. For example where a person is diagnosed with a de-habilitating disability the aspects of the medical model such as rehabilitation may be difficult to comprehend whereas the social aspects such as accessibility options are easier to accept. The social model is valuable in the long term but at this time it is unrealistic to consider that such a philosophy could ever improve accessibility in the shorter term. Universal design is still largely absent in Ireland's built environment and an aging building stock would take considerable development to remove all barriers. Little has changed in the built environment of the 21st century therefore immediate and practical interim solutions are required rather than theoretical futuristic concepts.

There is however a scope for change as many international standards are beginning to consider a combined model of disability based around the latest WHO definition of disability (ERT, 2008). In 1980 the WHO introduced the International Classification of Impairments, Disabilities and Handicaps at a time where the world was in the centre of an explosive disability movement, this was a definition firmly rooted in the medical model based around the concepts of handicap and impairment. As the disability movement gained momentum in the late nineties it was realised that the WHO definition was no longer relevant in these more socially progressive times. The second definition entitled International Classification of Functioning, Disability and Health was launched in 2000. The definition is broadly accepted and centres on issues relating to bodily functions, bodily structures, participation and activity, and environmental factors, each of which are among the core philosophies of this research. The components of the definition do not provide one single concise definition, but interlinking factors that may or may not be relevant to the definition, depending on its purpose. The following schematic best illustrates the interactions of components in constructing the overall WHO definition:



(WHO, 2000, page 7)

Figure 3.3 Interactions between various components of the WHO definition

The definition places somewhat greater emphasis on health and functioning rather than just disability implying disability has a socially constructed element and therefore demands a political response. The WHO wish the definition to be used as a tool for measuring functioning in society, no matter what the reason is for the impairment by shifting the focus from source or cause to impact on the individual in the environment. The definition acknowledges that every person can experience health problems to a greater or lesser degree and therefore become disabled thus mainstreaming disability as a universal experience (WHO, 2000). The WHO definition by its own admission is a universal classification of disability and health intended for use by health and health related sectors ignoring other key stakeholder's potential influence. Many who study the social interaction of disability in the built environment incorrectly adopt inappropriate definitions. The WHO felt that neither the social nor medical models are adequate in defining disability although elements of both are significant. Disability is both a personal and social phenomena, it combines the interaction of the person and the features of the person's life – some interactions being deeply personal, some being completely external (WHO, 2000). The WHO advocates a combined model or as they refer to it a "biopsychosocial model" that eliminates the inaccuracies the other models make in their reduction of disability to one lone aspect.

The value of this definition/model of disability is that it combines the two most recognised models by acknowledging that both environmental and individual factors contribute to the quality of social participation and hence the status of people with disabilities. Compared to the 1980 definition, the 2000 definition replaces the term "disability" with "activity" and "handicap" with "participation". This naturally develops a philosophy towards a model where inclusion and activity are of primary importance. This model allows credible interaction and overlapping of research data in the areas of medicine, architecture and socialism that can provide a more cohesive representation as to the individual causes of barriers for people with disabilities and consequently the influence required to overcome them. Rather than sitting across the impenetrable divide models of disability should be used as the stepping-stones with all disciplines having to trust them momentarily if true advancement is to se achieved.

Both the medical and social models raise many questions of what causes disablement. Neither model is far reaching enough to provide all the solutions. A person will experience barriers due to physical limitation. But it is also true that there are many designed environmental barriers that do not bear these limitations in mind. Even optimally designed environments built with a strong socially inclusive brief can find themselves inaccessible to some. The reason for this must come back to the individual, individuals are different, and every individual is unique. No two disabilities can be the same in the way no two people can be the same. So therefore is there a need for a "model" at all, do we need to categorise a person's disablement into a social or medical model? Could a "person-centred model" be created which applies to and addresses the needs of every individual, every disability and every environment? In an ideal world this would be the solution, however the ever-changing nature of each of these factors would create a model impossible to interpret, track and use. The cultural model has emerged in recent years and reflects much of the ideals of the WHO model and the model proposed later in this research to be known as a "Supportive model". The cultural model has clear distinctions to the social and medical models. Firstly it looks to mixing models depending on situations and circumstances and the interested disciplines.

Subscription to a combined model is by no means taking the easy option in attempt to remain neutral in a non-critical manner but rather as Devlieger, (2005) described it as an inclusive concept that corroborates the flexibility of disability as existential, mechanical and social phenomenon defined and reproduced by society. The cultural model embraces identity within community on macro and micro scales. Another distinction of this model is in how the other models define themselves. Rather than lying within the constraints of environmental access or disabling physical limitations the cultural model obtains, examines and applies information on all combined aspects in a critical manner to allow the individual to find identity, community and place in the world. A combined model allows for contemporary identification where a person with a disability no longer has to try to appear and feel normal in the worlds they occupy. Communication is the central tool to the cultural model and as proposed by the "LADDER" concept conveying positive information on inclusive environments will assist mainstreaming of people with disabilities in society.

Rather than opting for one of the two traditional constraining models a variation of the combined model should be used. Those who have strongly defended both models individually in their own right may find it difficult to be flexible with their approach. Personal, historical, political and educational experiences will all strongly influence opinions. The two opposing models have their supporters from obvious sources. Those in the medical and rehabilitation sectors and some unprogressive designers adopt the medical model while those in the disability activist/universal design sector may opt for the more radical social model. An over generalised statement perhaps, but once a model has been adopted can progress be effectively made on improving access? This may be slowing the progression of the improvement of accessibility with either camp fearing being portrayed a renegade by exploring an opposing model and siding with the perceived "opposition". The adoption of such widely opposing models places each group on conflicting sides of a needless divide that can only hinder the advancement of the disability agenda to the detriment of people with disabilities. It is only through uniting these key stakeholders that coherent development can be achieved.

All models serve their purpose and their intention are to assist not hinder the status of people with disabilities. Rather than attempting to combine them together as a hybrid model Smart (2009) felt it made more sense to train the interested professionals on both sides of the divide as to how to learn from their opposing model and when to choose it if required. This idealistic view of key players ignoring their socially ingrained model is unfeasible, as such parties would find it difficult to ignore their deep-rooted core philosophies. Taking elements from both schools of thought produces a much more attractive option allowing users to remain true to their perceived ideals.

The development of a combined-model that facilitates holistic service provision though inter-agency working of key stakeholders using participatory research to assist in promoting and improving the quality of life for people with disabilities must be considered. The "Supportive" model proposed by this research would allow overlapping and interaction of the strengths of medical and social models. Only through analysis of each model of disability can key stakeholders identify the necessary strengths and create benefits than can be clearly seen in the lives of people with disabilities. A suggested "Supportive" model that effectively and intrinsically intertwines aspects from each model relating to the individual, disability and the built environment, the three factors causing the disability provides many solutions. Although intervention in the built environment can assist "impairments" and rehabilitation strategies can help an individual to overcome a loss each taken in isolation or together can never achieve a built environment accessible to all. It is not feasible to suggest that even in an utopists society that an environment can be independently accessible to all, while it is also not acceptable to see a disability or impairment as the boundary. Disability must be seen as an even cohesion of concepts, the impairment, the disability and the built environment (even when designed in social consciousness). Both medical and social models have defined the disability in their own right, but only though their amalgamation and ongoing development that optimum levels of accessibility and inclusiveness can be achieved by matching the ability to the environment present. The proposed "Supportive" model of disability firmly links individual, disability and built environment and has been accepted and adopted in the implementation of this research.

It is felt that neither the WHO model nor Cultural model provide enough basis and foundation for improving access to a significantly acceptable standard for all (including key stakeholders). Aspirational concepts of both models do nothing to improve the here and now of a socially unconscious society. Universal design is intrinsically linked to the progression of the proposed "Supportive" model as in time as the model is accepted and developed through the combined efforts of the key stakeholders true independent living for people with disabilities may be finally realised. However this is an aspiration for the future, the lack of acceptance of universal design and the slow progression of technical medical advancement in Ireland had led to a situation where interim arrangements must be put into place to assist people with disabilities. Until both these areas are accepted universal access is not a possibility in Irish society, therefore in this intervening period progression must be made. Part M of the Building Regulations is currently in force in Ireland, it is legally binding and more than just an aspirational standard. Acceptance and development of this provision based on "adequate provision" in the spirit it was devised must be considered as a stepping-stone along the way to improving the overall status of people with disabilities. Lack of physical ability and societies' inability to embrace this perceived difference and evolve must be acknowledged so that these intrinsically intertwined issues can be developed in a manner beneficial to all. Inflexible models of disability locked into approaches that divide rather than unite cannot achieve this. The proposed "Supportive" model embraces attitudes and requirements of both sides of the divide in a manner that can achieve realistic improvements. The acceptance of this model acts as a tool that facilitates analysis from contrasting viewpoints that allow unconsidered often-opposing theories to develop. The use of participatory research with people with disabilities enhances credibility of outcomes. The proposed construction of the "Supportive" model in the context of this research is shown in Figure 3.4.

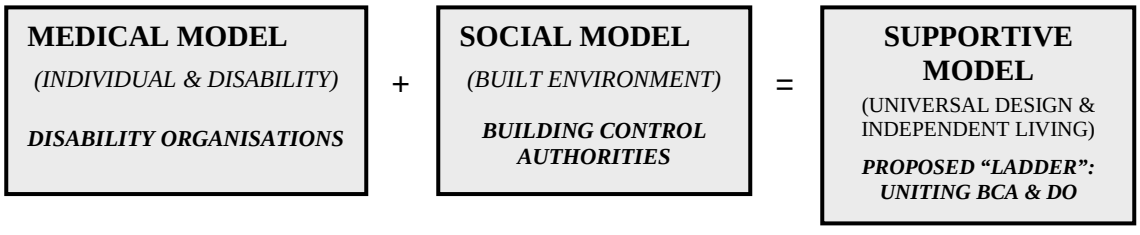


Figure 3.4 Construction of a proposed "Supportive" Model of Disability

Rather than being confined by the restraints of either medical or social model the user can draw from their strengths in a manner that intrinsically intertwines both models. This ultimately will be of "support" to the person with a disability while also "supporting" other key stakeholders' interests. Amalgamating the ethos of the medical model in rehabilitating the individual's disability with the ethos of the social model in providing more inclusive environments in line with universal design principles holds the key to finally moving towards embracing universal design initiatives that in time may facilitate independent living for all. The "Supportive" model eliminates the tendency for bias in such an emotive subject with all contributing factors considered rationally one by one by the relevant key stakeholder in a unified approach. As mentioned universal design is still in its infancy in Ireland therefore the most sensible option in current research is to examine the current legal requirement for access, Part M and consider it under the "Supportive" approach. This approach can tangibly rather than speculatively address the contributing factors to inaccessibility as empowerment for independent living can generated through the provision of accurate accessibility information for individual decision-making in the "LADDER" concept. An inter-agency approach combining the strengths of the medical and social models of disability with the philosophy of the proposed "LADDER" concepts generate an interim arrangement to improving accessibility. Empowering people with disabilities to make decisions along side reforming the manner key stakeholders collect and communicate accessibility is a valuable interim measure to improving the status of people with disabilities until universal design principles are accepted and applied in Irish built environments.

Conducting research by combining individual accessibility options with built environment requirements provides a holistic approach that identifies contrasting perspectives that may allow unconsidered theories to develop. In this research in order to gain an insight into theories of perhaps conflicting interested parties two key stakeholders, Building Control Officers and Disability Organisations are examined. Both were questioned in relation to their overall opinions and acceptance of such models in their promotion of accessibility.

This research aims to identify the models they subscribe to and their opinions and deliberations in relation to the implications of their service for improving access for the people they represent.

3.1.5 Influence of Models of Disability on Disability Status in Ireland

Models of disability have shaped the status of people with disabilities in Ireland in relation to policy and legislation formulation. Over the last decade Ireland has undergone considerable change in relation to legislative provision for people with disabilities and has adopted an excellent formula for the provision of legislative protection for people with disabilities. This formula centred on the three core aspects of this research, the individual, the disability and the environment. Ireland became awakened to the disability movement in the mid-nineties and disability has slowly emerged onto the agenda of many governments since the International Year of Disabled People in 1981. By the mid-nineties activity had peaked especially across Europe with the emergence of the social model of disability. Many countries had reformed their equality and disability legislation to reflect the status of people with disabilities in their communities. Encouraging developments have taken place over the last 15 years that commenced when the government instigated comprehensive research to assess the status of people with disabilities within the Republic of Ireland. The findings of the Commission on the Status of People with Disabilities in 1996 initially prompted this research and the findings and recommendations are still as relevant today as in 1996. The government has underlined this significance and importance by committing to the policy document "Towards Equal Citizenship" that set out how to implement the recommendations originally set out by the Commission. However many of the recommendations were either rejected or not implemented giving an indication of the pace of advancement of disability issues in Ireland over the last decade. For example one of the recommendations rejected by the Department of Environment, Heritage and Local Government was a requirement for mandatory inspections of built developments, which is currently not a compulsory requirement.

The Department rejected this requirement stating that the current system is sufficient and will remain in place. Neither the Commission's recommendation that all legislation and guidelines that refer to any aspect of the built environment be reviewed, nor the recommendation that a policy of lifetime adaptable housing be adopted as the norm have been accepted. The government is willing to keep the disability charter on their agenda and there has been much progress in other key areas since this initial movement of the mid-nineteen nineties. Areas of importance include the Employment Equality Act 1998/2004, the Equal Status Act 2000/2004, the Barcelona Declaration Project – "The City and the Disabled", the National Disability Strategy, the Disability Act 2005, the National Disability Survey 2006, the International Year of Equal Opportunities for All 2007, the UN International Convention on the Rights of Persons with Disabilities and the Council of Europe Disability Action Plan 2006 to 2015. Each of these policies and legislative structures are key areas of importance and have joined together to form a comprehensive disability package that has contributed to improved disability status in Ireland today. Due to this and their implications on the future acceptance and success of this research each of these elements is examined in detail in Appendix I. This synopsis traces the development of the disability movement in Ireland over the last fifteen years and how the acceptance of various models of disability has shaped such developments. In the examination of these strategies an overview is also provided as to how this research comes at an opportune time where Ireland has undergone considerable reformation in providing for people with disabilities, a time whereby the progression of the disability agenda through innovative application of such strategies is crucial.

3.1.6 Summary

In summation models of disability assist understanding of disability as to whether we need to alter the environment or the individual or either. Their inclusion in research assists the contemplation of previously unconsidered of viewpoints. The medical model requires people with disabilities to adapt and rehabilitate "to fit" into society as it is, if the person cannot conform then the alternative is institutional care and the person with a disability becomes dependant on care providers, loosing independence.

The medical model has overemphasised the diagnosis, once made it prescribes lifestyle and the treatment from that point forward. The social model alternatively identifies the strengths of the person with a disability and what the barriers are to their inclusion. The cure for disability lies in a change of attitude rather than medically based cures. The social model only reflects part of their lives, the part that interacts with society on a daily basis. Those who wish to bring about change whether consciously or not have underlying conviction in one of the two models. However both models are continually shifting due to advances in both medicine and design initiatives. Their success may only be mapped though the achievement of results. Smart (2009) feels that neither model is sufficient and now is the time for all models to evolve, refine and modify. Neither model can reflect all the needs of a person with a disability. Key stakeholders cannot respond to all their requirements unless a combined approach based around construction of a "Supportive" model definition as proposed in this research is adopted. The subscription to this holistic model allows users to identify and examine other perspectives from other key stakeholders that previously may have been unconsidered.

This holistic approach allows for the contemplation of often-unconsidered perspectives through inter-agency cooperation enhancing the reliability of research in the area of disability access. The provision of up to date accurate information on accessibility is the key to the success of this model empowering people with disabilities. Adoption of such a cohesive model could assist in interconnecting valuable resources of key stakeholders who currently stand on opposing sides of an impenetrable divide. The interconnection of such resources could result in the greater acceptance of universal design principles and permit empowerment of people with disabilities to live independently in society. Opportunities for education, work and social interaction for people with disabilities is reliant on independent accessibility to the environment they inhabit and a significant development over the last decade was the introduction and subsequent amendment of Building Control legislation in Ireland. Section 3.2 examines the third variable in the accessibility equation, the built environment. This is examined in terms of the concept of universal design and access provisions under current Irish legislation and how such aspects may form the template for the proposed "LADDER" concept.

3.2 THE BUILT ENVIRONMENT

3.2.1 Accessibility through Building Control

Most urban environments initially came to form through need and use. The requirements of its users and the way in which they interacted with this environment shaped early towns and cities around us. As these spaces evolved through little conscious thought they began to exclude those who did not fall into the category of "the average man". Gradually policy makers recognised the need to address the requirements of people who have varying levels of ability. Much of this recognition emanated from campaigning by disability advocacy groups. Such groups endeavoured to alter the mindset of decision makers from planning for social inclusion for all rather than the marginalisation of those who do not fall into the "correct" criteria. Access in its most basic form was defined by Munro and Elderwoodward (1992) as "means or right of using, reaching or entering". Originally this term was used to describe buildings or components that would be used by people in wheelchairs however it has slowly evolved to include people with a wide range of functional abilities. In its broadest sense, accessible design is any design intended to make performance of basic activities easier and safer for as many people with disabilities as possible (Davis and Beasley, 1994). As previously mentioned every person and hence every disability is different, therefore accessible design can never be entirely accessible to all so the aim must be to attempt to cater for as many as possible.

Unfortunately little research has been carried out on the historical development and planning of Irish urban areas taking accessibility into account. It appears that towns and cities that once came to be without little conscious planning evolved through the input of "interested" parties, unfortunately the interests of these parties was not accessibility. Traditionally urban planning like the social model of disability reflected the interests of political groups with urban development plans focusing on their commercial value or requirements before the needs of other less influential groups. This ethos has inevitably contributed to the marginalisation of people with disabilities from mainstream society. Of all sectors of society people with disabilities appear to be neglected the most in urban planning.

Whether this was due to ignorance, prejudice, or sheer absent-mindedness it will never be known for sure, but such omissions can no longer be tolerated. Fortunately the mind set has begun to change and people with disabilities are no longer forgotten in the planning of urban spaces and a strong legislative framework has evolved to protect their needs. Design of urban spaces must take into account three things; the individual, the disability and the environment, and legislative provisions enacted should take account of this. Legislative and regulatory frameworks have begun to place the needs of people with disabilities on the construction agenda, and new developments, material alterations or change of use must now address their needs.

The construction industry in Ireland is regulated by a two-tier system of planning and building control that have no direct link to each other. Although this research firmly focuses on building control, planning law also sets outs standards a development must conform to, whereas building control sets out performance standards that aim to provide for the health, safety and welfare of people in and around buildings (Rogerson, 2005). The role of planning in the provision of access must be considered and Jones & Payne (1997) suggested that if planners recognise diversity, uniqueness and individuality instead of outdated perceptions such as “average” or “normal” that the accessibility of urban spaces can be improved for all. This suggested flexible approach to planning has yet to be adopted which is unfortunate as it could be immensely successful if the actual needs, as determined by people with disabilities, were embodied at every stage. Planners have considerable power to create change, what is lacking appears to be their resources and motivation to influence this change. Unfortunately such change is also determined by the over-riding requirement to balance cost versus the benefits of such initiatives that has in part created the limited legislative requirements currently in place. Ideology of inclusive design has in reality been replaced by achievable cost efficient technical standards. Little research seems to have been conducted in this country as to how wide the gap between the two really is. People with disabilities must be consulted at the early stages of any urban planning process of both public and private buildings that may have an impact on their accessibility.

Public consultations and consultation with disability organisations could greatly improve accessibility of an urban environment. Even when a development is granted planning permission this does not infer that it meets building control standards or the requirements of people with disabilities, in fact the building control authority may never have assessed the plans. The majority of planning departments when assessing an application do not consider any elements of building control including access for people with disabilities (Rogerson, 2005). If this cannot be addressed then the alternative must be considered to ensure the provisions and authority of building control is strengthened. Most urban development plans now make reference to people with disabilities. These development plans however focus on meeting minimum legislative requirements rather than embracing the spirit in which the law was passed. As a group, the voice of people with disabilities often goes unnoticed by urban designers and planners. Therefore their needs are rarely adequately reflected in the planning and development process. The fact that Development Plans and other planning documents are unavailable in braille text compounds such marginalisation. Cities have developed in a manner that takes into account the physical ideal of modern man who as discussed is in the minority in society. Although many may aspire to this, in reality few achieve such perfection. In terms of usability many cities have been designed for non-disabled people thus legitimising the stigmas that have been evident for many generations. Such stigmas assume their own version of normal and have reduced disability to a base level of lack of function or perceived limitation that society feels it can then normalise through a design process that has little conscious thought of the "design for all" process. As towns and cities develop mindful consideration must be paid to firstly, designing and secondly building, spaces usable (with ease) by all.

3.2.1.1 Regulation of Access to the Built Environment

As outlined in Appendix I many provisions have developed over the last decade for improving integration and social inclusion for people with disabilities including equality legislation and disability strategies. However such polices can only be effective if linked to legislation that regulates the built environment.

The long awaited Building Control Act 1990 was the first piece of Irish legislation that provided for the internal working, health and safety of buildings. This legislation has been built upon to create the current Building Control Act 2007. This provides the underlying framework for monitoring and enforcement of access to the built environment in Ireland. This Act allows for the establishment of Building Control Authorities (BCA) and the making of Building Regulations and Building Control Regulations. The Department of Environment, Heritage, and Local Government who are advised by the Building Regulations Advisory Board (BRAB) introduced this legislation. The BRAB is a statutory body membership of which includes individuals from the construction industry and public and private bodies. The BRAB uses public consultations to assist in their decision making in relation all aspects of building control. Through the provision of Building Regulations, standards have been issued that ensure the health, safety and welfare of people using the built environment. There are thirteen standards in total that regulate many aspects of performance of a building including structure, fire safety, ventilation, energy conservation and access for people with disabilities. The standard that regulates access to the built environment for people with disabilities is Part M of the Building Regulations 2000 and its associated Technical Guidance Document (TGD) M. This replaces the Building Regulations 1997 and the associated TGD M –Access for Disabled People with the significant change of requiring new dwellings to visitable by people with disabilities. A copy of Part M of the Building Regulations 2000 can be found in Appendix II.

The TGD to Part M forms the basis for the design of the audit criteria used in the development of the "LADDER" concept designed in this research. These audit criteria will be used to examine accessibility of a typical urban area. Part M was chosen for various reasons but primarily due to the fact that it has become evident that universal design has yet to be embraced by the design industry in Ireland. Although reference is often made to universal design in design circles it appears to be a more notional ideological allusion. The reality is that in a competitive construction industry accessibility is not a priority and minimum compliance with legislative requirements is more cost efficient and more desirable by prudent clients.

The TGD to Part M is the most commonly referenced accessible guidance standard (Rogerson, 2005) and is used by the design industry in their attempts to prove compliance therefore it was fitting to use this standard in a manner that could tangibly improve the status of people with disabilities. Although universal design is clearly a more desirable option it is not rational to endeavour to design a "LADDER" concept for change based on a concept that in Ireland is currently perceived as idealistic. It is hoped that once the final required legislative frameworks are in place that universal design will become more widely accepted, therefore the "LADDER" concept will be designed in a manner that will easily allow future amalgamation with universal design criteria. The TGD to Part M provides the minimum standards required to provide for access by people with disabilities, although many view these standards as optimum. The underlying philosophy on which these requirements are based is that buildings should be accessible and usable by everyone including people with disabilities (Rogerson, 2005). Those involved in the design and construction of buildings should have regard to this philosophy of universal access and should consider making additional provision where practicable and appropriate (Building Regulations, 2000). This legislation was made under Building Control Regulations 2000 and applies to the construction of new builds or to material alterations or extensions to existing buildings. It may also apply to an existing building that has a significant change of use. Part M sets out the minimum level of provision to meet access requirements and provides broad principles and performance criteria.

The reality in Ireland is that designers and architects see Part M as optimum standards (Rogerson, 2005). Although there are many aspirational guides published they are seen as excessive and not cost efficient. Consequently this research opts to accept this reality and focus primarily on the TGD to Part M as one of the foundations in the design of this research and "LADDER" concept in the hope that design professionals and enforcement officers would recognise a standard they use daily and are already familiar with. In doing so this creates a realistic footing to launch a tool that could be adopted by design and enforcement stakeholders in improving the status of people with disabilities.

3.2.1.2 Enforcement of Access Requirements

Building Control legislation introduced basic powers of inspection and enforcement for Local Authorities for new buildings, extensions, material alterations and changes of use of buildings for access for people with disabilities. Under the Building Control Act, Building Control Authorities were established. These authorities were defined as the council of a county or the city corporation or corporation of a county borough and have enforcement control in these administrative areas. There are thirty-seven building control authorities in the state that hold the statutory responsibility for enforcing the regulations. They have each designated "authorised persons" who have the power to enter and inspect plans and site works. In order to enforce building control legislation the building control authorities have the power to serve an enforcement notice if the design or the development does not comply with the relevant legislation. This notice can be served up to 5 years after completion of the works. Prosecution and orders from the High Court to cease construction are also enforcement options but normally as a last resort.

Currently there is an inspection target for building control authorities of between 12-15% of developments set out by Department of Environment, Heritage, and Local Government and agreed by the City and County Manager's Association. At present 90% of building control authorities meet this target, while two-thirds exceed it (Rogerson, 2005). Inspections are carried out as random sample inspections to ensure compliance. This is not a statutory requirement therefore inspection rates vary significantly across the country. The current rate of monitoring was recently found to be poorly coordinated, haphazard and piecemeal (Rogerson, 2005). This target which is seen as optimum rather than minimum was adopted in the 1990s and has not been revised since. This highlights the current need for an alternative more coordinated and perhaps simplified approach to inspection that may be presented by this research. In 2008 all 37 building control authorities reached their minimum target for inspection, with some in fact exceeding this target (BCA, 2010).This equates to 11,034 inspections for building control.

Currently there is no available documented source as to what constitutes an inspection or how it may be carried out. It is not possible to determine if follow up inspections or access audits are being carried out. Best practice would require these inspections to be documented in the form of standard operating procedures that are transparent and available under freedom of information. This would improve enforcement, gathering of statistical information and provision of information to key stakeholders as well as trust in the system. The proposed "LADDER" concept could offer the enforcement body a documented standardised inspection tool or standard operating procedure that provides easily understood and accessible inspection outcomes and reports.

As mentioned Ireland operates through a system of planning and building control for all new buildings and local authorities hold this control. Theoretically both departments who enforce the Planning and Development Acts and the Building Control Acts respectively can control accessibility. It is a legal requirement to comply with the provisions of both sets of legislation however their enforcement is quite different. Under planning legislation an applicant is required to achieve planning permission for a development where oftentimes conditions are attached. Planning laws ensure planning permission meets planning requirements prior to commencement of a development. Traditionally the onus for ensuring compliance with Part M was a form of self-certification where an architect or designer would issue an "opinion on compliance" to state a development was compliant. The only instance where a prior approval system was in place for building control was in the issue of fire certificates. This has recently changed with the introduction of Disability Access Certificates (DAC). The Building Control Act 2007 set out standards for strengthening of enforcement powers of building control authorities this impacted on the area of access to the built environment by introducing the DAC. This certificate places the onus upon those designing new non-domestic buildings and apartment blocks to confirm that their designs comply with Part M, Access for People with Disabilities. The Building Control (amendment) Regulations 2009 brought this measure into effect in October 2009 and from the 1st January 2010 building control authorities have to certify that all designs of new non-domestic buildings and new apartment blocks comply with Part M.

This certification must be achieved prior to the commencement of construction. The designer applies to their building control authority for a DAC at the planning stage and a building cannot be occupied, opened or operated until the DAC is granted. The subsequent provision of the DAC is dependant on the applicant's compliance with provisions of Part M. The building control authority may seek a high court injunction to enforce this provision, and with the probable expenses this acts as a greater deterrent than normal court penalties. These strengthened powers are welcomed. However this may further reduce the perceived need for site inspection. The DAC replaces the previous voluntary system of "opinion on compliance" whereby a registered professional gave their opinion of the levels of compliance with Part M. This system had no statutory basis and was often referred to as self-certification. The early stages of the DAC will inevitably lead to much confusion as design professionals struggle with the level of detail required as the TGD to Part M is the most exacting of all the standards (Society of Chartered Surveyors, 2009). Therefore training and education holds the key to its success and a standardised approach may be suggested by this research.

The "LADDER" concept proposed by this research could provide the necessary tools to demonstrate compliance with the requirements of the DAC while also assisting enforcement and standardisation. Although the new system of DAC is welcomed it clearly has some failings as it clearly does not require any site inspection of the building works and works on a system of "prior notional approval" rather than actual approval of the built structure. This may further reduce the current rate of inspection for disability access. However, the Minister, An Bord Pleanala, or a Building Control Authority, can authorise inspection of a building and any plans or documents relating to such a building. This inspection can be carried out up to five years following completion of the building allowing accessibility to be considered up onto this stage. Where a building is found not to comply with the building regulations, the authority may serve an enforcement notice. An enforcement notice may require the "removal, alteration or making safe of any structure, or prohibit use of part or all of a building". Statistics are published on the numbers of enforcement notices served, however they is no means of determining what the notice was for or the type of development it was served upon.

The most recent available statistics show that in 2008, 34 enforcement notices were served however the data was collected in a manner that makes it impossible to differentiate what element of building control these notices related to. Comparison to other years shows much variation in the numbers of enforcement notices served with no obvious trend observed. Peaks may correlate to peaks in levels of construction or increased funding in Building Control Sections:

Year:	2000	2001	2002	2003	2004	2005	2006
Notices Served:	80	103	63	33	56	17	57

(BCA, 2010)

Currently a developer must show minimum compliance with each section of the Building Regulations. Non-compliance will lead to a fine not greater than €1016, and/or, at the discretion of the court, a prison sentence of not greater than 6 months for a summary conviction. For an indictable offence, an offender can expect a fine of not greater than €12,000 or at the discretion of the court a prison sentence of not greater than 2 years. Along with introducing the DAC the Building Control Act 2007 established standards for professional conduct and workmanship. The Act also provides for registration of designers such as architects that aims to increase the quality of designs submitted. The Building Control Act also introduced extra powers for building control authorities to halt constructions or bring summary prosecutions for all building code offences that don't comply with Part M, directly to the district court rather than the previous cumbersome circuit court route. 19 summary prosecutions were taken under building control legislation in 2008 however there unfortunately is no concise breakdown as to the nature of these offences and no statistical data for 2009 is available to date. This latest figure shows a notable decrease in the level of prosecution on previous years and this may be as a result in the decrease in activity in the construction Industry in Ireland.

Year:	2000	2001	2002	2003	2004	2005	2006
Prosecutions:	28	36	43	32	41	44	24

(BCA, 2010)

It must be questioned as to whether these figures would vary considerably should a more comprehensive inspection system be introduced?

Presumably the levels would increase initially and once publicity of such prosecutions came to light compliance should theoretically increase through a realistic fear of prosecution that is currently perceived to be low (Society of Chartered Surveyors, 2009). The Act also increased the maximum penalties for those found in contravention of the legislation (Building Control Bill, 2005).

3.2.1.3 Appeals under Part M

Although current Building Control Statistics do not differentiate for Part M there is some specific information available on Appeals of planning decisions. When a development falls outside the boundaries of "adequate provision" and a prosecution in relation to Part M of the Building Regulations 2000 is undertaken, an appeal can be submitted to An Bord Pleanala. This is the Planning Appeals Board who is an independent, fair, impartial and open body. Cases where planning permission has been refused or where conditions are perceived unreasonable may also be appealed. There have been three recorded cases do date that have been appealed to an Bord Pleanala in relation to the provision of access for people with disabilities under Part M. The first example is an appeal from 1996 where the Building Control Authority in Cork refused relaxation of section M 1 of Part M of the Building Regulations. This was with respect to the redevelopment of a building for the development of apartments. The demolition and reconstruction of the building was required to create apartments, accessible parking spaces, common areas and an accessible lift in accordance with the requirements of Part M. This decision was appealed and An Board Pleanala allowed this appeal and concluded that it would not be reasonable or practicable in this instance to apply the requirement for access for people with disabilities to the works in question (An Bord Pleanala, 1997).

The second appeal in 2001 was also in Cork where an appeal was lodged against the decision of the Cork County Council Building Control Authority to refuse the relaxation of a requirement of Part M to provide a lift for disabled access to the upper floor of a new office.

The appellant felt that it was not appropriate to provide access for wheelchair users to this upper floor in a new extension because there was no satisfactory guarantee of independent means of escape. The appellant felt if this condition was enforced it would be in contradiction to compliance with Part B (Fire) of the Building Regulations. Consequently the appellant felt a relaxation of the Regulations would be appropriate in this respect. An Bord Pleanala decided to refuse the appeal on the grounds that this would not be consistent with the requirement to make reasonable provision to enable people with disabilities have safe and independent access to office accommodation on upper floors of a building (An Bord Pleanala, 2001).

The third recorded appeal was in relation to the construction of an external ramp to provide wheelchair access to commercial premises. In this instance the appellant wished to provide the necessary ramp however Kilkenny County Council Building Control Authority felt the ramp would reduce the width of the public footpath to a substandard width for users and would therefore give rise to an obstruction to the general public, including mobility and visually impaired users and therefore constitute a public safety hazard. When permission was refused by Kilkenny County Council the case was appealed to An Bord Pleanala who upheld the original decision to refuse permission in the interest of proper planning and sustainable development and hazards to public safety (An Bord Pleanala, 2008).

3.2.1.4 Summary

The main legislative provision in Ireland to improve levels of accessibility of the built environment is Part M of the Building Regulations 2000. This comprehensive piece of legislation that includes specific design criteria has both strengths and weaknesses in improving the status of people with disabilities. The most notable deficiency is the current manner of monitoring and enforcement with no consistent or standardised approach evident. The adoption of a standard operating procedure such as the proposed "LADDER" concept could reduce or perhaps eliminate such deficiencies. Part M currently is the most critical piece of legislation that provides not only physical but psychological access to the built environment.

Due to its importance in this respect and its use as part of the core methodology of this research a comprehensive analysis of Part M of the Building Regulations 2000 and proposed amendments to this legislation is presented in Appendix III. This analysis considers not only the adequacy of current provisions but also how the recently proposed draft amendment may influence disability status in future. This analysis also examines the opinions of keys stakeholders such as the National Disability Authority, the Irish Wheelchair Association, the National Consumer Agency, and the Irish Council for Social Housing and the Society of Chartered Surveyors on how the proposed amendments will have an effect on on their members. Opinions of the Royal Institute of the Architects of Ireland were also sought in this respect but unfortunately were not forthcoming. This synopsis presented in Appendix III also identifies how this current round of amendments could not only improve the status of people with disabilities but also provide a template for the acceptance of the proposed "LADDER" concept.

Universal design is the only reasonable means to progress accessibility and for the Irish design industry to meet the future needs of all in society. It offers a solution that will meet every individual's requirements over their lifetime generating a built environment that not only facilitates independent access but also one that can endure the tests of time. As stated by John Ollie back in 1997 at the "Architecture in the City" Conference aimed at promoting "Design for All" "a city is only as accessible as its weakest link". Unfortunately these "weak links" highlighted by Ollie remain in abundance today throughout Ireland's urban environments and although the "LADDER" concept uses the current regulatory standard rather than universal design criteria the approach must be considered a step forward to improving the status of people with disabilities into the future. The next section considers universal design and how it must move from an aspirational to a realistic alternative if the design industry in Ireland are to meet the needs of a population that are aging at an unprecedented rate.

3.2.2 Universal Design

3.2.2.1 Introduction to Universal Design

The rural environment to the most part exists in its intended raw state, however the built environment has been created by society and its layout reflects societies' attitudes, laws and opinions on the intended user. Buildings, shops, streets, footpaths and other public spaces are indicative of the evolution of the societies that constructed them. These spaces must evolve culturally and adapt to a more socially conscious state. The built environment has the stamp of each society that built upon it and over time it has become clear that accessibility was not one of their priorities. Lack of access to the built environment is one of the greatest barriers to full participation in mainstream society faced by people with disabilities on a daily basis (O'Herlihy, 2005). The design and construction of the built environment in Ireland today continues to affect choices for independent living for people with disabilities and this research aims to assist people with disabilities make such choices. As previously highlighted by Barnes (2007) empowerment is the key to independent living, it provides an individual access to human experiences and human rights. If it is not physically possible for a person to access services on their own then support must be provided to assist their decision-making and basic human rights. People with disabilities must be in a position to empower themselves without feeling controlled and the proposed "LADDER" concept will hopefully provide a potential solution to empower them in accessing the built environment, its services and social inclusion it promises.

As mentioned previously the notional "average" or "normal" person influenced the design of the built environment for everyone to use. A common misconception regarding universal design is that it benefits only a minority of members of the population. On the contrary universal design aspires to benefit every member of the population by promoting accessible and usable products, services and environments Centre for Excellence in Universal Design (CEUD) (2010). A universal design approach aims to provide designs that take into account that at some point, during their lives every person experiences some form of limitation in ability that needs to be designed for.

Designers tend to have a stereotypical picture of building users; a fit male, between 18 and 45, who is not very tall, short, fat or left-handed (Penton, 1989). Penton estimated at this time that this average accounted for only 20% of the population of that time, leaving 80% of the remaining population (children, elderly, pregnant women, people with pushchairs/luggage/shopping and those with a physical disability etc) having to adapt themselves to the environments around them. Although no statistics have been collated in Ireland as to the numbers of so called "normal" people, recent CSO figures provide some interesting forecasts. The most recent Irish CSO (2007) figures estimated that by 2021 15% of the Irish population will be over 65 years and that a child born today has a 50% chance of surviving to greater than 80 years of age. The CSO (2007) also predicted that by 2021 the numbers of individuals who have reached over 80 years of age will have increased by about two-thirds. This combined with the prediction that by 2050 that there will only be two 18-64 year olds for every over 65 year old (compared to six for every one in 2006) indicates that the increased life expectancy combined with the lack of available carers means we need to plan a more accessible future for all. As people grow older, they are subject to subtle and often progressive changes in their physical shape, performance and other functional capabilities. These changes are below what is conventionally described as disability and therefore are often overlooked by designers. Due to a combination of increased life expectancy and changing habits, older generations are now far more active than previous generations. Sporting activities, exercise and fitness classes feature as part of new lifestyles for older people who are not only healthier, but also more experimental than before. Many others will loose full capacity to independently function in society at some point in their lives. Accessibility can be reduced by a medical injury or condition (temporary, long-term or permanent), or a physical attribute (e.g. height, size) and therefore universal design benefits more people than people with disabilities or aging populations (CEUD, 2010). 30% of all those over 65 years in 2006 indicated they had a disability compared to the total incidence in the general population of 9% (CSO, 2007). Whether or not this aging population will be in a position to live out the rest of their lives independently will depend on how well designers respond to the problem that has been identified to them well in advance to a point where it becomes a crisis.

In his study of the development of universal design, Duncan (2007) found that it is impossible to identify exactly how many people would benefit from universal design solutions. Although Penton's figure of 80% seems somewhat overestimated Duncan (2007) highlighted how changing demographics similar to those predicted for Ireland and the increasing incidence of "circumstantial disabilities" indicates that a significantly large portion of society will benefit from safer, more comfortable user friendly environments presented by universal design (Duncan, 2007).

As mentioned there have been many laws and policies recently introduced to promote social inclusion and prevent discrimination in Ireland. The introduction of the Disability Act 2005 finally places the onus on the design industry to meet demands by developing more innovative universal designs to meet these regulatory requirements in assisting people with disabilities to live more inclusive lives in mainstream society. Unfortunately Ireland has found it difficult to embrace the benefits of universal design and many still design within the constraints of minimum design criteria set out by building control legislation. Whether this has been due to cost or apathy there has been a history in Ireland in providing separate accessible designs specifically for people with disabilities. This is also known as Barrier Free Design, a practice that had the unintended but welcome advantage of improving the built environment for everyone. While legislation provides the minimum standards that permit access universal design envisages that all environments should be accessible by everyone regardless of ability as everyone is different – there is no average or normal person (O'Herlihy, 2005). The foundation for the first Centre for Excellence in Universal Design in Ireland aims to increase awareness of the benefits of universal design and encourage designers to incorporate these principles into their designs rather that minimum accessibility criteria. The term universal design was first coined in the mid-1980's by a US architect Ronald L Mace and it embraces and broadens the concept of barrier free design. Universal design is a further evolutionary stage of this design paradigm that maximises the number and demographic of people who can use the built environment. Ron Mace's original definition in 1988 still resonates more that 20 years on:

> "The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design".
>
> (Mace, 1988 page 4)

This definition was a response to the inconsistencies in emerging barrier free design trends whereby access was provided, but frequently in a separate feature like a rear entrance, stigmatising the intended user (Duncan, 2007). Continued progress in the area of accessibility has provided a platform towards a person centred approach to design. Universal design has also been referred to as "user centred" design that considers the needs of all users from the very beginning of the design process. It attempts to reduce the need for separate accessible or adaptive design solutions that often marginalise people with disabilities. This goal is achieved by going beyond the needs and abilities of average, healthy adults to include those with motor, sensory disabilities, and circumstantial disabilities (such as children and older adults) during a universal design process. It has developed as a result of the combination of the disability rights movement and the many years of work on improving accessibility and the lessons learned in that process (Duncan, 2007).

3.2.2.2 The Principles of Universally Designing for All

In 1993 Coleman expressed how universal design represents the direction of current design theory that incorporates both accessible and adaptable design practices in a manner that does not differentiate or discriminate. Unfortunately the direction of accessibility design in Ireland has continued to centre on barrier free/adaptive design solutions since this time with universal design principles unnoticeable in much of today's built environment. Coleman considered at this time that designing for the broader average and designing to counter decline would create a more universal approach to access incorporating safety, function and a more convenient environment for everyone, not just those with a disability. Ultimately this concept must to be adopted and developed by all designers, as it will embrace the needs of people at each stage of life, from childhood to old age which is going to become increasing important if the population ages in line with current CSO (2007) predictions.

Accessible design must develop to the point where designers and society perceive it as the norm, rather than involving adaptive design solutions. Design solutions should not be seen as special, needs are requirements, requirements for the basic functioning of a significantly high proportion of the population throughout their lifetime and the lifetime of society. Environments that evolve and provide for the needs of people with permanent or circumstantial disabilities will undoubtedly benefit the so-called average person and hence society as a whole. Faure (1992) cleverly identified that architects in an effort to compensate for the weaknesses of their projects, may have embellished their designs by often adding ineffectual steps or staircases that are handicapping. Such design practices are still in clear evidence today, however with the added feature of special wheelchair lifts or long ramps to allow compliance with minimum legislative requirements rather than creating innovative creative designs that accommodate all. Instead, designers should be designing for the "broader average" those who do not fit into the category of "average man". The concept of designing for the broader average reaches far beyond disability into mainstream society to include all. One disadvantage that emerged from the accessible and universal design revolutions was the adoption of two mindsets, one was to try to design in a manner that was usable by all and the other was to completely ignore innovative design styles by assuming nothing can be done (Duncan, 2007).

Universal design will never meet every single person's requirements, however through innovative design solutions, even in historic buildings measures can be put into place to make it accessible to as many as possible, including people with disabilities. Universal design can be subtle to the point of indistinguishable; it is a design process for human diversity, social inclusion and equality. This holistic and innovative approach creates many challenges for design, professionals (EIDD, 2004). Universal design aims to enable all people to have equal opportunities to participate in every aspect of society. To achieve this the built environment its components, services, culture and information must be accessible and convenient to all. This practice makes conscious use of the analysis of human needs and aspirations and requires the involvement of end users at every stage in the design process (EIDD, 2004) as is required with any such research.

Universal design developed in the mid-nineties with the formulation of the seven founding principles by the North Carolina based Centre for Universal Design (see Appendix IV). The principles are still as relevant today as in 1997 and are currently utilised by the Centre for Excellence in Universal Design (CEUD) in Ireland in promoting universal design theory. The purpose of the Principles is to guide the design profession in areas of environments, products and communications. While 100% universal access is neither achievable nor expected many feel that application of the seven principles equals satisfying accessible design legislation. This is not necessarily the case as designers must still meet with specifications and adhere to minimum requirements. The CEUD (2010) described how universal design is not only applicable to the needs of people with disabilities, but to everyone, regardless of age, size, ability or disability; it is not a list of specifications; it is an approach to design that considers the varied abilities of users. Care must be taken by designers adopting this approach not to over develop the concept to the extent it begins to marginalise once more.

Universal design and accessibility improvements have developed in a connected yet parallel manner to the benefit to both design concepts (Duncan, 2007) and if implemented thoughtfully can also meet regulatory and user requirements in tandem. Universal design promotes as inclusive and accessible design as possible that aims to meet the optimum level of needs in order to achieve maximum accessibility that promotes independent living and social inclusion, not only through the built environment but through the services provided within it. They too can be designed through the principles of universal design. Universal design has however been mistakenly described as the search for a one-size-fits-all design (CEUD, 2010). Universal design does encourage designers to consider the wide-ranging abilities of their users and where possible, an optimal design that caters for as many people as possible. The aim is to provide the same (or equivalent) experiences, activities and services to all. It is accepted that these may have to be provided through slightly different routes or means, but designers should strive to create a design that does not exclude or segregate (CEUD, 2010).

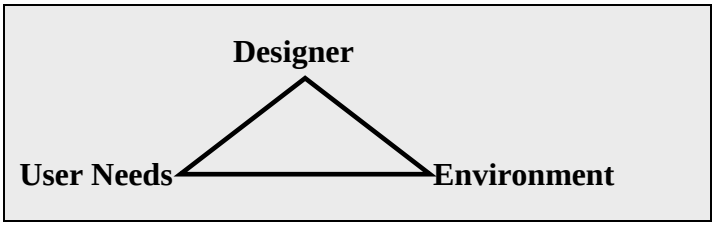
Universal design must take into account the interaction of the individual and their senses with the built environment including what they hear, see, touch and perceive about the space along side function use and appearance. The CEUD (2010) identified many features that must be considered when adopting the universal design approach (see Appendix IV). Incorporating these features into early design stages will lengthen the life and lifetime adaptability of the building and consequently reduce the need and the cost of subsequent retrofitting. The features identified by the CEUD clearly mirror the criteria that require examination in the access auditing process that determines accessibility levels. The significance of this is discussed later in this chapter. Accessible designs that promote access for people with disabilities should not hinder access for others and the careful selection of design criteria will alleviate this.

As identified by Duncan (2007) the needs of every single person's requirements cannot be met through a single design paradigm however through innovative design solutions such as universal design the built environment can be made accessible to as many as possible, including people with disabilities. This holistic approach is clearly reflective of the principles of the proposed "Supportive" model of disability. Such an approach also provides a clear psychological dimension to the changes necessary to make a building accessible. Good "inclusive" design will send unconscious positive messages to people with disabilities that tell them that they are important and are welcome (Napolitano, 1996). Universal design should be invisible, it cannot be a "special need" provision it must be so universal that nobody notices it (NDA, 2002). Such aspects must be incorporated into the design brief and extend beyond the limitations of access solutions to include all individuals to create an inclusive society through the promotion of integrated and mainstream design solutions and services (Duncan, 2007). A wide range of anthropometric data has been collaborated relating to the "average man", this has been taught to designers and architects and is instrumental in formulating an inclusive built environment. Designing from such predetermined data was traditionally a linear relationship. The designer did not assess the built environment once established nor did he receive comments or feedback from users (Figure 3.5).

(Faure, 1992)

Figure 3.5 Interaction of Designer, User and the Environment

For the development of designers the relationship between these variables needs to be evolved. A designer needs to pay greater attention to a wider range of available anthropometric data, develop a consciousness of the needs of people with varying abilities, and assess the existing accessibility of the built environment. This creates an interactive model as shown in figure 3.6 where universal design is a possibility.



(Wilkoff and Abed, 1994)

Figure 3.6 The Principals of Universal Design

Wilkoff and Abed (1994) suggested that there must be a direct relationship between the designer, the environment and the needs of the total population. In both these cases the individual has been omitted from the models, as no matter how a person defines the parameters, it is the task of the designer to meet legal requirements and show "sensitivity" to the needs of others. However this interactive model suggests an end point at each area of interaction and although it aims to develop a consciousness of the needs of people with disabilities it does not directly involve them. For a design to be truly accessible to the "broader average" rather than the "average" a more cyclical interactive model must be developed with all key stakeholders feeding the process, designing with people with disabilities rather than for them. At the center of this process must reside the person and a suggested more aptly depicted version of this model where all aspects work cyclically together is depicted in figure 3.7.

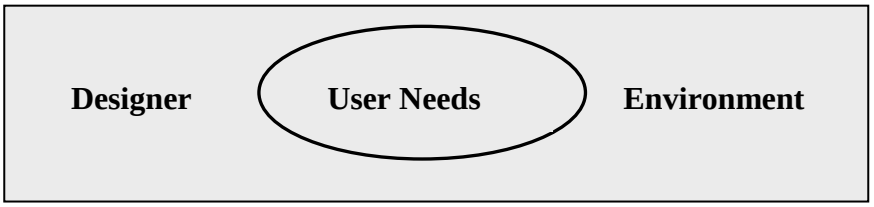


Figure 3.7 Proposed Model for Universal Design

The implementation of ergonomic principals based on real individual experiences in approaching accessibility helps to improve the provision of solutions. Ergonomics is largely based on accommodation that is looking for the "fit" or interface between the task and the individual. Accessibility traditionally is defined in terms of entering, reaching or opening, while a more progressive term, accommodation, infers adaptability and the ability to adjust or alter. Therefore, accommodation in accessibility implies flexibility and an ability to adjust to the individuality of different people and different situations. Accommodation also requires accessibility solutions to be reasonable and convenient to use. To accommodate for a person's needs may be a more acceptable means of persuading the design profession to think unilaterally on the subject and provide interim solutions until universal design is the norm. In their description of the implementation of accessibility, Owens, Hoffman and Kumar (1996) claim that the principle of accommodation in accessibility and the standard measurements of anthropometric data are vital to its success. They feel that combining both of these elements is important in deriving an effective approach to the evaluation and design of an accessible built environment. However the use of more technical-based approaches is also argued for. Innovative design solutions that go beyond traditional ergonomics of matching tasks to individuals must evolve.

Duncan (2007) called for the original seven principles of universal design to be revised and although internationally recognised the use of terms like "adaptation" does not make it a progressive model. He also identifies the need for universal design to expand into areas of affordability and sustainability and such innovative policies are of the utmost importance in areas of current economic downturn. Updating the original seven design principles must however combine with technical-based approaches to create a more sophisticated approach to accommodation reflective of the 21st century technological revolution. The future of universal design hangs in the balance, a still relatively unrecognised solution in Ireland the reluctance of designers to develop it in line with other technological advancement may prove to its detriment. The CEUD (2010) identified that no two people are the same or have the same ability and this variation may be further influenced by both external and internal factors including the activity.

Updating of anthropometric data or applying the principles of ergonomics will never provide environments accessible to every individual in the same manner that universal design can provide such access. The future success of universal design in meeting the needs of our future selves lies in an appreciation of the variance of ability combined with technological innovation (CEUD, 2010). The development of technical advancement of more innovative anthropometric data solutions has been slow perhaps due to the poor uptake of the acceptance of universal design principles. The CEUD in Ireland has generated an innovative approach to this problem they have devised an innovative approach to universal design incorporating:

- User aware design: pushing the boundaries of mainstream products, services and environments to cater for as many people as possible, and;
- Customisable design: design to minimise difficulties of adaptation to particular users.

This pioneering approach aims to eliminate the current apathy towards universal design in Ireland and aims to present micro and macro advantages of subscribing to its principles. One such measure the CEUD has devised and are promoting is a process to improve accessibility of services that are available through various IT channels. Emerging technologies such as interactive television, mobile hand held devices, stand alone data points and navigation systems are all being assessed in terms of how best such technologies can be developed to empower users to successfully access their services (CEUD, 2010). The proposed process sets accessibility targets, compliance testing, maintenance and expansion plans all based around a user-centred design process to assist services providers meet accessibility requirements of as many potential users as possible. This process allows continued updating as a service expands in a manner that also will mirror the continued variances of the user and highlights the importance of visual, auditory, tactile and cognitive senses in improving access. Although the process does not physically alter the built environment it does create empowerment that as identified earlier is an important attribute to universal access. The integration of information technology must also form part of this basis of reform of universal design with the incorporation of not only personal organisation devices but also sophisticated software that combined have the capabilities of empowering the individual to live independently.

The proposed "LADDER" concept is one such capability that could be transposed to such devices, providing a "live" mobile decision-making tool that provides the power necessary to make the choices essential for independent living.

3.2.2.3 Advantages of Universal Design

Creating barrier-free environments for people with disabilities is something that has a very firm physical as well as psychological dimension. Universal design affects everyone's life however only a limited number of people will initially recognise the benefits. It is generally understood that wide doors, ramps and lifts are physical improvements to the narrow doors, steps and stairs that went before them. It is clear that an approach adopting the principles of universal design will immeasurably assist independent living and the inclusion of a person with disabilities into society by creating a more welcoming and usable environment. The demographics of society are altering at an exponential rate and more mobile aging populations demand greater accessibility options. Duncan (2007) felt that such challenges are in need of urgent response to provide design approaches and standards based on universal design principles will meet the future requirements of the evolving populations. Universal design is clearly safer, more comfortable and usable for all, other advantages of include:

- Assisting broader society such as older people, short-term sick/injured, pregnant women, people with buggies/trolleys.
- Increased market reach as the service or environment is available to a higher number and wider range of potential customers.
- Enhanced customer satisfaction and retention increasing awareness and potentially creating new custom.
- Market crossover success, products that are aimed at a specific target group can sometimes generate interest and demand from unforeseen markets.
- Positive public mage as a business that positively contributes to society by incorporating a universal design approach is likely to receive a reputation for having a high level of corporate social responsibility.

- Increased consumer expectations as universal design enables companies to design products and service and environments that more closely match consumer expectations and needs.
- Compliance with legislation and standards as universal design is an approach that not only promotes compliance, but has much wider potential for improving accessibility and usability, beyond the minimum requirements enforced by law.

(CEUD, 2010)

Although the advantages of a design for all concept are clear they must be put in context by obvious disadvantages such as affordability, achieving context sensitive solutions and finding appropriate solutions for historic or listed buildings. It is generally perceived that universal design is expensive and therefore not universally accessible to all for reasons of cost (Duncan, 2007). However levels of improved accessibility may lead to increased business and custom negating initial outlay expenses. There may also be disappointment in the realisation that not all aspects can be made accessible due to structural impracticality, leading to a tendency to "opt out" of the universal design forum (Duncan, 2007). This could be overcome by the provision of auxiliary aids, assistive technology or reasonable alternatives. However the wide-ranging groups that universal design caters for successfully counters such disadvantages. Consequently under its obligations under the Disability Act 2005 the CEUD in Ireland is currently promoting a campaign to encourage designers to incorporate universal design in their designs through education, consultancy and information provision. This is an important step forward to improving the accessibility and hence status of people with disabilities, consequently a detailed examination of the future of universal design in Ireland is presented in Appendix V. Although the current proposed "LADDER" concept is based upon compliance with regulatory standard it is envisaged that future widespread acceptance of the principles of universal design would easily gel with its philosophy that is founded in the proposed "Supportive" model of disability. Cohesion of these aspects could create a decision-making tool that provides accessibility information not just for people with disabilities but for all service users in society together with circumstantial disabilities they may be experienced by any member of society at any given time.

3.2.2.4 Summary

Promotion of understanding of the key factors to access the individual, disability and the built environment has led to many changes in policy and legislative formulation in Ireland over the last decade. Both social and medical models have influenced the legislature to create an "accessibility package" that if implemented in the sprit it was intended would create a society ultimately more accessible to all. Universal design is the solution to many of the challenges facing a rapidly changing society, and although there is not a great difference between its principles and regular design initiatives it will take some time to become a natural part of the design process in Ireland. The principle upon which it is built provides a comprehensive framework not only for improving access of the built environment but to services that assist independent social inclusion.

A key finding from literature reviewed identified that providing accurate up to date accessibility information empowers a user to make an informed decision in a manner that matches their skills and generates independence. This provision of accurate live accessibility data was identified as being an extremely important element to independence and must form part of the universal design process. In the absence of universal accessibility for all Duncan (2007) proposed that the provision of information could counteract inaccessible environments and hence progress universal design and the status of people with disabilities. Provision of unambiguous and user friendly information about what a person with a disability may encounter is critical to the success of this approach and consequently is a key element in this research. The design and development of the "LADDER" concept has its foundation in the collection and communication of live accurate accessibility information in a user-friendly aesthetically acceptable manner that may reform the manner in which key stakeholders collect and communicate accessibility information. The next section, 3.3 examines the key elements of the "LADDER" concept, access auditing and GIS as tools for efficient access data collection and communication. Although the design and development of the "LADDER" concept is a multi-dimensional process these two key elements create the linchpins upon which it hangs and therefore must be examined in greater detail.

3.3 COLLECTION AND COMMUNICATION OF ACCESS INFORMATION

3.3.1 Access Auditing to Collect Access Information

With a thorough understanding of the individual, the disability and the built environment as the requirements for access, research can then commence on designing a process to improve access. The built environment is one of the greatest barriers to full inclusion and independence for people with disabilities. As discussed much of the built environment has been designed and constructed for the so-called "average" or "norm". Successful improvement to a building or a resource or identification of existing provisions depends upon awareness of existing deficiencies and knowledge of either potential solutions or where to get reliable advice. The collection of such information as previously identified is a vital factor in the decision-making process for a person with a disability. Detailed, accurate up to date accessibility information can empower a person with a disability to make bespoke decisions based on their individual abilities. The validity of such information holds the key to empowerment for independent living. Fearns (1996) initially identified that to reach these objectives it is necessary for an entire organisation, not just a single representative, to accept a collective responsibility for, and a positive attitude towards, freedom of choice and equal opportunity. The freedom of choice creates empowerment that in turn is the key to independent living. To improve access the actual accessibility of the built environment must be firstly understood and measured. Such an audit goes beyond the structural aspects of the building by taking into account building use, management, safety and maintenance. As with all audits whether financial or structural there is inevitably a connection between the result and the cost of corrective action, such consequences may insight a reluctance to implement an audit in the fear of the cost of the outcome. Several definitions for access auditing have evolved however the most comprehensive remains:

> "An access audit is a means by which an environment is examined against predetermined criteria and its latent opportunities to accommodate better access are identified". (Access Committee for England (ACE), 1997, page 9)

An access audit will examine the existing built environment against pre-determined criteria designed to measure the "usability" of a building by people with disabilities. "Usability" ranges from getting in and around a building, to getting out, particularly in the event of an emergency. Depending on the measurement criteria the assessment will examine how much of the facilities can be used independently by people with disabilities (Holmes-Siedle, 1996). Clearly one of the greatest obstacles in relation to freedom of choice and independence is the accessibility of the built environment. However another significant barrier is the inaccessibility of access information of such built environments. An access audit will establish how close to, or far away from an aspect of the built environment is from that maximum (Fearns, 1993). The collection of this data is vital in informing potential users if the environment meets their individual needs. Empowerment of the user generates confidence, independence and greater social inclusion. The built environment either can be designed initially for maximum flexibility to meet various needs in a process like universal design, or adapted and used in ways that achieve that flexibility. The concept of access auditing has slowly expanded and now is being looked at in terms of a detailed process. According to Holmes-Siedle (1996), this process can, if carried out correctly, be the starting point for an ongoing project for the lifetime of a building.

There are numerous reasons for carrying out an access audit and Bright and Sawyer (2004) outlined funding of design projects, comparative studies, analytical studies, conservation projects, and verifying compliance with guidelines and regulatory standards as some of the most common motives. The reason for carrying out an access audit will inevitably decide how it should be designed, implemented, who carries it out, what measurement criteria are used and how the results will be utilised. It must be clearly understood that an access audit is not just about getting wheelchairs in and out of a building, an access audit can address the needs of ambulant disabled people, elderly people, those with poor dexterity or little strength, people with poor comprehension, and those with hearing and/or vision impairments (Penton, 1996). An audit will endeavor to include as many of requirements of the broader version of the "average" person as possible within the scope of the audit.

This section aims to provide an introduction to access auditing and to examine such criteria in order to appreciate both the multifaceted and diverse nature of the process, which formed a core part of the methodology utilised in this research.

3.3.1.1 Principles of the Design and Implementation of Access Audits

This research aims to design the proposed "LADDER" concept based around the technique of access auditing. Duncan (2007) recommended that future research is required on understanding and improving way-finding methods to allow a consistent approach for decision-making. This research aims to develop this gap in current service provision. Although the actual "LADDER" concept developed was explained in detail in Chapter 2 it is important to understand the underlying principles upon which the concept was developed. This section summarises the concept of access auditing and the procedure required to design and implement successful access audits. However due to its significance in the context of this research a more detailed account in this respect can be accessed in Appendix V.

The aim of an access audit is to identify levels of accessibility and to establish how well a building performs in terms of access and ease of use by a wide range of potential users, including people with disabilities, and to recommend access improvements (Bright and Sawyer, 2004). This brief has changed little since its inception in the nineties where an access audit was considered by Penton (1995) to be a measured assessment of a building and its usability by people with a wide range of disabilities. Once implemented it can be fundamental in the preparation and implementation of a strategy for improvement (Penton, 1995). Without clearly identifying a problem or a barrier, a plan to improve cannot be credibly implemented. A thorough audit should look at more than just physical mobility and disability it must also examine use of services by people with sensory impairments and mental disabilities. The limit of what is to be assessed will depend on the frame of reference of the project. Every audit conducted will have a different scope, for example the Higher Education Authority in Ireland designated that by September 2010, 5% of third level university places in Ireland be accessible to people with disabilities.

A coordinated approach must therefore be developed in assessing all third level education facilities for compliance with this statutory requirement in a standardised, consistent and transparent manner. Utilisation of a standardised access audit and associated access action plan in this situation would be an ideal mechanism for fairly identifying the numbers a university could accommodate while also presenting a plan for improvement. An access audit encompasses two elements: individuals with disabilities and the built environment. It could be presumed that architects, designers, surveyors, engineers and planners are the experts in the area of the built environment however it is this group of professionals who have shaped many of the inaccessible environments of today. Therefore the most successful audits and surveys are carried out by a varied group of able-bodied people and people with disabilities, using questions designed mainly by people with disabilities (Holmes-Siedle, 1996). The CUA (1997) felt that an auditor must to be able to read plans, sketch, survey, observe, edit and record. Based on such observations it was evident that numerous skills must be attained before credible research could take place involving the implementation of access audits. Therefore comprehensive training was carried out in access auditing as outlined in Chapter 2.

It was decided at an early stage that for the "LADDER" concept to be useful and accepted by key stakeholders that the measurement criteria adopted must be the minimum legal requirement. As identified designers have a propensity to accept the TGD to Part M as the standard they aspire to in providing accessibility. By choosing this current legislative requirement it presents an opportunity to examine in minute detail each criterion of the TGD and its effectiveness in providing access. The layout and organisation of the TGD also allows for the design of an access audit with relative ease for identifying specific areas for access of individual disabilities. This could provide a system that may possibly be utilised by key stakeholders in their undertaking to promote accessibility. Although NDA guidelines and other commercial audit packs based on universal design criteria are excellent measurement criteria for auditing they are somewhat aspirational and have no lawful standing so therefore cannot be legally enforced.

Although a built environment appears concrete it becomes fluid with the passing of time and no matter how well designed an audit is, it will only be useful for a certain period as a building will naturally change over time in terms of structure and use. The "LADDER" concept is designed in a manner that allows for continued adaptation in line with potential legislative change and the anticipated progression towards universal design.

The type of audit utilised in this research is an Analytical Audit (see Appendix V for further options). This is an audit that gathers data that indicates the accessibility of a building that may be used for publication in references, reports, directories and guides. This can assist people with disabilities in availing of accessible services that suit their individual needs. It is envisioned that if people with disabilities are provided with accurate up to date information in relation to the built environment that they intend to access that this will empower them to the extent that they can make independent choices and thus live more independently in the community. In this research an "external audit" as opposed to "self audit" is carried out on a selected research area in order to test the proposed "LADDER" concept. Each of the owners of buildings in the selected test area are asked to participate and have the accessibility of their buildings audited against the selected audit criteria. They are also offered advice as to how to improve access in the form of an Access Action Plan, the merits of which are discussed later in this chapter.

3.3.1.2 Reporting of Results

Once completed the access audit comprises of a compilation of a list of defects that need to be put right in order to make a building and its environs accessible (C.U.A, 1997). However results also provide a valuable representation of both accessible and inaccessible features that can assist decision-making for people with disabilities. On completion of the physical audit the auditor/client is in possession of a concise working document. This raw data is the information required to produce an informative report. Conventionally such reports draw from the checklist data, often in spreadsheet format, to produce text heavy written reports that attempt to depict a representation of accessibility. The use of such results forms an integral part of this research. The ACE (1997), described what they felt were essential components of such reports:

- a detailed description of the barriers presented;
- a suggested means of removing or overcoming the barriers in a practical or achievable manner while also reconciling conservation issues;
- a timetable of works which are costed and programmed over a fixed period which minimise the disruptions to building operations.
- references to consultation exercises, other audits and/or development strategies like staff training.

Although a report constructed in such a manner has many clear advantages there is however one distinct disadvantage. Such reports are long and detailed and do not provide quick and easy access to the data, especially for people with disabilities who require it in a timely fashion relevant to their present need. The auditor must spend much time collating and describing the audit result data, while the reader must trawl through every sentence of the document in an analytical manner in an attempt to identify overall or comparative levels of accessibility. Once the hardcopy report has been generated there are however many practical advantages to its publication. The NDA (2002) also described how feedback from the audit can be provided as a draft report of findings or as a final report accompanied by an "access audit companion". This document assists interpretation of the audit and acts as a reference document as to best practice and standards. The NDA also detail the format of such an access audit report similar to that of the ACE. Although a beneficial document in its own right the report from the findings of an access audit tend to be rather text heavy and laborious to gain concise meaning. There is a clear need for innovative sophisticated methods of representing results of access audits. The "LADDER" concept proposed by this study aims by utilising GIS visual graphics to simplify the representation of the results of access audits. The methodology employed could reduce the audit findings in a concise manner that could allow for the efficient communication of pertinent "live" details in a convenient user-friendly manner that could be easily updated and be of benefit to all stakeholders including advocates and enforcement officers. Irrespective of the mode of representation the results of access audits are a valuable source of information.

Even if an organisation cannot afford the cost of physical improvements to accessibility they can use the results in other ways and throughout this research many uses for the results of access audits are suggested, all of which could tangibly improve the status of people with disabilities. Traditional uses outlined by Fearns (1996) do not necessarily entail a high monetary cost for example using results as an information source to those intending to visit the building in answering potential visitors' questions. Audit results could also be used to improve the overall management practices of a premises, for example, no longer using a high sheen floor polish or using the larger accessible toilet for the storage of cleaning materials. It must be accepted that unplanned or unforeseen changes will take place and these changes must be either predicted or responded to rapidly. Preventative measures must also be implemented to avoid reoccurrence. Examples include, ice on an external approach, free standing objects moved into the path of travel, or an induction loop being turned off by an employee and not being reconnected. Such subjective measures are important and will be examined in detail later in this research.

It is clear from all sources that access auditing should not be a one-off exercise and there is a need for continual review and progression in order to keep the results "live" and relevant. Access auditing must form part of a systematic approach to continuous improvement of access. Audits need updating and renewal as the built environment remains fluid with passing time. It is clear that there are many potential uses for access audit results however the manner in which such results are presented to date are limited. Hard copy files and spreadsheets dominate the world of access auditing and as mentioned such files are neither easy to generate nor digest. It is clear than Fearns and Holmes-Siedle were the founding developers and promoters of access auditing and they effectively researched the requirements for access and developed successful models for access auditing. However little development or innovation as to the representation of results of the access audits has emerged since the inception of access auditing in the nineties. Innovative tools such as access auditing will only continue to develop if built upon via an interagency approach taking expertise from key stakeholders such as local authorities and disability groups.

Protracted text heavy reports currently form the basis for many reports by those who endeavor to promote improved accessibility on a political level. Submission of long-winded reports of this nature is unlikely to catch the attention of already over inundated politicians and other key players. Similar comparisons could be made in local authority departments that enforce accessibility legislation where building control authorities have much hard copy and computer based accessibility data. Such data on current and new building stocks is presented in a manner that does not easily allow extraction of pertinent data by interested parties. Little on no data is available in graphic or geographic format. Without easily accessible "snapshot" data presentation there is a danger that the disability agenda will be lost beneath a pile of over written and under appreciated reports. Current antiquated methods of data presentation greatly limit the use and potential of accessibility information. It makes it difficult to draw overall conclusions or make constructive comparisons on local, regional or national scales. This research will examine a geographical representation tool (GIS) for the communication of this data in the development of the proposed "LADDER" concept.

3.3.1.3 Access Action Plans

As described there are many key factors to take into consideration in the implementation of an access audit and a considerable amount of research must be undertaken prior to commencement. Once the audit commences it must examine access features and requirements of all users and it must identify both physical and communication barriers to access and suggest improvements to enhance access. Such solutions form the foundation of an Access Action Plan (NDA, 2002) which is a continuing programme of works that begins with an access audit. The audit will provide the information needed to decide the plan of action. The access audit is just one step towards improving access, once complete an entire strategy for action can commence. An Access Action Plan is a strategy to improve access based on the findings of the access audit and can ensure that access remains high on the agenda to assist ongoing improvement (NDA, 2002). The action plan will incorporate a schedule for how and when the works will be carried out, some of which may be long terms goals based on long-term future renovations and budgets. A procedure must also be incorporated to allow for continuous review.

When finished the Plan will allow for continuous re-evaluation or assessment of the building in relation to access and the improvement of existing facilities (ACE, 1997). Access Action Plans must be specific to the environment audited reflecting its design and maintenance, as well as the needs of its specific users. Generic Plans have become commonplace with some consultants who have recognised the expediency in revising Plans based on similar developments such as hotels or shopping centres. Plans must be individual and uniquely site specific and should determine the management policies for the audit and its periodic review. After testing the proposed "LADDER" concept participants of the access audit will be offered comprehensive access action plans so that this research can achieve tangible results.

Hosker's (1996) approach to improving access based on the use of Access Action Plans although simplistic remains viable. Firstly the access audit needs to be carried out then a policy needs to be developed and finally the Action Plan must be coordinated. The access audit should identify where good practice and advisory guidelines already exist and identify means of improving access to sites and services. It should also utilise the expertise of existing staff and useful local and national contacts, and emphasise where current provisions meet a perceived need or require improvement. The access policy or statement demonstrates the organisation's commitment to providing inclusive access for all, this should be provided at the earliest possible stage to reaffirm their commitment (O'Herlihy, 2005). Hosker (1996) also described more specific components and processes of a resulting disability policy. He felt the policy should define the term people with disabilities, identify existing discrimination against people with disabilities, and designate a senior member of staff to implement the policy and the Action Plan. It should also develop a statement that commits the organisation to equal rights and opportunities as well as outlining the methodology required in meeting the needs of people with disabilities. The policy must also outline the procedure for dealing with complaints and comments, outline an assurance for developing operational guidelines, and explain how the policy and the action plan will be promoted. Coordination is the key to the success of the Plan as this will assist continued progression of a Plan that may last years.

From these proposals a specific action plan may be formulated that Hosker (1996) stated must contain a list of proposals with accompanying statements on targets, dates, resources, and individuals responsible in order for its implementation to be truly successful.

A recent significant development in the area of managing audit results and Action Plans is the introduction of specifically designed software. Such software has been designed to assist auditors conducting audits. These software applications are currently UK based and are designed around meeting requirements of their current legislative provisions under the Disability Discrimination Act. The software is an interactive database system that contains electronic checklist of audit criteria for use on a laptop, desktop or hand held palm pilot. Where applicable software can provide additional guidance linked to the criteria being audited, notes and action points can also be recorded. From there an Access Action Plan can then be automatically generated to assist the improvement of access. Although expensive and often prescriptive to software companies' audit criteria, such technological advancements could easily link to the "LADDER" concept proposed by this study and assist in the collection of data in a time efficient manner.

3.3.1.4 Summary of Access Auditing Process

People with disabilities clearly can become "disabled" by inaccessibility to buildings. The current lack of provision of information and communication of information of accessible and inaccessible features further disempowers them in living independent lives within society. Access auditing has evolved as an important tool for identifying access as well as barriers to access and solutions towards improving accessibility. On identification of various aspects that may reduce accessibility, mitigation measures can be decided upon and implemented. This however is not their only advantage as audits also highlight good accessible features so that the audit findings can then be used as an information tool to assist people with disabilities in their decision-making process. In 2004 the National Disability Strategy required government departments to develop a number of departmental Sectoral Plans to improve accessibility.

As part of the Sectoral Plan for the Department of Environment, Heritage and Local Government each local authority committed to implementing access audits. These access audits were to include all public buildings, public parks, open spaces, pavements, roads and streets. From this a plan of remedial works could be formulated to improve access for people with disabilities. Although conceived in 2004 local authorities are only just coming to terms with their requirements under the strategy and to date little progress has been made and very few audits have been implemented. The previously mentioned "Excellence through Accessibility Award" and Inclusion of People with Disabilities in Education Strategy are two other state led initiatives that required government departments to review their current levels of access in order to develop and improve accessibility. These brief examples highlight current state led initiatives that clearly highlight the importance of the acceptance of access auditing as a valuable field of expertise on a political level.

Acceptance by government that change must now be tangible rather than the adoption of previous aspirational strategies indicates that the timing of this research corresponds to the need for improved handling and communication of accessibility data collected. This research aims to use access auditing to design the proposed "LADDER" concept not only to provide a decision-making tool for people with disabilities but also a system to evaluate Irish legislation and assist the reform of the handling of access information by disability organisations and building control authorities. Access auditing is both complex and diverse, but with the appropriate training and suitable mitigation options it must become one of the features to the forefront in the improvement of access. Since its conception the presentation of results are typically standardised to hardcopy report formats that are very difficult to extract concise information from or depict access for potential users. IT options for the organisation and representation of such results are evolving and one such area that has rapidly developed is a computer mapping system, GIS. The following section 3.3.2 will provide a brief overview of GIS, the power of mapping, current uses in the area of disability and its potential for communicating accessibility data in electronic map format.

3.3.2 GIS to Communicate Access Information

3.3.2.1 Introduction

This research proposes that effective communication of accessibility information can dramatically enhance the quality of life and hence the status of people with disabilities to the extent whereby it empowers them to live more independently in society. Although efficient means of gathering such data have already been identified in the form of access audits the current method of presenting such data in written reports is less than satisfactory. This research proposes the design and development of the "LADDER" concept that collects access data using access audits and communicates this information is in a computerised geographical representation or map. This representation is in the form of GIS that incorporates computer software that links geographic information (where things are) with descriptive information (what things are) (ESRI, 2008). A map at its most basic level is a two-dimensional graphic illustration of space of all or part of the earth. However, this description is too simplistic as a map has much more potential than this, its potential lies in how the map is used, especially if this use is computerised. Our understanding of maps is generally a learned response as we experience many variations of maps throughout individual personal development; maps are a culturally learned knowledge (Crampton, 2010). It is often said that knowledge is power and maps not only have the power to convey important information for people with disabilities, they could empower them to the extent that they can become a decision-making tool to assist in their daily activities. Mapping creates knowledge however reflecting it on a map does not create extra physical space it provides a new way of treating and communicating existing space (Crampton, 2010). The manner in which data is presented signifies the levels to which its user will be empowered. Using computer animation map data can be transposed from static to dynamic (Steinberg and Steinberg, 2006).

The previous section demonstrated how accessibility information or knowledge can be measured and collected in an accurate and useful manner, however the significance of results often become lost in wordy text. This section endeavours to introduce the power of maps and provide an overview of GIS as a means of communicating this information in a way that is meaningful, empowering and user friendly.

GIS provides a foundation for solving some of the worlds more complex problems and can form the basis for fruitful research. Productive research requires collection of appropriate data in a suitable fashion and then intelligently analysing data in a manner that makes sense of the hypothesis or question posed (Steinberg and Steinberg, 2006). Geographic information management has developed on an international scale to cope with the vast amount of information about various aspects of this planet, yet the plotting disability access has remained relatively unconsidered in this discipline.

3.3.2.2 The Empowerment of Maps

Each time a map is drawn a decision is made. What to map and who to map for are the types of information for typical considerations of every new map. A map is selective and limited by the user requirements and hence they offer a powerful authoritative representation of things and events in the world that cannot be presented by other means in that moment (Harvey, 2008). In doing so a map becomes "power" a reflection of the values and beliefs of the mapmaker. If these beliefs do not cater for all then inequity may quickly become evident. Harley (1989) was one of the first to identify that maps are as he called it "authoritarian images" and he felt that if we do not acknowledge this it could strengthen and legitimise their apparent normality. Harley's reference to authority or power is of key importance to this research. Whether intended or not each map generates a form of "power" that may assist or hinder the user. Maps are generated from a unique perspective. This perspective may not take into account all possible users of a map, justifiable so as many maps are so specific to purpose that they may ever only be utilised by one person or organisation. Maps however that enter the public domain and intend to be available to all provide a concrete, sometimes unforgiving, view-point that once printed cannot be changed thus providing an authoritarian image from the commissioner's eye. An image that if commissioned by a policy maker, a social group, or legislature may stand to marginalise or disempower those excluded by its representation and therefore is a crucial element in addressing the status of people with disabilities. Maps are specific relations of power and are created by communicating what we choose to represent and how we represent it and consequently becomes political (Crampton, 2010).

In historical terms maps have not lost their power or importance as they have developed seamlessly beside the technology that evolved around them. Woods (1992) one of the most noted authorities in mapping described how maps create the past, future and present. The past and the future are intangible yet they can accurately come together in the lines on a map. Woods (1992) recognised that the knowledge of the map is the knowledge and experiences of the world from which it emerged. Woods (1992) cleverly described maps as providing us with "reality", this reality may exceed a person's vision, it may be a past reality or indeed a future reality but the importance being "reality". Like a mirror or photograph a map is real for the moment it was plotted it becomes momentarily "live". Although an urban environment may appear solid and indestructible, to map that scene can only be a "map for the moment" as the concrete somehow becomes fluid with the passing of time. Woods (1992) described the map as "the windows of the world", the view from which is predetermined by the author, subject and theme. For people with disabilities "maps for the moment" date far too quickly, they require continuously up to date living maps that will address their needs.

Maps present an impression of the world from a particular viewpoint. Once embedded in the printed text the lines of the map acquire an authority and a power that is hard to dislodge. Therefore if a map of a public space is generated for use by all citizens, and it does not contain pertinent information for people with disabilities the authority of this map portrays that status that person holds within society. Harvey (2008) identified that as IT expands geographers and cartographers are not the only disciplines making maps. Skills to produce digital meaningful maps that allow updating can be easily attained without years of training and expertise. However without prior understanding of concepts and skills the meaning of the map may be lost. This reinforces the requirement to acknowledge the power of the map-making process as without prior understanding the generation of a map may serve contradictory to the original purpose. Maps that act as aids to mobility and access for people with disabilities will only be empowering if personal geographies are taken into account. Individuals are regarded as active agents, giving meaning to their environment through their interactions with it. The built environment presents varying "messages" to individuals.

If cartographers or planners take it upon themselves to produce maps or guides for people with disabilities without first seeking to understand the groups' images of the environment, they are likely to create a product founded on their own values and images, rather than those of the potential users (Vujakovic & Matthews, 1994).

> "Cartographic silences reinforce political silences and therefore sustain the political disempowerment of specific groups within society. All maps concerning issues of disability become political statements concerning the nature of the built environment as soon as they enter the public arena".
>
> (Vujakovic & Matthews, 1994, page 363)

The main source of information on such authoritarian images is an individual's direct experience of the world. As a social group, people with disabilities generate a range of environmental encounters and these encounters are different in type, context and intensity from those of other groups. Their impressions of the built environment will differ, and their conceptions of environmental difficulty will often go unnoticed by those who do not share their problems. This experience stems from their personal movement and travel through space. People often develop mental maps through discussions of a location, such mental maps can often prove unreliable as they communicate information based on personal exposures and perceptions (Harvey, 2008). These experiences develop very subjective opinions on the environment or a "personal geography". Maps will also represent something beyond an individual's experience and are also a source of information about locations that we perhaps have not yet experienced. People trust the map due to their personal lack of experience of the location (Harvey, 2008) and for a person with a disability to trust such a map is placing their independence in the hands of those who created it. For many years disability has been examined in terms of location and space. It is only in recent history that geographers have placed disability on their agendas and they can have a valuable input to the debate. Church and Marston (2003) described accessibility to the built environment as one of the most important characteristics of the geography of space and accessibility of space. The geography of space can take on numerous entities from the minute (the height of a door handle) to the extreme (the accessibility of a transport system).

They successfully argued that without actually measuring levels of accessibility in a built environment it is almost unfeasible to compare the alternatives in an attempt to promote change. Access auditing provides an effective tool for such measurement, a tool that if designed and implemented effectively can present comparisons and suggestions for improvement in an easily understandable and accessible format. The issue of geography of disability is of interest in the background development of this research and a more in-depth analysis can be examined in Appendix VI.

One of the most important functions of the map is route planning and orientation. To find a route from one point to another without any prior cognitive imagery of the area is almost impossible without the use of a map. Most map users see maps as a tool to assist them in getting from point A to point B without becoming disorientated along the way. This use of the map is of great importance to a person with a disability who, for getting from A to B autonomously, can make the difference to being reliant on care assistants to being an independent active member of society. Creating their own individual authoritarian images could revolutionise how their world is currently perceived. Individuals interact differently with the built environment due to many reasons; past experiences, observance skills, social class and personality all play key roles in how an individual perceives the environment in which they interact. Vujakovic & Matthews (1994) highlighted that if the map creator does not work with people with disabilities rather than their individual perceptions of what they believe they actually require then they are at risk of creating a map reflecting their own values/prejudices rather than a map that is representative of the group at hand.

Imrie and Edwards (2007) examined the relationship between identity and space and the use of the space each person individually occupies. They successfully identified how space has a major influence on the way that people feel not only about themselves but of how society feels about them. A person can go from feeling free and independent to feeling trapped and humiliated solely through the space in which they are interacting. An example of a wheelchair user being unable to access sanitary accommodation as depicted by Imrie and Edwards (2007) clearly demonstrated such humiliation.

Further research in the area of space and place for people with disabilities can only help to reduce the disablement they currently feel in society. Unless carefully planned and managed the built environment can disempower users. In a changing built environment that relies on interaction, much of a person's daily life is spent dealing with intricate spatial communications. People live at one location, work at another, and interact with commercial units, services, friends and institutions all at varied locations across built environments. Failure to provide accurate information on how to access any of these links to society will serious negate on the social inclusion and interaction of people with disabilities. Making sense of this knowledge and adding to existing stocks allows us to identify patterns and hence make assumptions around them. Maps are no longer the final product merely storing and presenting data, they can be valuable live representation tools that could assist people with disabilities visualise how they can live independently. Transposing maps to a live visual interactive system as proposed in this research allows for endless possibilities and opportunities including individual empowerment. Technological developments created the computerisation of cartography that has overcome shortcomings of the paper map such as their difficulty to alter, update and combine with other datasets. GIS is an excellent example of such a development (Phadke, 2006). The willingness of key stakeholders such as Disability Organisations and Building Control Authorities to embrace such a radical philosophy of mapping combined with technological developments such as GIS could transform the current controlling nature of the map. This research aims to use GIS to alter existing representations of accessibility data and present a means of communicating such data in a useful, live and accessible form that adjusts to meet the need of the user.

3.3.2.3 Overview of GIS

Geography traditionally depicted the world in maps, atlases and globes and assisted each individual in the decision-making process of where to go and how to get there. It allows greater understanding and therefore use of the planet. Even before computerisation GIS had been used for a long time by a person's sub consciousness that linked attributes to maps through the personal computer in the brain (Phadke, 2006).

This theory indicates that the development of GIS was a natural progression from an individual interpretation of cognitive maps. A more detailed history of the development of GIS can be accessed in Appendix VI. As mentioned GIS links geographic information (built environment) with descriptive information (access requirements). Unlike the paper map where once you unfold it geographical information is presented as points and lines a GIS stores this data in layers in digital format. Each layer represents a different theme or attribute of the map and once they are laid over each other on the same geographic area a real time comprehensive view can be visualised (ESRI, 2008). In its simplest form a GIS is a system designed to store, manipulate, analyse and output map based or spatial information (Steinberg and Steinberg, 2006). GIS can display a map on a computer screen and display detailed information about its features. Phadke (2006) illustrated how GIS is a special type of information system that combines the effects of digital cartography, computer aided design and data management systems. It references graphic data to an x-y co-ordinate system and it separates map features in the form of layers. A GIS can divide an entire area to be mapped into separate files, but it handles all of the data within these files as if they were on one "seamless" map file. Along with holding the spatial or graphic data, a GIS can also handle attribute data. This data can give descriptive information about the associated graphic elements (Korte, 1997). There have been many definitions proposed for GIS that depict combinations of hardware and software and associated components of data input, analysis, management and mapping and such definitions have not evolved significantly since its inception in the 1960's. Schuurman (2004) felt that such definitions are now redundant as they became overstated in an attempt to legitimise a new concept. As GIS has become well established it is now assumed to be useful and successful and therefore justifications are no longer necessary (Schuurman, 2004). However the most recent and comprehensive definition sourced eloquentlyoutlines the multi-dimensional attributes of GIS:

> "A combination of hardware, software, data, people, procedures and institutional arrangements for collecting, storing, manipulating, analysing and displaying information about spatially distributed phenomena for the purpose of inventory, decision making, and/or problem solving within operations, management and strategic contexts as related to issues at hand". (Nyerges and Jankowski, 2010 p.5)

This expands greatly on the more commonly accepted early definition by Maguire (1993) who defined at its most basic level a GIS as:

> "An integrated system for the collection, storage, management and presentation of geographical data". (Maguire, 1993 page 12)

The significance of the Nyerges and Jankowski (2010) definition lies in the fact that it goes beyond the software functions of a GIS of storing/managing/handling data and embraces the elements of people and procedures. GIS must be seen as a system that takes all external factors relevant to the data into account rather than just being a piece of add-on software. Their definition also puts important focus on the out put of GIS and potential uses one of which is decision-making and problem solving - both elements considered vital to this research. Their definition also highlights further uses such as management and strategic contexts that this research hopes will attract key stakeholders into accepting GIS in assisting the status of people with disabilities. Defining GIS on such macro and micro planes can only assist in its acceptance and use in diverse disciplines that expand beyond the realm of geographers and cartographers. However some commentators feel that the limitations of definitions are often constraining. GIS refuses to accept the temptation of adhering to a simplistic definition due to its wide range of applications, a holistic model of a functional GIS must be considered in defining the system (Tomlinson, 2007). This model needs to place spatial data at the core surrounded by features such as attribute data, data storage, data analysis, management and presentation. A one-line summation falls short of identifying its true capabilities and functions and its greater attributes must be considered in its description. Shahab (2008) felt that any researcher intending to find a comprehensive definition for GIS must consider three issues:

- GIS will always be related to other databases through its unique feature of spatial reference that geo-references as a means of storing and using the data.
- GIS embraces technology and combines digital maps and images with statistical packages in a comprehensive manner.

- GIS must be defined as a process rather than an amalgamation of hardware and software. The manner data is entered, stored and analysed must reflect the proposed use for a specific research question/decision-making function.

Although Shahab (2008) had described definitions as "now redundant as they became overstated" he does ironically his own interpretation of GIS as:

> "A purpose specific database that combines the elements of data input from maps and other sources, data storage, data acquisition and query, data transformation and analysis and data reporting in a form such as maps"
>
> (Shahab, 2008, page 32)

GIS allows the collection and analysis of information far more easily than was possible with traditional techniques though its use of an integrated technology system. Shahab (2008) felt that GIS is not a new concept but an evolution of individual technologies such as digital cartography to create a system that is greater then the sum of its parts. Application of such principles to results gathered in the implementation of access audits may have far reaching implications. A map is easier understood than a table and visualisation manufactures meaning from the data in order to "see" spatial patterns therefore increasing the accessibility and meaning of spatial analysis to many users (Schuurman, 2004). Accessibility data could possibly benefit from the exploration, analysis and presentation of the data in a manner that no longer depends solely on the written text to depict a complex subject that is firmly rooted in space and time. Representations created could have the potential for specifically addressing the needs of the end user in a way that could be so diverse that the authoritarian image becomes diluted to a level that demarginalises the map to become usable by all.

A GIS facilitates the forming of relationships between different sets of data connecting both qualitative and quantitative data in a geographical context (Steinberg and Steinberg, 2006). One of the focuses of this research is the product of a GIS, the map and its combination with access audit results for potential use by people with disabilities and key stakeholders to access and communicate accessibility data.

Therefore rather than presenting a detailed account of the complexities of the components of a GIS in this section Appendix VI provides an up to date practical overview. This depiction is informative to a level that provides the insight required to understand the underlying principles in the development, formation and understanding of the maps presented in this research. It is often said that a picture paints a thousand words and high-quality digital representation of attribute data on a geographical plane can make availability of data more accessible and desirable to a wide range of varied users (Steinberg and Steinberg, 2006).

3.3.2.4 GIS as a Decision-Making Tool

Kraak and Ormeling (1996) identified that GIS is not merely used to question data, the user can also use it interactively as the data changes over time to become a support system for making decisions in real time. This is of great importance to people with disabilities in gaining independence. One distinct advantage of GIS is the transformation of data into a format that is beneficial to the prescribed user and therefore assists the user obtain pertinent information quicker and more efficiently (Tomlinson, 2007). Users must be in a position to interact with the data in a user-friendly manner that is easily understood. GIS does not have a fixed identity it is many things to many people, it can be seen as a piece of software, a scientific approach, an analytical device or a presentation tool (Schuurman, 2004). This research identifies decision-making as one important element of data transformation and output element of GIS as it generates the empowerment constituent of the map. Tomlinson (2007) identified that we operate in an environment of continual change especially in urban environments, and GIS has the potential to expand at the equivalent rate providing data that is “live” and up to date with perpetually changing surroundings. This is especially relevant in how the ever-changing urban environment impacts on people with disabilities and how accessibility information must be communicated “live” to its users if it is to bear relevance. Phadke, (2006) also identified a primary function of a GIS as a decision support tool that is beneficial when a decision is required that involves spatially referenced data.

Conventional uses include resource management, land use planning, demographics and environmental monitoring however the scope of GIS has started to extend beyond the world of geography as it has been embraced by the social sciences. GIS facilitates critical thinking as it allows the integration of previously unconsidered geographically based variables into research. As mentioned as IT expands geographers and cartographers are not the only disciplines making maps, skills to produce digital meaningful maps can be easily attained without years of training (Harvey, 2008). The adaptation and improvement of GIS technology has assisted this acceptance to the point where its growth is innumerable to the extent that it has even expanded its use to business and marketing (Phadke, 2006). GIS is designed for making determinations and to see it just as a collection of hardware and software for depicting data disregards its fundamental rationale that is to play an integral part of decision-making processes (Shahab, 2008). 50% of the brains neurons are used for visual intelligence and GIS provides a valuable means for the brain to identify patterns (Schuurman, 2004). In decision-making visual displays can provide intuitive conclusions through cognitive thinking and although not scientific such conclusions are powerful tools for discerning information quickly using visual rather than tabular prompts. People reason using imagery and visual depictions are processed differently to text or numerics (Schuurman, 2004). A recent development in GIS is its expansion into multimedia, combining its capabilities with videos, graphics, animation and sound brings geographical information to life in the form of "living maps" (Shahab, 2008). Combing decision-making capabilities with options of keeping data live will empower users of the "LADDER" concept to make independent choices that influence their daily activities and lives.

Nyerges and Jankowski (2010) also clearly defined GIS as a decision support tool. They felt information provided during all aspects of a GIS can be used in an integrated manner to assist the decision-making process for substantive societal concerns such as urban management. Nyerges and Jankowski (2010) identified some of the decision-making functions of a GIS to include data management to extend human memory, graphic display to enhance visualisation and spatial analysis to improve human computing performance.

The world has become more urbanised therefore never before has a decision making tool such as GIS been vital to solving the many complexities such urbanisation presents including access for people with disabilities. Once the process has begun GIS forms clear reliable representations that assist decision-making. While geography endeavors to improve individual understanding of the world, cartography visually communicates this understanding (Harvey, 2008). Therefore the communication of the decision is represented in a map and this map influences how we "know" this complex world that continually presents us with choices and associated decisions. GIS must therefore combine communication and representation effectively in order to provide a successful user-friendly map (Harvey, 2008).

3.3.2.5 Current GIS Applications and Links to Accessibility

Although this research aims to present GIS as a communication and decision-making tool there are many other applications that justify the acceptance of this innovation. GIS is currently expanding at an exponential rate and becoming more recognised outside the world of geographers by many other disciplines such as police departments, car navigation systems, organ donation planning and infectious disease monitoring (Schuurman, 2004). The diversity of this acceptance indicates the ease at which the technology can be transposed into disciplines that have little foundations or understanding of geography. The S in GIS is now often referred to as Science indicating the shift in focus away from geography towards the social sciences (Schuurman, 2004) into which the area of disability clearly fits. The varied nature of GIS that allows us to view, understand, question, interpret, and visualise data in many ways that reveal relationships, patterns, and trends in the form of maps, reports, and charts (ESRI, 2008) has made it an attractive system for non expert users. GIS is also being used in many other disciplines such as agriculture, social sciences, archaeology, finance, utilities, telecommunications, engineering and surveying. GIS allows users to identify problems, respond to them intelligently and share results with key stakeholders. It can also be used in epidemiology to examine provision of health care facilities and can map any system that is visual or spatial including the internal organs of a patient (ESRI, 2008).

GIS is of benefit to many disciplines as it helps to answer questions and solve problems by handling data in a way that is quickly understood and easily shared. The application and benefit in the use of GIS in disciplines such as environment, climate control and municipal services are clear and the ESRI, (2008) identified current worldwide diverse uses of GIS:

- Studying the effects of global warming by using maps to study rises in sea level near Delaware and the rate the glaciers are melting in the Himalayas;
- Monitoring power; Nashville Electric uses GIS to automate electric facilities and Florida Power and Light uses GIS to track weather fronts and hurricanes;
- Canada's Timberline uses GIS to monitor sustainable forests and the impact both visual and biological of forestry;
- City of San Diego incorporates GIS into their city access plan by providing information on where to get a job, a facility or a service.

Architecture and design is firmly rooted in spatial thinking and GIS can assist by organising digital spatial data in an accessible and logical manner allowing the user to consider design possibilities more quickly and efficiently than previously conceived (ESRI, 2008). Geospatial data is now more easily accessible through recent advancements in data capture such as Geographical Positioning Systems and real time sensors making digital information accurate, affordable and available (Tomlinson, 2007). Mobile consumers are now requiring convenient commercial location services that will enhance the mobile "on the go lifestyle" and GIS is ideally suited to provide the data necessary (ESRI, 2008). At the very core of every service is a location identifier that can be linked to numerous datasets that can assist the business and the consumer that can be attractively managed on a map. GIS communicates information in a manner that sparks greater understanding of places and events and provides decision-making tools that utilise the resources present in a way that is personal to the user (ESRI, 2008). GIS is a powerful tool to collect, store and retrieve, analyse and unfold spatial data and for this reason it is an excellent tool to plan, design, construct future built environments as well as communicating information of current environments for people with disabilities.

In her use of GIS for the investigation of the accessibility of public transport for people with disabilities, Fernandez (2007) found that a problem that is often encountered is the availability of up to date uniform, appropriate electronic data and the retention of quality of this data when it has been converted to electronic format. The success of a GIS similar to the success of the "LADDER" concept is therefore dependent on good design, quality control, data input and management (Fernandez, 2007). She felt it is of the utmost importance that governments and private industry develop a standardised approach to the collection and storage of information that influences any aspect of society, as this will allow for productive and efficient analysis and presentation on such data using GIS. Fernandez's (2007) observations reflect the underlying philosophy of this research that is if a holistic consistent approach was applied to the collection and communication of accessibility information it could be represented in a standardised informative manner beneficial to all users.

In recent times there have however been some interesting developments in relation to the use of mapping and GIS in the area of disability. Examples include, street navigation systems for visually impaired pedestrians such as NCBI & TACIS "Dublin by Touch", and internet information provision services such as "Disabled Go", Access in the City, Accessible Ireland, the National Access Register and the Blue Badge Map. Each of these initiatives provide users with access information on urban environments, however none have developed a holistic approach that could benefit people with disabilities and stakeholders such as enforcement authorities or advocacy organisations. Some other initiatives identified at European level include Consorci de Recursos I Documentacio per a l'Autonomia Personal (CRID), the Coventry Mapping Project and City Planning for the Disabled in Muenster each of which combined accessibility data and mapping. Each of these aforementioned projects is very different in their approach to information collection and communication although similar underlying philosophies of improving access are evident. Due to this significance these approaches are examined in detail in Appendix VI. Although thought provoking and interesting none of these approaches are sophisticated enough to address the breach the current gap in service provision identified earlier in this research.

3.4 Summary

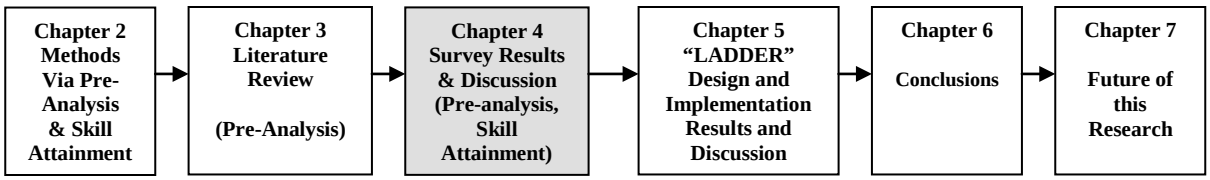
The landscape around us is viewed uniquely and individually. This view may change over time or personal experience. Interpreting these views, although difficult may not be impossible. Traditional hard copy maps allowed for the display of "reality" or a "view-point" at a particular time. Although valuable, paper maps have rapidly developed from their stagnant hard copy form into the computer sciences. This transition allows for the growth and expansion of the map through linkage with live non-graphic data. Implications for the creator? Limitless opportunities to analyse data in new and imaginative ways. For the end user? A system whereby individual needs can be identified, addressed and expanded over time that creates an innovative platform that can diverge from traditional/conventional methods of data usage. GIS has become integral in the electronic visualisation of graphic and non-graphic data. It can be applied across the spectrum from science to the arts.

Effective application of its use in the field of disability access is relatively untapped. As accessibility is a transient factor the ability to alter a geographic representation over time must prove a valuable resource in the communication of access data. Access to the built environment has been traditionally investigated using conventional methods of surveying. Most studies relate to improving access to the built environment rather than demonstrating existing provisions to empower a user to make decisions that generate independence. Access auditing is a valuable tool for both the identification of current provisions and problems and the planning of solutions. Combining access auditing with the regulatory standard to provide a communication and decision-making tool for key stakeholders may be an effective means of empowering independent living and reforming current accessibility data collection and presentation. Traditionally the use of results of access audits has been limited and in some cases confined to presentation in text, checklist or tabular form. The linking of these sets of non-graphic spatial data with graphic data such as a digital map could radically change the manner in which people with disabilities perceive and use the environment around them.

The intended product of this study, the "LADDER" concept, could not only assist people with disabilities in decision-making it may also help key stakeholders advance their efforts by handling and visualising the data in a new and exciting manner.

However this is not just a one-dimensional process of conducting an access audit and feeding the results into a GIS. For a person with a disability to use a map they must trust the map as their independence is placed in the hands of those who created it. The careful consideration of the design of the "LADDER" process using the two stage methodology outlined in Chapter 2 combined with two distinct phases of participatory research hopefully will earn such trust. An understanding of the foundations of the individual, the disability and the built environment upon which this research lies upon combined with the requirements of people with disabilities (empowerment for independent living) and key stakeholders (enforcement and promotion of access) forms the conceptual framework of this multi-dimensional research. The "LADDER" concept aims to "elevate" the status of people with disabilities by providing them with reliable up to date accessibility information that will not only empower them to live independently but may also reform and standardise current accessibility data collection and communication procedures to the benefit of all people with disabilities in accessing the built environment.

Chapter 2 identified the multi-dimensional methodology employed in the investigation of the concepts that went towards the design, testing and development of the proposed "LADDER" concept. Chapter 4 examines the results and observations on the implementation of the Pre-analysis and Skill Attainment methodology while Chapter 5 examines the results and observations of the "LADDER" Design and Implementation part of the methodology.



4.1 INTRODUCTION

People with disabilities have the same rights as others to live independently in the built environment and to achieve this aim the individual, disability and environment must be considered and therefore were examined in detail in the review of literature. One of the largest areas of concern raised by people with disabilities, through the Report of the Commission on the Status of People with Disabilities in 1996 was the question of access to the built environment. This prompted an initial interest in the accessibility aspect of this subject area. Accessibility is not just a mechanical operation of getting in an out of buildings it is also the key to independence and social inclusion. One of the underlying concerns of the disabled community that was outlined in Commission's report was how people with disabilities have been defined. Inappropriate and offensive language has been used in many definitions. Definitions of disability should use language that reflects the right of people with disabilities to be treated as full citizens (Commission on the Status of People with Disabilities, 1996). Definitions have evolved into "models" and must be understood in any disability research. This is the starting point the literature review was built upon.

To examine the identified key factors pertaining to accessibility subscription to models of disability is an unavoidable scenario for interested parties if unbiased research is to be implemented. As previously discussed, neither social nor medical models provide enough basis and foundation for developing accessibility to the "normal" standard. It was found that the medical model could lead both to overt and covert discrimination that has historically hampered people with disabilities and their participation in a meaningful way in wider society (ERT, 2008). Detailed examination of the social model found that it limits the progression of disability research. Shakespeare (2002) identified how such research will not look to the life of the individual just the environment they interact with. This inadequacy in the social model means it too should be put to one side and reinvented as it currently creates more problems than it solves (Shakespeare, 2006). Hence this study adopts the earlier proposed "Supportive" model of disability.

The value of this model of disability is that it successfully combines the two most recognised models by acknowledging both environmental and individual factors that contribute to the quality of social participation, creating a philosophy where inclusion and activity are of primary importance. Application of this theory in this research allows effective development of the "LADDER" concept using the "Supportive" model perspective allowing more successful communication of accessibility data to assist independent living. The data communicated takes both medical (disability and aids) and social (environmental factors) attributes into account providing information that allows clear concise decision-making to allow greater social inclusion and integration. It is an opportune point to launch the "LADDER" concept as the Irish government has built upon a bank of access and anti-discrimination legislation that effectively provides a foundation to progress the status of people with disabilities. The Employment Equality Act, Equal Status Act and Disability Act, combined with signing up to the Barcelona Declaration and the International Convention on the Rights of People with Disabilities, all indicate the state is fulfilling its legal requirement to provide for people with disabilities. However this is not just "lip-service" to appear progressive to neighbouring states. The development of research such as the National Disability Survey, policies such as the Disability Action Plan and the National Disability Strategy show the commitment of government to tangibly improve disability status in Ireland. The natural progression would be that as status improves information provision must improve and such information must be communicated in a timely and appropriate manner and the "LADDER" concept is proposed as a tool that can assist in this respect.

Part M of the Building Regulations is the current legislative requirement to provide physical access and it was found through both the available literature and survey implementation that this is the design brief through which designers acquire their minimum access criteria for their designs. Although the TGD offers minimum design criteria, it is clear that many take these dimensions as optimum standards. It was therefore appropriate to adopt Part M for designing the "LADDER" concept and to examine Part M in detail from an enforcement, accuracy and usability standpoint. Although it has its failings, it does provide for a minimum level of accessibility. Part M is examined in greater detail later in this chapter.

It is hoped eventually Part M will progress in line with universal design principles and be seen as "Access for All" rather than just people with disabilities. Universal design has developed internationally as a result of the combination of the disability rights movement and the many years of work on improving accessibility and the lessons learned in that process (Duncan, 2007). Recent legislative and policy changes indicate that Ireland is at last appropriately equipped to accept such innovative concepts and can finally embrace universal design. The design of the "LADDER" concept relied on the precise combination of two previously unrelated methodologies, access auditing and GIS. From an examination of each of these fields it was found that access auditing would provide the level of information required to create a decision-making process for people with disabilities. However, in this process it was identified that an exponential amount of information is generated making the process of extracting data difficult and time consuming. A mapping system such as GIS was identified as a possible solution and it was found to have both the management and presentation capabilities desired for the design of the "LADDER" concept. Although other applications of GIS in the area of disability were identified none as yet have provided the detail necessary for an individual (and key stakeholders) in making decisions about both accessible and inaccessible features. Each of the current works identified limited levels of access information. Levels of inaccessibility are just as important as, not only do they provide extra information to the individual (who in their own circumstance may still be able to access a feature) they also communicate information for key stakeholders who wish to promote change.

Upon examination of these distinct areas of relevance to the aims of this research, pre-analysis, skill attainment and design and implementation of the research was conducted. The subsequent results and their discussion are presented in Chapter 4 and 5. Chapter 4 aims to present, evaluate and synthesise the results of the Part 1 Pre-analysis, Skill Attainment and Survey Methodologies introduced in Chapter 2. Chapter 5 outlines and examines the results of Part 2 the Design and Implementation part of the methodology. Both chapters aim to highlight the key results and examine their critical importance to the research aim and objectives. It also examines how these objectives may have been limited by methodologies chosen.

4.2 PARTICIPATION IN THE WIDER HORIZON'S "ACCESS FOR ALL"

From the outset of this research it was identified that participatory research from people with disabilities would be required if the research was to be credible. Kitchin (2005) clearly identified that new methods of research in the area of disability must be developed as they could hold considerable promise for creating inclusive, emancipatory and empowering research that does not undermine the scientific process of the outcome. The NDA (2005) have developed "Ethical Guidance for Research with People with Disabilities" that clearly identifies that if research involves people with disabilities, then appropriate engagement about the research process can help the researcher frame questions better, test validity and acceptability of research and methodology and assist in the interpretation of findings. The NDA (2002) also recommended "Guidelines for Effective Consultation with People with Disabilities". This promotes disability awareness as a contributing factor to the success of any research in the area. Combining this with a sensitive approach will greatly enhance and validate the outcomes of such research. Kitchin (2005) also highlighted how such guidelines from a government organisation provide a clear message of the direction of politics in disability research and disability issues more generally.

This combined with a legislative and strategic approach provides a valuable framework for empowering the disabled community. The "Access for All" programme was therefore adopted in the methodology for a number of reasons. Firstly the organisation of this programme enabled the researcher to live, travel and work with people of varying abilities from physical to sensory over 3 months of the 20-month research time frame in three different countries. This allowed for the analysis and documentation of daily accessibility requirements of people with disabilities. These findings were of the utmost importance, as they acted as a framework for the development and research of the overall hypothesis behind the "LADDER" concept along side the detailed design of the access audit and this research. The gap in provision initially identified as the reason for this research grew exponentially from subsequent interaction with individuals it neglected to provide for.

This intensive methodology involved lecturing, caring for, travelling, working with and most importantly learning from people with disabilities. But the common denominator in this steep learning curve was the people and what they had to offer: people who really don't care about definitions or models of disability: people who don't care about Part M or the concepts of universal design. People who just want to live a life as independently and free from their disability as they can.

Many valuable lessons were learned from participants. From one member of the group I learned that a car crash could change your life forever. Although now hearing and visually impaired with some mobility problems this person became the mother of the group always checking on other members to ensure they were all fed before her. From another I learned never to accept anything substandard. A wheelchair user his entire life this group member would never shy away from speaking his mind if it could improve access for him or any other member of the group, down to blocking a non-disabled driver in a car space for four hours on one of our auditing trips! From a third member of the group (registered blind since birth), I learned to speed up! Always ready with coat on, he was first out with a braille measuring tape to start every audit. These may sound like anecdotal stories, but stories they are not. Each one of the 19 participants provided me with valuable lessons. Lessons that on a daily basis provided a momentary insight into a life of a person with a disability. This insight reached far beyond physical restrictions to the emotional barriers faced on a daily basis by every single candidate. These lessons assisted in many ways throughout the design of the "LADDER" concept reinforcing the proposal that without an effective decision-making tool to make journeys to unfamiliar areas, inaccessibility becomes an emotional as well as physical barrier. From the "Access for All" experience it was identified that the lack of information on accessible and inaccessible features of our urban environments was vast. It was originally perceived that people with disabilities would have some crude mechanisms such as word of mouth to assist with their decision-making processes on accessing the built environment. It was however quickly established that a "lottery" system was in place whereby participants relied on luck as to whether an environment could cater for their individual needs.

Living in close proximity with people with disabilities allowed for one-to-one interaction and participation in their daily lives and the challenges faced by people of varying abilities. As the time spanned over three months it was possible to get to know each participant very well and consequently how each person felt about his or her individual accessibility options. The experience facilitated the attainment of many disability awareness skills along side personal interaction with people in wheelchairs, people on crutches, people on walkers, people with hearing impairments, people with visual impairments and people with invisible disabilities such as severe epilepsy. Instead of being a single result of its own, participation in this programme provided a background for the formulation and investigation research objectives. The following issues were also identified as benefits of using this participatory research method;

- The experience created a new insight and way of thinking of the everyday requirements of the lives of people with varying disabilities. Having only ever lived with a person with a physical disability, it was now possible to see first hand and attempt to understand difficulties, both emotionally and physically, experienced by people with other types of disability such as blindness.
- Attending access auditing training after this experience greatly enhanced the course and subsequent access auditing, as there was now a deep insight developed into the daily accessibility requirements for people with varying abilities. This assisted the subsequent design of the "LADDER" concept became more consequential and user-friendly as a result.
- Forming friendships with people with disabilities at this stage provided valuable links for the distribution and implementation of the survey of disability organisations. Many of the people on the "Access for All" Programme were linked with disability organisations in their area and volunteered to examine the proposed survey within their organisations and provide appropriate feedback.
- Travelling on a daily basis with people with disabilities allowed for a practical insight into the difficulties encountered especially those of a subjective nature such as vegetation, moveable objects and weather conditions. This greatly assisted the access auditing of the 157 buildings and circulation paths in the survey.

Subjective topics such as surface conditions could be now easily assessed after experiencing the difficulties people with disabilities had experienced earlier.

There was one extremely important outcome identified from participation in this programme. Generally, it was found that when participants were in a familiar environment they were relatively independent. Daily routines were familiar and rarely deviated from. Buildings and streets visited were done so according to known perceptions of accessibility and repeated daily routine. However, when the participants entered an unfamiliar environment, for example in Dublin, Belfast and Pittsburgh, USA, their levels of independence dropped dramatically. This coupled with an upset in routine created many accessibility problems. Disorientation and fear of inaccessibility of unknown routes led to lack of participation in many activities and a feeling of isolation in some members of the group. This was mainly due to a decrease in confidence levels in unfamiliar atmospheres. This was an unforeseen circumstance that the organisers did not predict. People who were once very independent in their own lives and communities became very dependent on those around them. There appeared to be a level of reversion in some of the participants to a level where they began to feel apprehensive in performing daily tasks such as personal care. As there were only two care assistants for 19 participants the researcher was required to act as a third care assistant. Although this opportunity allowed for an incredible insight into the challenges faced by people with disabilities, it did dramatically impact on available time to assess international policies on disability and access to the built environment and became a limitation of use of this methodology. However, this in itself was an extremely interesting finding as when people with disabilities did not have the necessary information or decision-making capability on potential accessibility of an area they planned to visit confidence was severely compromised to the extent whereby many did not participate and they lost independence. This identifies a need for the proposed “LADDER” concept as it could provide the information necessary to regain both confidence and independence.

Kitchin (2005) agreed that in general disability research is not representative of people with disabilities’ experiences and knowledge, it is only people with disabilities who can truly know what it is like to be “disabled”.

It was felt that the insight gained into the physical and especially emotional experiences of the participants was of vital importance to this research and will reach far beyond the completion of this work. The incorporation of participation in this programme in the methodology also justified the need for this research, as the gap in communication of accessibility information was much greater than initially perceived making decision-making a lottery for people with disabilities that can eliminate independence. In turn this makes full participation and integration within society a similar game of chance.

4.3 RESPONSES FROM BUILDING CONTROL AUTHORITY SURVEYS

4.3.1 Introduction

The survey of Building Control Authority's (BCAs) Officers was implemented on two separate occasions. Firstly in 1999 when this research was originally devised and then again in 2010 when the research was revisited. During the interim a significant change in legislation and government strategy was observed and the questionnaires hoped to identify the difference such changes had on accessibility policies of this target group. A total of 37 questionnaires were issued on both occasions, one to each of the BCAs in Ireland, this accounts for the total population of this sector. Of the 37 questionnaires 17 were successfully completed and returned in 1999 and 26 were returned in 2010. In 1999 there was an initial response rate of 62% (23 BCAs) of the total population unfortunately only 17 of those responses were valid. The remaining six were invalid due to incomplete or blank questionnaires returned. This was still a relatively high response rate from a public body. However, it was felt that those who had active policies might have been more inclined to respond than those who hadn't. There was also an issue identified that 8 BCAs were not aware that they had been appointed as Access Officers as required by each Local Authority. These BCAs in turn declined to participate in this research. This failure by Local Authorities to recognise their roles and responsibilities in relation to access may provide an indication of the lack of commitment and interest in the subject area as a whole. In 2010 all 26 responses were valid providing an increased response rate of 70%. Of the 11 non-respondents 8 replied indicating they were unable to respond due to current industrial "work to rule" action as explained in Chapter 2.

This however was still an increase on the initial survey that may reflect the timely nature of the research due to increased interest in the subject area owing, in part, to the current proposed revision of Part M. Due to the population size (37 BCAs = 100% of the population) response rates are represented in absolute figures. The design of the survey administered reflected skills attained during participatory research with people with disabilities. The following sections outline the findings and comparisons of the administration of these questionnaires.

4.3.2 Section A; General and Section B; Access Auditing and Access Officers

a) Definition of Disability

The opening question of Section A asked if BCAs had a working definition of disability, of the responses received in 1999. Five stated that they had a definition in place. This question was posed to assess disability awareness. The most common definition in the first round of the survey was taken from Part M; "People who have an impairment of hearing or sight, or an impairment that limits ability to walk or which restricts them to using a wheelchair". Other definitions included variations of "physically or mentally disadvantaged". 11 of 17 respondents in 1999 did not have a definition, while one left the question blank. In 2010, of the 26 respondents 15 had accepted definitions of disability for their area while one also left this question blank. Definitions adopted in 2010 included the definition as defined by the Disability Act 2005, the 1974 Union of Physically Impaired Against Segregation (UPIAS) definition and the definition introduced under Part M. One department went as far as creating their own definition which although a one dimensional designation stating that "Disability equals Impairment" indicated that they had taken the time to consider this demographic. It was interesting to note that one Local Authority was still using the 1974 UPIAS definition that defines disability as; "the disadvantage or restriction of activity caused by a contemporary social organisation which takes little or no account of people who have physical impairments and thus excludes them from participation in the mainstream of social activities". This definition identifies disability as external to the individual and is a result of environmental or social factors. This social model was radical for its time and still holds significance today for those who wish to adopt it.

For a BCA to accept this model means that they may tend to look beyond the physical barriers to access and may adopt inclusive design strategies such as universal design. The survival of this definition into the 21st century highlights the importance of this period in a time where the disability revolution began, a definition coined 34 years ago is still of relevance and benefit to our enforcement officers today. Devlieger (2005) identified how the social model has begun to initiate cultural growth and renewal signifying disability as a socio-spatial issue that can be empowered through innovative as well as stringent building control enforcement. However, the majority of respondents (11 in total) apply the definition provided under the Disability Act 2005 that presents the medical model of disability:

"a substantial restriction in the capacity of the person to carry on a profession, business or occupation in the state or to participate in social or cultural life by reason of an enduring physical, sensory, mental health or intellectual impairment". Two BCAs adopted the repealed 1997 Part M of the Building Regulations definition of disability; "People who have an impairment of hearing or sight or an impairment which limits their ability to walk or which restricts them to using a wheelchair". The adoption of either of these definitions rooted in medical models of disability by a profession endeavouring to create and improve physical access locks the user in the concept of "abelist" norms and anything beyond this may by default be deemed abnormal. Smart (2009) identified that acceptance of this model locks the person into a category that allows discrimination by virtue of their individual malfunction. BCAs then see the person as the "problem" to be dealt with through the provision of ramps, handrails and wider doors under Building Regulations rather than addressing wider environmental factors and social policy decisions that contribute to disability through the absence of universal design. If BCAs adopted the "Supportive" definition of disability such as the one proposed in this research, that incorporated individual, disability and environment a more holistic approach could be applied to each building control decision that could finally move Ireland towards embracing universal design, rather than merely applying minimum accessible design criteria. The continued acceptance of the medical/social models of disability in both 1999 and 2010 shows that regulatory bodies are still firmly rooted in providing access for people with disabilities rather than providing access for all.

b) Incidence of Disability

14 BCAs in 1999 did not know the percentage of the population in their functional area who had a disability. If a BCA has not quantified the number of people in their area requiring access they cannot adequately cater for their needs. Of those who had obtained this information one thought that between 0% and 5% of the population of that area had a disability and one thought that between 6% and 10% of the population of their area had a disability. This information had been obtained through either surveys assistance from local disability groups or approximations based on previous research. This compares to 2010 where 11 BCAs provided statistics on incidence of disability in their areas, this varied from 6-10% of population (8 BCAs) to >10% of population (3 BCAs). 15 BCAs did not know the percentage population with a disability. Considering the widely published Census 2006 and National Disability Survey 2006 that both provided national and regional figures of just under 10% of total population experiencing some form of disability (Chapter 1) it was surprising that just 3 BCAs correctly identified the number of individuals their enforcement of Part M would cater for. As the majority of BCAs have still not identified these figures as important in their enforcement of Part M, they have failed to identify who they are regulating, which in turn may result in ineffective enforcement. Although a higher number had accurately estimated the number of people with disabilities in their area in 2010, a total of 15 BCAs still did not know (compared to 14 in 1999) highlighting that no significant interest in the reality of the incidence of disability has been sparked by current debate and regulatory amendments.

c) Liaisons with Disability Organisations

When asked if they actively liase with disability organisations in their area seven BCAs in 1999 said that they did liase with such groups. Of these responses one was involved with their local branch of the NDA, three liased actively with their local access group and the remaining liased with government organisations. The main reason given for not liasing with groups in their area was staff shortages and therefore a lack of time and personnel for such meetings.

In 2010, of the 26 responses received 17 of the BCAs actively liased with local disability groups such as Menni Services, Disability Federation of Ireland, County Disability Advisory Panel, County Disability Network, Local Access Groups, Centres for Independent Living, National Council for the Blind and the Mental Health Initiative. The variety of groups liased with in 2010 is encouraging as they reflect not only physical disabilities but also sensory and intellectual disabilities reflecting the advancement in disability and equal status legislation over the last decade. This may also reflect the increased desire for disability organisations to act as advocates for their members on a more formal level with many BCAs indicating that such meetings were planned on quarterly or monthly basis. Such close interagency collaboration will greatly improve understanding on both sides as to the requirements for access for all.

d) Policies or Schemes to Promote Access

When asked about policies or schemes that promote access in their area in 1999 two BCAs said that they had such schemes or policies in place. These policies or schemes were mainly centred on the disabled person's grant to allow for internal or external alterations within a person's home. No other policies or schemes were elaborated upon. Over half (10) of BCAs in 1999 who responded had access policies incorporated into the development plan for their area. In 2010 it was found that just six BCAs had such polices or schemes that included an online accessibility learning game entitled "Jobot's Access All Areas", a policy statement in their Development Plan to strive towards universal design, a Policy supporting the National Disability Strategy (as discussed in Appendix I) and the availability of their Access Officer to provide one to one guidance on accessibility. The use of an Internet game is an extremely innovative scheme and could easily be linked in with the proposed "LADDER" concept to make it specific to each area. The availability of the Access Officer is also welcomed as in 1999 many BCAs were not fully aware of this function in their role. This indicates a slow yet valuable progression into more encouraging methods of promoting access.

e) Provisions in Development Plans

In 1999 provisions were noted in 10 development plans that included very broad statements like “incorporating street access into the main thoroughfares”. One respondent commented that the reference to access was “a brief reference which is no more than aspirational”. This indicates that although the necessary practical framework may be present, a commitment to the spirit of accessible design may not be evident. Another comment was “to incorporate appropriate access arrangements to shops” and “to include access for all citizens, including the disabled”. Other provisions included accessible public housing. This compares to 2010 where 17 BCA identified provisions for access in their local Development Plans such as “compliance with Part M”, “promotion of social inclusion”, encourage diversity and universal design” “Compliance with the Disability Act 2005” and “Building Control Standards to be maintained to a high level”. The inclusion of access requirements in the Plan has not radically improved since 1999 however there appears to be greater acceptance of “design for all” strategies. However, it is feared that these references may still be aspirational as many BCAs still did not identify who the requirements of this Plan are aimed towards, or promote any policies or schemes to actively encourage such initiatives. One BCA commented that “Building Control has absolutely nothing to do with planning and development of the area or the Development Plan for the area and therefore access is not and should not be considered”. This startling comment reflects findings of Chapter 3 that although Planning and Building Control Departments work side by side they may never liase or work in partnership on issues such as access that impact on both their areas of expertise.

f) Use of Access Audits and Access Surveys

When questioned on their use of access auditing or surveying of access provisions in their area in 1999 two BCAs had carried out an access audit in their area whereas five had implemented an access survey. 10 had carried out neither. 22 of the 26 respondents in 2010 had conducted an access audit and this increase shows the validation by BCAs of the importance of using access audits to identify barriers to accessibility and its recognition as a beneficial tool for this purpose.

Compared to just two BCAs in 1999 this identifies the wide acceptance of access auditing over the last decade and as BCAs are both pressed for time and resources they would not adopt such a technique unless they felt it was justified by the value of its outcome. Just three BCAs in 2010 had conducted access surveys, highlighting the move away from this limited method of data collection. One BCA had conducted neither an audit nor survey compared to 10 in 1999 thus indicating that BCAs are finally moving towards identifying access problems in their area. Using the access audit designed in this study would act both as an identification tool and an enforcement tool for BCAs and greatly assist in their promotion of more inclusive and accessible environments.

g) Training in Accessibility

In relation to training in monitoring for access provisions in their building control area three BCAs in 1999 said that they had received training. Some had attended seminars or training courses on Part M. Fire Safety Officers also received training on Part M in relation to Fire Safety Certificates. One BCA was considering developing training in relation to promoting Part M at the construction phase aimed at developers. In 2010 all but one BCA had received training. This is an extremely positive development as education and awareness was clearly identified as one of the barriers to improving access. Some had completed Access Awareness training, Disability Act 2005 training and Access through Building Control training. It is unfortunate however that such training has not been put into practice by developing policies or schemes to improve access or develop their Development Plans to be more tangible templates for improving access rather than aspirational mission statements. Seven BCAs had completed the same Access Auditing Course as attended for this research, again highlighting their validation of the importance of access auditing in the area of Building Control. This compares to 1999 where none of the BCAs had completed this course highlighting the current opportune nature of the progression of research in this subject area.

h) Access Guides

BCAs were also asked if there was an access guide to their area. Three did have a guide for their area in 1999 compared to four in 2010.

Two were handwritten polices compiled by their access officers while two were online guides showing accessibility of Local Authority buildings and improvements made to them over time. This lack of availability of accessibility information even relating to their own Local Authority buildings highlights the shortage of time or resources to compile or present such data even though they have gained the necessary expertise. Many BCAs have received the necessary training to collate the information. However, they are not applying these skills to assist people with disabilities in obtaining information. The proposed "LADDER" concept simplifies the process of both collating and presenting such data making it both useful and time saving for both the BCAs and the end user. The progression of two BCAs into use of the Internet is a promising development in the provision of open transparent information in an easily updated and user-friendly manner that lends itself easily to the amalgamation with GIS. Unfortunately neither of these sites utilise GIS however one was linked to a mapping package "Google Maps".

i) Access Officers

In 1999 only one BCA had a full time access officer while two had an access officer in place on a part time basis. Respondents at this time selected a number of reasons for not having an access officer. The main reasons for absence of such officers were finance (eight) and six did not know why there was no access officer in place. Other reasons included, other officials carrying out the duties of access officer (five), access groups carrying out these duties (four) and no need for such a service (one). Some of the duties of an access officer that were elaborated upon included inspecting buildings for compliance with Part M and developing access strategies for the area. This result is startling, as prior to the issue of this questionnaire each of the local authorities were instructed by the Department of the Environment (Building Control Section) to designate an Access Officer. The questionnaire issued was addressed to the specified designated Access Officers in each Building Control Department. Many had commented that they were unaware that they had been designated as such an officer. Others felt that they were not suitably qualified or it was not their specialised area to deal with the questionnaire. The importance of the presence of access officers was highlighted at this time by Manley (1996).

She found that Access Officers in Local Authorities are in a very good position to promote better design, policies and actions that enable people with disabilities to access the built environment more independently. However, she also noted that this appointment should not just be a symbolic gesture to accept the importance of the issue, clear roles and functions must be outlined. Overall the appointment of an access officer can act as a "catalyst for action" by the Local Authority on access issues (Manley, 1996). It was encouraging to find in 2010 that only one BCA did not have an Access Officer, 13 had part-time officers, 10 had full time officers and two incorporated the role into the role of BCA. This increase in Access Officers is long awaited as in 1997 each BCA was required to designate such officers within their departments and in 1999 it was found that only three had. The BCA that did not have an Access Officer said this work is undertaken for them by a local disability organisation. This could be an interesting development and could be examined closer by fellow BCAs to assess which is the more beneficial system. The presence of such officers would greatly assist the collation and communication of accessibility information and inter agency collaboration with groups such as disability organisations. Such developments would assist the acceptance and development of the proposed "LADDER" concept for communicating information that promotes social integration. Their current roles were outlined as follows;

- Liasing with Disability Organisations.
- Assessing Disability Access Certificates.
- Ensuring Local Authority Compliance with Provisions of the Disability Act 2005.
- Managing and Co-ordinating the National Disability Strategy for their Area.
- Advising on Issues relating to Disability Access in their Area.
- Development of Local Authority Implementation Plans of Access to LA Buildings.

No Access Officer had a role of collection and communication of information on accessibility of their area to assist people with disabilities. This is a huge gap in services in this area and it is unacceptable that a state body ignores the needs of this group in such an obvious manner.

The absence of the availability of this information on both local and national levels impinges greatly on social integration, inclusion and independent living. Table 4.1 summarises the comparisons of Section A and B of the two survey results issued in 1999 and 2010.

SURVEY QUESTION	1999 = 17 RESPONSES		2010 = 26 RESPONSES	
Do you have a working definition of "Disability"?	**Yes** **No**	**5** **11**	**Yes** **No**	**15** **11**
What percentage of the population in your Local Authority area have either physical or sensory disabilities?	**Don't Know** **0-5%** **6-10%**	**14** **1** **1**	**Don't Know** **6-10%** **>10%**	**15** **8** **3**
Do you actively liase with local disability groups?	**Yes** **No**	**7** **10**	**Yes** **No**	**17** **9**
Do you have any polices or schemes in place that encourage access?	**Yes** **No**	**2** **12**	**Yes** **No**	**6** **20**
Is access for incorporated into the Development Plan for your area?	**Yes** **No**	**10** **7**	**Yes** **No**	**17** **8**
Has an access audit or access survey been carried out in your Local Authority area?	**Audit** **Survey** **Neither**	**2** **5** **10**	**Audit** **Survey** **Neither**	**22** **3** **1**
Has BCA received training in relation to monitoring for access?	**Yes** **No**	**3** **14**	**Yes** **No**	**25** **1**
Is there an access guide to your area created on the basis of an Access Audit or Access Survey?	**Yes** **No** **Blank**	**3** **10** **4**	**Yes** **No**	**4** **22**

Table 4.1 Comparison of 1999 and 2010 BCA Survey Results Section A & B

4.3.3 Section C; Part M of the Building Regulations

j) Effectiveness of Part M in Providing Access

Section C moved the survey into the area of examination of Part M and its effectiveness and enforcement. A number of additional questions were added to this section in the reissue of this survey in 2010, in light of the changes and proposed changes in this legislation. When it came to questions relating to Part M 10 respondents in 1999 felt that there should be mandatory monitoring of Part M. This figure increased in 2010 to 21 BCAs. The relative increase in those who felt monitoring should be mandatory is very interesting in a time where the Disability Access Certificate (DAC) has just been introduced to require the developer to certify their plan meets the requirements of Part M. Theoretically this self-certification style system could have led to BCAs reducing time spent monitoring Part M. However, this does not appear to be the case.

Perhaps as the DAC becomes more commonplace BCAs will grow to trust developers and accept DACs as primae facie evidence of compliance. In the interim it is welcomed that the majority of BCAs are in agreement that they should be actively monitoring Part M.

k) Making Developers Aware

In making developers more aware of their legal obligations in 1999 several options were chosen, seven BCAs used literature to promote compliance with Part M and six gave oral advice with respect to obligations under M. The use of media and workshops were also included by one BCA. Four respondents admitted that they do not advise developers of their legal obligations under Part M. One respondent stated that there is no need to make reference to Part M at this stage and therefore do not provide such advice. In 2010 all but one BCA provided some form of information to developments on promoting compliance with Part M. The methods chosen included Literature (10), Media (8) and No Advice (1). 12 responded that the method they use to make developers aware was through oral advice during inspections, monitoring or enforcement. Many found this to be an effective means of clearly portraying requirements that are individual to each development and provides a concise understanding of the requirements of the legislation and therefore how best to meet requirements of minimum criteria. BCAs can therefore influence the accessibility and the method in which it is achieved from an early stage. This must be seen as one of the most efficient means of promoting compliance.

l) Compliance Inspection Rate

In the 2010 survey BCAs were asked what their current inspection rate for compliance with Part M was. The observed rates varied greatly with the majority of BCAs (10 in total) inspecting the required 10% to 15% of new developments for compliance with Part M. Nine BCAs actually exceed this target that was set out by Department of Environment, Heritage, and Local Government and agreed by the City and County Manager's Association and inspect greater than 20% of all new developments. This is encouraging that BCAs are going beyond their agreed targets indicating that their interest in promoting Part M is greater that first impressions would imply.

Seven BCAs felt that they inspected less than 10% of all new developments. Unfortunately they did not all provide reasons as to why they did not reach their required target, although one cited the moratorium on recruitment and staff shortages in their department as the cause.

The DAC is a very recent introduction in the enforcement of Part M and therefore in the 2010 survey BCAs were questioned as to whether they have granted any such certificates as yet. From the combination of results a total of 43 DACs have been granted by 20 BCAs, the seven remaining BCAs are yet to approve such certificates. This certificate places the onus upon those designing new non-domestic buildings and apartment blocks to confirm that their designs comply with Part M. This requirement came into effect on 1st January 2010 and BCAs have to certify that all designs of new non-domestic buildings and new apartment blocks comply with Part M. As mentioned 21 BCAs felt there should be active mandatory monitoring of Part M and from these figures many of these would already be in the process of issuing DACs. This indicates that they are not solely relying on the DAC, but also carrying out subsequent monitoring. If this were to continue it might undermine the value of the DAC as a self-certification system if the BCA has to also physically check developments. However, as mentioned only 10% to 15% of developments are generally inspected. Therefore the DAC is a vital development in improving the accessibility of the remaining 85% to 90% of uninspected developments. Only one BCA stated that they remained to be convinced as to whether the DAC was a better means of enforcement of Part M. The majority felt that although it has not altered the obligation on the developer to comply with the provision of Part M it has increased their awareness of the requirements. One stated that "as the developer may not open, operate or occupy a premises until a DAC has been achieved it may focus the mind better towards the needs of people with disabilities".

Six BCAs when questioned in 2010 had received complaints from members of the public in relation to Part M. These complaints varied in nature and related to physical inaccessibility in their area such as the fact that Part M does not apply to public transport or existing buildings, inaccessibility of public buildings.

One BCA felt that they received many complaints relating to the simplicity of the TGD and how it is "unsophisticated" for society today. Such complainants felt that the TGD is not far reaching enough and does not live up to the expectations of its focus group. There is currently no formal system for recording or monitoring complaints and no national statistical data is available, therefore complaints referred to are observation based. The results also indicate that the 20 remaining BCAs have not received any complaints. This is surprising as many BCAs work in close collaboration with disability organisations and it was expected that they may bring such issues to their attention. This once again identifies the need for closer collaboration of the two groups to successfully improve the legislative and practical provision of access.

m) Promoting Compliance

Promoting compliance with Part M was another issue addressed by the survey, six BCAs in 1999 attached conditions to planning applications in order to promote compliance with Part M. Two used recommendations whereas five did not use any method to promote compliance. Four used other forms of promoting compliance with Part M that was not expanded upon. These responses included making applicants aware of their legal requirements of all of the Building Regulations. In 2010 six BCAs attached conditions and/or recommendations to planning applications while others are beginning to use the DAC to promote compliance. One BCA does not use any method to promote compliance while eight use monitoring and inspections. The promotion of compliance is felt to be an important tool for encouraging compliance as if developers feel the area of access is being individually singled out by the BCA a greater importance will be attached to it by them. Respondents in 2010 appear far more willing to engage with developers on an individual level on the area of access than in 1999 and this can only serve as a positive progression.

n) Sufficiency of Part M in Providing Access

When asked in 1999 if they thought if the provisions of Part M were sufficient, 12 BCAs felt that it was sufficient for providing access for people with disabilities in the built environment. Four respondents found that Part M was not at all sufficient.

One BCA did not give a response to this question. Some of the reasons given for respondents feeling that Part M was insufficient were that it applied to just buildings and not housing or that the requirements of Part M did not go into sufficient detail. Other BCAs commented that more involvement was required from outside organisations if overall access was to be improved. A similar figure in 2010 was found where respondents were equally divided with 13 BCAs feeling it is sufficient and 13 feeling it is not sufficient. At a time where the current regulations are being revised this is an interesting finding that indicates that half of its enforcement officers feel the current standard is satisfactory. One of those who felt that it's currently unsatisfactory commented that, in its current form, users accept this minimum standard rather than best practice, a procedure that will never achieve access for all. Another BCA noted that; "the reliance on encouraging developers to apply minimum standards is unacceptable as well as unsustainable with a regulation that does not seamlessly link in with other associated planning and development legislation". This reiterates findings in Chapter 3 whereby if provided with a standard human nature appears to favour the minimum requirements rather than going beyond what is required and acting within the spirit in which the regulations are based. This means that any TGD revisions should promote the highest possible standards of accessibility as these will inevitably act as the benchmark for achieving the required DAC as developers may feel it is difficult to justify to their client valid reasons for the promotion of best practice in this area.

o) Methods for Monitoring for Compliance

In relation to monitoring for compliance with Part M a wide variety of options were chosen in 1999. Seven respondents used site visits during construction (SV 1) or liaisons with developers to monitor buildings for compliance with Part M. Eight chose site visits on completion (SV 2) of a development, viewing of plans submitted (eight) or responding to third party complaints (eight). Six BCAs who responded to this questionnaire admitted that they did not actively monitor for compliance with Part M. Many respondents selected greater than one option. In 2010 eight BCAs chose the access audit as the desired means for monitoring Part M. This option was not selected by any respondent in 1999 and again highlights the increase in interest in this area by the BCAs over the last decade.

Among methods used included responding to third party complaints (10) and liaisons with developers (13). All but one BCA used site visits during construction as a means of assessing compliance, whereas six never visit completed works to ensure provisions have been complied with. Physical assessment of access provisions must be prioritised and although access auditing is on the increase this failure of BCAs to use the process at these vital points may significantly undermine the importance of Part M. 24 BCAs use plans to determine access. This means that two BCAs fail to examine any plans in respect of access for people with disabilities. This is unfortunate as for the BCA to make submissions on access at such an early opportunity, not only highlights the importance of the legislation but also will impinge on the success of the design in providing appropriate access. It is encouraging that all BCAs are now monitoring for compliance by some means unlike in 1999 where six authorities did not carry out any monitoring. This indicates the level of importance placed on Part M as part of overall building control has increased and hopefully will continue to do so.

p) Understanding of Reasonable and Adequate Provision under Part M

With respect to defining "Reasonable Provision" (as defined in the 1997 Regulations in force in 1999), four respondents did have a definition, which included "the minimum design criteria of the TGD" or "provision where naturally or obviously required". In the amended version of Part M in 2000 the term "reasonable" was replaced by "adequate". Therefore in the 2010 survey BCAs were questioned as to their interpretation of "adequate provision" and 12 respondents cited their interpretation. This included "compliance with the provisions of Part M", "compliance with the provisions of the TGD", "compliance analysis on a case by case basis". One BCA gave quite a detailed interpretation in terms of distinguishing between what is deemed adequate for a public building and what is adequate for a workplace. They felt that "a public building such as library or restaurant should be accessible to all regardless, whereas a factory, power sub-station or pilot training area should be deemed fit for purpose for those working in these areas". It is evident that the revision of the legislation from "reasonable" to "adequate" has had little impact on the manner in which provision shall be interpreted for people with disabilities.

The majority still feel that reasonable and adequate provision in terms of Part M is providing the minimum level of access as set out by the TGD. The term "reasonable" had angered many disability organisations to the point where their lobbying resulted in the change of the term to "adequate". However this success has been short lived as little difference in the interpretation is apparent over the last decade and it is not yet know if either term will be present in the proposed revision of the legislation.

q) Sufficiency of TGD to Part M in Providing Access

When questioned on whether or not the TGD to Part M was sufficient in 1999, many (12 in total) felt that it was sufficient in providing access for people with disabilities. This is the same number of respondents who also thought that Part M was sufficient in providing access. The same number of respondents also left this question blank (one) as did in relation to the sufficiency of Part M. Some of the reasons given for four of the respondents feeling that the TGD to Part M is insufficient included the fact that there is no mandatory monitoring of the TGD and that interpretations of the TGD can vary. One BCA stated that "full coverage of access concerns are not included", "it does not account for all types of disabilities and the specifications set down need to be mandatory". There was a subsequent revision of Part M in 2000, and in the survey administered in 2010, of the responding BCAs, 11 felt that this revision was still insufficient in providing adequate access. Interestingly one BCA ticked both yes and no as they felt that it is all down to how the developer chooses to interpret the standard and how the BCA chooses to enforce it. "If one goes with the minimum acceptable by the TGD and the enforcement officer does not have the training or expertise to adequately assess access then the value of the TGD in providing access can be lost".

The access audit criteria for the "LADDER" concept are based around this standard and during implementation it was found that if each of the individual criteria were implemented in the "spirit" of the legislation then a high level accessibility would be observed, however in reality developers tend to adhere to the minimum they can "get away with" which is not the reckoning behind the legislation or its subsequent revisions.

r) Information Sources

In enforcing Part M respondents were asked if they use any other information sources to assist monitoring and enforcement. Ten used reference material in 1999 that describe access dimensions and criteria for people with disabilities. Reference materials included NDA publications (four), Goldsmith publications (one) and the TGD (one). In 2010 responses indicated that 11 BCAs do not use anything other than the TGD to Part M as their reference material. Although not very progressive on their part in terms of promoting universal design it does justify the decision to use the TGD as the audit criteria for this research. Many BCAs still see the TGD as the baseline standard rather than aspirational guides that have no legal standing. Some BCAs (seven) still used the NDA publication "Buildings for Everyone" as a reference document to encourage and promote accessible design in the spirit of which the law was enacted. It was thought that in the intervening time between the two surveys, BCAs would have moved towards an active promotion of universal design that goes beyond statutory requirement, however this appears not to be the case.

s) Conditions Attached to Planning Conditions

In 1999 some 11 BCAs claimed that between 0% and 10% of all planning applications of which Part M would apply to, had conditions attached relating to Part M. Two felt that this figure was too difficult to estimate while three left this particular question blank. Some of these respondents indicated that it was not the responsibility of the BCA to attach such conditions, once again indicating confusion as to their roles and functions in the area of access. This confusion is disconcerting as it shows a lack of understanding of basic responsibilities. None of the respondents had ever refused a planning application for non-compliance with requirements of Part M. In 2010 four BCAs attach conditions to between 0 to 10% of planning applications and four also attach conditions to between 11% and 30% of applications. Three attach accessibility conditions on all applications while 11 felt this figure was too difficult to estimate. As in 1999, some respondents felt it was not part of their role or function to attach such conditions; this again undermines the significance of Part M at this early stage of development. If a standard condition such as "adequate provision shall be made for access for all" were attached to all planning decisions then developers would be well aware of their responsibilities from the outset.

None of the BCAs were aware of any application that was refused on the grounds of non-compliance with Part M however one felt that there was a refusal on planning grounds based on a developers refusal to provide suitable access arrangements in line with the Development Plan in their submission, this was subsequently amended on resubmission.

t) Legal Action in relation to Part M

When asked if they had ever carried out legal action in relation to Part M one BCA said that they served four enforcement notices in their area. 16 BCAs had never carried out a prosecution in relation to compliance with the requirements of Part M. From this we can draw two possible reasons. Either most developments are in compliance with Part M, or BCAs are either not monitoring enough developments for compliance, or are not using their enforcement powers to their full potential. In 2010 this figure increased to 11 BCAs having carried out some form of legal action directly relating to non-compliance with Part M. Action taken in all cases was in the form of Enforcements Notices against inaccessible features. For example a requirement for a ramp to be provided to access a dental surgery, inaccessible disabled toilets, inaccessible stairs and inadequate access to common areas of dwellings. The failure of designers to incorporate such basic facilities in designs, especially in vital heath care facilities, reiterates the need for more vigorous enforcement. In 2010 the Building Control Authority published its latest figures (Chapter 3) in relation to the issuing of Enforcement Notices and although it is not possible to differentiate the exact nature of the Enforcement Notices issued, it is encouraging that many BCAs are exercising their powers of enforcement. However 15 BCAs have never, since the introduction of the legislation in 1997, initiated any form of legal action for developments that are non-compliant with Part M. Although it is difficult to conceive that there was no need for legal action and that all developments were compliant, one BCA did comment that they; “use an advisor rather than prosecutor approach to achieving compliance that they find to be successful as the issue never gets to the point of requiring legal intervention”. This BCA proposes that if you arrive in court you have failed in your role to advise and educate the applicant.

This innovative solution provides a mechanism whereby observations and potential solutions may be suggested at an early stage and may succeed in achieving access that goes beyond standard minimum requirements.

u) Proposed Draft Amendments to Part M

Participants in the 2010 were questioned as to their opinions on the sufficiency of the proposed draft amendments of the new Part M in providing access for people with disabilities. 20 BCAs felt that the new regulations will significantly improve access. An examination of the implications of this draft document is presented in detail in Appendix I and although the draft suggests designers consult higher design specifications, it is felt that provision must be also made for existing buildings and the provision of guidance on measures that could be taken to upgrade their accessibility. Failings were also noted in the omission of increasing enforcement powers and strengthening of links between building and planning control. Opinions of the BCAs varied in this respect. Some felt that the proposed draft is ambiguous and presents unclear, bordering on confusing, guidance with a lack of diagrams. Others felt that although it is much improved on the previous version it still relies on the goodwill of the developer to go beyond minimum criteria towards best practice. This appears ambitious within a construction industry still locked in recession. Five BCAs made submissions to government on the draft document and their comments related to issues such as technical specifications of external circulation, duplex apartments, lack of diagrams and lack of integration with other elements of building control. BCAs did however express their frustration as to the lack of commitment from government to resource their departments adequately in order to provide sufficient monitoring and enforcement. They feel they are under staffed and under resourced and this requires them to prioritise work and often Part M many not be top of this list. They also felt that there should be much more education of designers in universal accessibility that would in turn make the new DAC more successful to the point were monitoring could be decreased. Although to many self certification is desirable, in a system where a battle still exists to persuade developers to apply the minimum required by the TGD the Irish system is still along way off such best practice. Table 4.2 summarises the Comparison of 1999 and 2010 BCA Survey Results of Section C.

SURVEY QUESTION	1999 = 17 RESPONSES	2010 = 26 RESPONSES
Do you feel that there should be mandatory monitoring/inspection of Part M by BCA?	**Yes 10** **No 7**	**Yes 21** **No 5**
How do you make developers/applicants aware of their legal obligations under Part M of the Building Regulations?	**Literature 7** **Oral 6** **Media 1** **No Advice 4**	**Literature 10** **Oral 12** **Media 8** **No Advice 1**
What is your current inspection rate for compliance with Part M?	Question not posed in 1999 survey	**<10% 7** **10% - 15% 10** **>20% 9**
Since its introduction have you granted a Disability Access Certificate or DAC?	Question not posed in 1999 survey	**Yes 20** **No 6**
Do you foresee the DAC as an effective measure of improving accessibility of the built environment?	Question not posed in 1999 survey	**Yes 25** **No 0** **Unsure 1**
Have you received any complaints in relation to Part M from the public or otherwise?	Question not posed in 1999 survey	**Yes 6** **No 20**
What do you use to promote compliance with Part M?	**Conditions 6** **Recomm. 2** **Other 4** **None 5**	**Conditions 6** **Recomm. 6** **Other 8** **None 1**
Do you feel that Part M is sufficient in providing for access for people with disabilities?	**Yes 12** **No 4** **Blank 1**	**Yes 13** **No 13**
How do you monitor buildings for compliance with Part M? SV1 = Site Visit/liaison during construction SV2 = Site Visit on Development Completion	**Access Audit 0** **SV 1 7** **SV 2 8** **Plans 8** **Complaints 8** **Liaisons 4** **Don't 6**	**Access Audit 8** **SV 1 25** **SV 2 19** **Plans 24** **Complaints 10** **Liaisons 13** **Don't 0**
Do you feel that the the TGD is sufficient for providing access for people with disabilities?	**Yes 12** **No 5**	**Yes 15** **No 11**
Do you use other information sources for monitoring/enforcement of Part M?	**Yes 10** **No 7**	**Yes 15** **No 11**
What percentage of planning applications have planning conditions attached to them in relation to Part M?	**0 – 10 % 11** **11 – 30% 0** **All 0** **Too Difficult 2** **Not our role 2**	**0 – 10 % 4** **11 – 30% 4** **All 3** **Too Difficult 11** **Not our role 4**
Has a planning application ever been refused as a result of non compliance with Part M?	**Yes 0** **No 17**	**Yes 0** **No 26**
Have you ever carried out a legal prosecution/issued an enforcement notice in relation to non compliance with Part M?	Question not posed in 1999 survey	**Yes 11** **No 15**
Do you feel the current proposed draft amendments to Part M are sufficient in improving access for people with disabilities?	Question not posed in 1999 survey	**Yes 20** **No 6**
Did you make a submission on the consultation document issued relating to the proposed changes to Part M, if yes please expand?	Question not posed in 1999 survey	**Yes 5** **No 21**

Table 4.2 Comparison of 1999 and 2010 BCA Survey Results Section C

4.3.4 Section D; Use of IT and GIS

v) Use of IT and GIS

When questioned in 1999 on their use of GIS within Local Authorities 13 respondents said that they did at some stage use GIS. Versions of software used included MapInfo (five), and Mapnet (one). Use of GIS was mainly in relation to road design, road maintenance, sanitary services, planning and zoning. There was no use in Building Control, Part M or disability access. This also indicates that four BCAs never used GIS. When asked the same question in 2010 all but one BCA actively uses GIS. This dramatic increase mirrors the development of technology in general over this timeframe. Of the 25 who are using GIS, 21 use MapInfo, the software used in the design of the "LADDER" concept. It was however disappointing to learn that even today none of the BCAs were using GIS to map access. The system was generally being used in roads, planning and estate management. Data is still retained in either hardcopy (19) or electronic database (seven) style systems. This has not progressed significantly since 1999 where 11 kept this type of data on hardcopy files, three used databases, two used spreadsheets; and five did not keep any records in relation to accessibility data. Some respondents use these sources combined. Considering IT has progressed significantly during this time it is disappointing that government departments have not embraced new technology available to them for more innovative purposes such as communicating access information in a GIS.

w) Communicating Access Information in a GIS

The final question asked BCAs if they felt that using Part M as an access audit tool and communicating the results in a GIS was a beneficial for storing, displaying, analysing and communicating accessibility data for people with disabilities. 14 BCAs in 1999 felt that it would be a beneficial tool, while two did not feel it would be of benefit. One did not know either way. 22 BCAs in 2010 felt this would be of benefit to people with disabilities. Of the two who did not think it was of benefit, one BCA stated that people with disabilities do not have the expertise to understand such a system.

This is incongruous as if people with disabilities were afforded the opportunity to socially integrate in accessible environments including education they could gain such expertise and determine their own destinies, rather than relying on others to provide for them. Although the "LADDER" concept could never provide full access for all it could provide people with a decision-making tool to make informed choices in their own lives.

SURVEY QUESTION	1999 RESPONSE	2010 RESPONSE
Do any departments within your Local Authority use GIS?	**Yes 13** **No 4**	**Yes 25** **No 1**
How do you record data in relation to monitoring carried out for Part M?	**Hardcopy 11** **Databases 3** **Spreadsheets 2** **None Kept 5**	**Hardcopy 19** **Databases 7** **Spreadsheets 0** **None Kept 0**
Do you feel that combining access auditing and GIS would be a beneficial tool for communicating accessibility data?	**Yes 14** **No 2** **Don't Know 1**	**Yes 22** **No 2** **Don't Know 2**

Table 4.3 Comparison of 1999 and 2010 BCA Survey Results Section D

4.3.5 Summary of Building Control Authority Survey Findings

There were many interesting findings from the implementation of this survey especially when it was re-administered almost a decade later and a comparison of findings was made. It was found that BCAs are still mostly adhering to the medical model of disability that "provides for" people with disabilities rather than providing for access for all. The accessibility revolution commenced in Ireland in the mid-nineteen nineties and it was hoped that by now universal design would have become standard practice rather than the continuing constrictions and limitations of designing ramps and other prescriptive accessibility features. Although the incidence of liaisons of the BCAs with disability organisations has increased many are still unaware of the numbers of those in their areas who have a disability. This creates uncertainties as to their real commitment to the issue. However some have become more progressive in the area by developing policies or schemes on accessibility such as an Internet access game. Many of the Development Plans for Local Authorities now make reference to universal design and its promotion, however, there is little tangible evidence of such application or promotion by BCAs.

The area of access auditing has become widely popular by BCAs and many have completed the Access Auditing Training Course. Unfortunately many do not have the time to put these skills into practice. This however is encouraging, as although BCAs are not promoting universal design, they have both expertise and interest in access auditing and therefore may accept the proposed "LADDER" concept that incorporates current legal requirements. Currently they are using an NDA standard that does not have any legal standing or consistency. By subscribing to a methodology such as the proposed "LADDER" concept not only does it provide a time-efficient user friendly tool it is also a standardised approach that allows regional and national comparisons.

It was disappointing to find that BCAs are still not communicating information on access they have collated to the public in the form of access guides. Although many are collecting such information as part of their daily role they are not communicating this information within their own areas, regions or on a national level. It was later seen that this information is continued to be stored in either database or hardcopy format indicating that BCAs may neither have the time nor resources to utilise more sophisticated methods. The presence of an Access Officer has dramatically increased. Many are unsure of their role and none indicated that communication of information was incorporated into this role. This is unfortunate as this person is ideally located to communicate such information at local, regional and national levels to both state bodies and the public. This gap in services remains evident today again justifying the need for the suggested "LADDER" concept. The regulatory standard Part M was also examined and similar results were again found in the two surveys. Most still feel that there should be mandatory monitoring of Part M and although nearly all feel the recent introduction of the self-certification system of the DAC is a good idea. Monitoring would be greatly enhanced if the proposed auditing tool of the "LADDER" concept was used as it audits against the TGD of Part M. This in turn, if applied to the GIS function of the "LADDER" concept, would assist Access Officers in extracting information to assist other interested parties. BCAs are still divided as to whether the requirements of Part M and the TGD are sufficient in providing access. Many feel that it can provide reasonable or adequate access provided designers enter into the process in the spirit in which the legislation was drafted.

No BCA felt that at this point universal design is attainable in Ireland. It is however promising that the level of enforcement by BCAs has increased and they are more actively informing developers of their obligations under the law. Although they welcome the introduction of revised guidelines, many are still sceptical of the tangible difference such revisions will make. It was also clearly evident that the use and development of IT has dramatically increased across nearly all BCAs. However none are using GIS for the purposes of accessibility mapping. Although nearly all still felt the "LADDER" concept is a good idea, it is disappointing that this readily available IT resource, that could provide a dramatic tool for communicating the array of information they hold, is still not being utilised in this area. The increased availability of GIS resources and presence of Access Officers highlights that never was their a more opportune time to develop the proposed "LADDER" concept for enhancing the status of people with disabilities.

4.4 RESPONSES FROM DISABILITY ORGANISATION SURVEYS

4.4.1 Introduction

A total of 50 questionnaires were issued in 1999 to various Disability Organisations (DOs) who have an interest in access in Ireland. Of these 50 questionnaires 35 were successfully completed and returned. This was a 70% response rate of the total population. 11 responses were also received stating that the group had since disbanded due to lack of finance (nine) or due to restructuring (two). In 2010 ten of the original study group of DOs had since disbanded and therefore 40 questionnaires were issued once again to these key stakeholders. Of these a total of 25 were returned which is a response rate of 62%. This higher (than the BCAs response rates) response rate was expected as disability groups play an active role in the accessibility arena and have an active interest in the subject at hand. The terms of reference for inclusion of organisations in this questionnaire were that they had a strong focus on promoting access to the built environment. Almost one third of all organisations were Access Groups whose sole purpose was to promote access to the built environment. Other categories included voluntary organisations, action groups, partnership organisations and government organisations.

All of the groups were in existence for between two and eleven years that indicates that most were operating throughout the reformation of the Building Regulations. The inclusion of DOs in the research aimed to expand the use of participatory research beyond the "Access for all" experience in order to gain an insight into the opinions of those trying to directly influence change. It was disappointing to achieve a lower response rate in 2010 than the initial questionnaire. This may be due to the topical nature of physically accessibility in the nineteen nineties. Many non-respondents were phoned to encourage the return of the survey and although three obliged some expressed concerns that they are no longer involved in physical accessibility and now act as advocates for accessibility rights.

4.4.2 Section A; General Information

a) Organisation Classification

The first question of this survey was asked to identify the groups involved. Of the 35 responses in 1999, 34% were Voluntary Organisations, 29% were Access Groups, 20% were Action Groups, 6% were Partnerships and 3% described themselves as Government Organisations. 9% chose the "Other" option, which included groups like umbrella organisations. All of these groups were formed between 1988 and 1996. When the same question was posed in 2010 40% described themselves as Voluntary Organisations, 16% were Access Groups, 24% were Action Groups, and 20% described themselves as Government Organisations. It is evident that the demographics of these same groups have significantly changed. This may be due to the change in the disability movement over the last decade as highlighted in Chapter 3. Legislation has slowly moved towards anti-discrimination and equal opportunities that is now mirrored in the roles of the DOs. Physical accessibility was highly topical in the nineteen nineties due to the European movement in the area. However this has receded in recent times perhaps due to the frustration of the lack of progression of the area in this time or due to DOs feeling that access was being adequately provided. It was not envisioned that these roles would have altered to this extent so unfortunately the question was not posed as to why, but further analysis of responses gave some insight. Of the groups surveyed in 1999 the most common year in which groups were formed was 1995 (14%) and all but one had been formed at some time in the nineteen nineties.

The average number of people working within these organisations was 13 with on average five experiencing a disability, while the amount of people who worked voluntarily averaged at three. In 2010 92% of organisations were originally formed in the nineteen nineties while 8% stated that they had been reformed or re-branded in later years. It is not surprising that these organisations were formed in the nineteen nineties as this was the optimum time of the disability movement and although the response rate was disappointing it is encouraging to see that many of these organisations are still active. In 2010 there were 30 people with disabilities working in the DOs that responded. Although an increase on the nineteen nineties it still only an average of 12% of the total numbers employed, although greater than the national average it would have been expected that organisations representing this demographic would be more active in recruiting people with disabilities. This may be due to such applicants not having the skills or education to suit the role that in turn could be due to inaccessibility to the built environment (in universities). However these are just surmisings as no research has as yet been carried out in this area. In 2010 DOs were also asked if their building was accessible to people with disabilities whereby 72% felt that their building was accessible. However this response was undermined by many adding further information by stating “don’t know”, “probably”, “partially” and “accessible to those who need to be in those areas”. Such expressions indicate that many still do not understand the legislation pertaining to physical access or have not endeavoured to determine if their building is compliant. The use of an auditing tool such as the one devised for the suggested “LADDER” concept could accurately determine compliance while also highlighting areas for improvement along side areas that are accessible.

b) Organisation Composition

Individuals actively involved in the organisations in 1999 and 2010 are compared in Table 3.4. This raises some interesting findings, as it is clear that although participation of health care staff such as Occupational Therapists has remained similar, the inclusion of Local Authority staff has dramatically increased with the inclusion of the new sub-group of Building Control Officers. This mirrors responses of BCAs who cited that 65% of them actively liase with DOs.

This inclusion of those involved in designing and regulating access for the built environment is encouraging, as it denotes that physically accessibility is still high on the agenda of many DOs and as relationships have formed and developed an interagency approach is being adopted. It is also promising that the numbers of Access Officers has increased as these are perceived (Chapter 3) as a valuable link between the DOs and BCAs. The strengthening and developing of such relationships is key to the promotion and acceptance of the "LADDER" concept.

STAFF FUNCTION	% 1999	% 2010
Administrative	**89%**	**88%**
Designated Access Officer	**37%**	**76%**
Occupational Therapist	**17%**	**16%**
Social Workers	**14%**	**20%**
Planners	**11%**	**32%**
Engineers	**9%**	**24%**
Architects	**6%**	**24%**
Commercial Representatives	**3%**	**8%**
Building Control Officers	**0%**	**44%**

Table 4.4 Functions of individuals working within Disability Organisations

c) Organisation Representation

People with varying disabilities were represented by many different groups. In 1999 43% of DOs represented the physically disabled, 34% had equal representation of all people with disabilities, 3% represented solely visually or hearing impaired people, while 17% represented other groups, including people with epilepsy or heart conditions. In 2010, 68% of DOs represented the physically disabled, 16% had equal representation of all people with disabilities, 8% represented solely visually or hearing impaired people, while 8% represented other groups such as neurological disorders. The numbers representing those with physical disabilities has however increased to a total of 84% representing their needs. This is a strong lobby group and has undoubtedly contributed to the success of the array of legislation and strategies published in recent times. However, there is still an unequal representation of categories of disability with those with sensory impairments still being under-represented. This may be a factor in the lack of provision for this group in Part M.

d) Organisation Activities

DOs were also questioned as to their core activities and some interesting results arose.

There were significant increases in all areas most notably in the areas of advising BCAs and developers on access, determining access to buildings and inspecting planning applications. This shows that, from stages as early as planning, DOs are willing to become actively involved in promoting access and forming relationships with those who design, monitor and influence such provisions. The increase in those determining access and examining plans is significant as it identifies a willingness to become actively involved in collecting information pertinent to those they represent. The method of storing this information is examined later in this chapter. However, it is clear that this bodes well for the acceptance of a system like the "LADDER" concept as a formal approach. Some DOs also noted other activities of their organisation such as social services and rehabilitation services. The comparison of these results is in Table 4.5.

ACTIVITIES	% 1999	% 2010
Communication of Disability Issues	**79%**	**88%**
Advising BCAs on Accessibility	**63%**	**80%**
Education in Disability Issues	**60%**	**64%**
Advise Developers on Access	**43%**	**64%**
Determine Access to Existing Buildings	**43%**	**60%**
Training on Access Issues	**37%**	**32%**
Planning Application Inspections	**20%**	**32%**

Table 4.5 Activities of Disability Organisations

e) Successes in the area of Access

80% of all respondents in 1999 had significant successes in relation to access provisions in their area (20% said that they had no recent successes in relation to access). These successes included, fund-raising, increasing consciousness, making access awareness videos, improving the accessibility of streetscapes, improving the accessibility of the built environment, increasing the use of tactile indicators and audible aids and improving the awareness of retailers and developers. One group had a member of their organisation fulfilling the role of "building inspector" within their BCA. In 2010 this figure had increased slightly to 84% and successes included gaining increased wheelchair accessible parking spaces, provision of wheelchair accessible shopping trolleys and improvement of accessible sanitary accommodation. Some organisations succeeded in the provision of integrated accessible seating in cinemas, installation of induction loop systems, subtitling of Irish television programmes and provision of tactile indicators in streetscapes.

Each of these significant successes shows that the work of DOs is making a tangible difference to the lives of people with disabilities. It also highlights the importance of their position between the individual with a disability, the designer and the enforcer as an intermediary. This may improve overall status towards full social inclusion and integration. Originally from comments received it was felt that DOs subscribed to the social model of disability where society neglected to provide sufficient legislation and innovative design for their members. However, it was felt that these organisations are now slowly moving closer to accepting a "Supportive" model, through their acceptance of innovative design combined with assistive devices to improve access. They are combining the key factors of individual, disability and environment to achieve more realistic attainable accessibility standards. Table 4.6 compares these findings.

SURVEY QUESTION	1999 = 35 RESPONSES	2010 = 25 RESPONSES
Does this premises comply with the requirements for Access under Part M	Question not posed in 1999 survey	**Yes 72%** **No 12%** **Don't Know 6%**
How many work in Organisation?	**Average 13**	**Average 10**
Of these how many have disability?	**Disability 5**	**Disability 30**
Have you had any successes in relation to access in your area?	**Yes 80%** **No 20%**	**Yes 84%** **No 16%**

Table 4.6 Comparison of 1999 and 2010 DOs Survey Results Section A

4.4.3 Section B; Information Technology and Local Authority Relationships

f) Accessibility Data Storage

The majority of data pertaining to access in the built environment in 1999 was stored by DOs in Hardcopy format (77%), 18% used Databases and 5% used Spreadsheets. 3% of organisations questioned in 1999 had used the MapInfo GIS package to represent data relating to access for people with visual impairments. 97% had not used a GIS in their organisation for data storage or otherwise at this time. In 2010 72% still used Hardcopy format, 20% used Databases and 8% used Spreadsheets. In this technological age it was interesting to find that the majority of DOs still rely on paper methods of data storage. This is regrettable as it is a very ineffective method of communicating such geographically based information to interested parties.

If such information is not made electronically available it cannot be printed, emailed or published on the Internet leaving a valuable stock of untapped information similar to that observed in the BCAs. None of the 25 DOs in 2010 were using GIS in relation to any aspect of accessibility, which is unsurprising considering their low acceptance of IT. DOs currently neither have the skills, resources nor experience to embrace an access mapping system such as GIS. However they do have a valuable database of unexplored accessibility information that if fed into the "LADDER" concept could provide a precious resource for people with disabilities in attaining information vital to independent decision-making.

g) Access Guides

Just under half of all respondents in 1999 (49%) knew of an access guide for their area. Six percent did not know if there was a guide present. This indicates that almost one half of all DOs were unaware of the presence of an access guide in their area. This either signifies that the guide does not exist, or that the DOs are unaware of its existence. In 2010 this figure remained relatively unchanged with 52% being aware of such a guide. It is not clear that none of the DOs respondents are using GIS and the majority are still storing data in hardcopy format. The likelihood therefore is that many of these guides are in the form of published text that loses relevance over time. It must be however noted that there are at least four on-line access guides (Appendix VI) such as "TACIS Dublin by Touch" whereby braille maps are produced for individual users. The development of similar systems including the proposed "LADDER" concept would provide users with a live decision-making tool individual to their needs creating a bespoke personal guide to the built environment.

h) Relationships with Building Control Authorities

74% of all respondents in 1999 felt that they had a good working relationship with their BCA while 11% did not feel that they did not. 14% had no opinion either way. This compares to 2010 where 68% felt this relationship was good. The decrease in confidence was cited by many as due to; "the failure of Building Control Departments to engage with Disability Organisations as a result of ongoing industrial action".

As previously mentioned at the time of administration of the 2010 survey there was a "work to rule" proviso in BCAs that included not undertaking any work that is not defined in their terms of employment. Liasing with key stakeholders such as disability organisations does not form part of their core responsibilities. This is damaging to the partnership that has been built with the DOs in recent years as it may take a long time to rebuild such relationships and trust that was evident. Interagency working between the BCAs and DOs is an integral link to the provision of successful access. The experience and knowledge of each group is important in its own right. However it is only when the two sources are combined that a seamless, holistic approach can be devised. 71% of respondents did actively liase with the BCA of their area in 1999. This may reflect the high level of success noted in relation to "success in accessibility issues" (80%). These liaisons were similar across the groups and included; liaisons in relation to access in the local urban environment, meetings in relation to new developments in the area and consultation regarding the installation of ramps and loop systems. These liaisons ranged from fortnightly to monthly to quarterly. In 2010, 72% of DOs were actively meeting with their local BCAs. However it was noted than many of these meetings have been postponed of late to industrial action. It is encouraging that over the last decade relationships that were formed have remained, however it is not known as to the nature of these relationships as one organisation cited; "meetings are sounding boards to air grievances over access issues". Although important in their own right such meetings should provide a mechanism for the two groups to work together rather than on opposite sides of an enforcer/lobbyist divide.

In assessing the attitudes of BCAs in 1999 towards access issues in their area, 60% felt that they had a positive attitude, 9% felt that the BCA had a negative attitude. 23% felt that their attitude was indifferent to people with disabilities, while the remaining 9% of all respondents did not know what attitude the BCA had toward access issues. In 2010 improved opinions on attitudes were noted with 84% feeling their BCA had a positive attitude to access. This can only serve to improve relationships between the two groups as if DOs feel the BCA has a more positive attitude they are more likely to build a more trusting relationship not solely based on complaints.

i) Inspections of New Developments

26% of respondents in 1999 carried out accessibility inspections of new developments. A total of 68% did not inspect new developments for compliance with Part M. In 2010 this figure had increased to 48% showing DOs taking a more active role in determining access. The collection of such information of new developments of almost half of DOs highlights the wealth of up to date information they have in their possession, information that is not being used to its full potential. To formalise this approach to data collection and use electronic means to store and analyse it could assist their members in acquiring information on services and facilities they wish to access.

j) Accessibility of Local Authority Buildings

Under half (46%) of all Local Authority buildings in the opinion of DOs were accessible to people with disabilities in 1999. 17% did not know if the buildings of their Local Authority were accessible or not at this time. Inaccessible features identified included no access for people with disabilities above ground level, inaccessible entrances, no loop system, no adaptive fire alarms and no visual indicator queuing system. Many respondents found that the reason for so many inaccessible features was the fact that many of these buildings were historical or listed buildings. In 2010 this figure had dramatically increased to 84% of those who felt these buildings were accessible. This is mainly due to “Towards 2016” which is the strategic document that pulls together the mission and strategic objectives of this National Disability Strategy. The strategy identified specific goals one being that every person with a disability would have access to public spaces and buildings (Chapter 3). DOs who did not find their Local Authority building accessible cited examples such as failure to provide accessible features for those with sensory impairments, the absence of induction loops for hearing impaired and failure of government staff to learn sign language.

k) Advice to Local Service Providers

57% of all respondents in 1999 did advise local building owners on access matters at this time. In 2010 this figure remained remarkably similar with 56% of DOs continuing to advise service providers in their areas.

Advice included recommendations relating to the location of moveable structures such as sandwich boards, accessibility of designated sanitary accommodation, training of staff in disability awareness as well as guidance on anti-discrimination and equal opportunities legislation. It is important for DOs to continue this role at local level as currently no government body provides a similar service. If DOs were again to formalise this approach through access auditing they could provide service providers with an Access Action Plan. This could incorporate all the advice they are currently applying with the distinct difference in providing greater detail, consistency and a plan of action as to how the provider may implement necessary changes. Advice provided in a more formal manner that spans the lifetime of a premises could be perceived by service providers as being more important and requiring action.

l) Contact with Other Disability Organisations

In 1999 only 14% of all responding groups admitted to having regular contact with other similar groups. These groups at this time included the Irish Wheelchair Association (IWA) (5%), the Disability Federation of Ireland (DFI) (2%), the National Association for the Deaf (NAD) (8%), the National Council for the Blind of Ireland (NCBI) (1%), and the NRB (5%). Some other groups included the Centre for Independent Living (CIL), local Health Boards, Cross Border Disability Organisations and the Disabled Drivers Association. In 2010 these figures had not significantly increased with just 20% being in regular contact with other organisations. Many of those relationships were with sister organisations or other organisations under the same umbrella. This is unsatisfactory as each of these organisations has individual knowledge and skill set that if collectively shared would provide a valuable resource for improving the status of their members. This combined with the fact that each group will be representative of different aspects of disability their interagency cooperation is key to the improvement of access. If representatives from each DOs in an area formed a committee and met regularly with their local BCA progress could be made that would realistically improve access for all. DOs lobbying for their own rights may be in the interest of their individual members, but such strategies may be to the detriment of other organisations. Figures relating to Section B of the survey are compared in Table 4.7.

SURVEY QUESTION	1999 = 35 RESPONSES		2010 = 25 RESPONSES	
At present, which methods do you use to store data in relation to access?	**Hardcopy** **Database** **Spreadsheet**	**77%** **18%** **5%**	**Hardcopy** **Database** **Spreadsheet**	**72%** **20%** **8%**
Have you ever used GIS in relation to access and accessibility data analysis?	**Yes** **No**	**3%** **97%**	**Yes** **No**	**0%** **100%**
Is there an access guide for your area based on access audit or access survey?	**Yes** **No** **Don't Know**	**49%** **45%** **6%**	**Yes** **No** **Don't Know**	**52%** **36%** **12%**
Do you have a good working relationship with your Building Control Authority?	**Good** **Not Good** **Don't Know**	**74%** **11%** **14%**	**Good** **Not Good** **Don't Know**	**68%** **24%** **8%**
Do you actively liase with your local BCA?	**Yes** **No**	**71%** **29%**	**Yes** **No**	**72%** **28%**
What attitude do you feel your BCA has in relation to access and Part M?	**Positive** **Negative** **Indifferent** **Don't Know**	**60%** **9%** **23%** **9%**	**Positive** **Negative** **Indifferent** **Don't Know**	**84%** **8%** **8%** **0%**
Do you carry out any planning application inspections?	**Yes** **No**	**26%** **68%**	**Yes** **No**	**48%** **52%**
Is your Local Authority building accessible to people with disabilities?	**Yes** **No** **Don' Know**	**46%** **37%** **17%**	**Yes** **No** **Don' Know**	**84%** **8%** **8%**
Do you advise local building owners on access matters?	**Yes** **No**	**57%** **43%**	**Yes** **No**	**56%** **44%**
Do you maintain regular contact with other similar disability groups?	**Yes** **No**	**14%** **86%**	**Yes** **No**	**20%** **80%**

Table 4.7 Comparison of 1999 and 2010 DOs Survey Results Section B

4.4.4 Section C; Part M of the Building Regulations

m) Compliance of Premises with Part M

Over a quarter of respondents (26%) in 1999 did not know if their premises complied with the minimum requirements of Part M. 34% felt that their premises did comply, while 17% had no physical premises and were using Council, parish or private buildings to hold their meetings. In 2010 36% of DOs felt that their building complied with the requirements of Part M, many (28%) of the remaining respondents were unsure as to what the requirements are under the legislation. This is unsatisfactory, such organisations advocate for people with disabilities. It would be expected that DOs would be aware of the legislative requirement for access for their members. This also highlights that there are 36% of buildings that represent people with disabilities still inaccessible to its members.

This highlights a defect in legislative provisions, as Part M does not apply to existing buildings and therefore any of these premises developed prior to 1997 do not by law have to accommodate the needs of people with disabilities.

n) Proposed Revision of Part M

In the 2010 survey DOs were questioned in relation to the proposed revision of Part M in 2010. They were firstly asked if they were aware of this revision and 52% said that they were. 40% were in fact approached by government to make a formal submission on the document. This is an extremely significant approach by government, as it not only strengthens relationships but also builds trust with the DOs. Being consulted at such early stages of policy formation also gives DOs an opportunity from the outset to voice the opinions of their members. However as mentioned earlier this voice could become much clearer and louder if the DOs joined together to provide a unified submission representing all people with disabilities. 44% of all DOs did, however, make submissions on the proposed Part M. This is an encouraging result as not all of these DOs were requested to make submissions and therefore used their own initiative to represent their member's needs. Submissions on the draft document included many comments on the needs of those with sensory impairments whose DOs still feel aren't adequately provided for in the new draft. Examples included requirements for improved signage and visual displays, provision of inductions loops, provision of braille signage and development of audible warning systems.

DOs representing people with physical impairments also made submissions and overall they felt that the new revision was a step back as it oversimplified the umbrella requirement for access with the statement; "adequate provision shall be made for people with disabilities to access and use a building, its facilities and environs". DOs felt that the continued use of the word "adequate" leaves the legislation open to very broad interpretation that may not be in the best interest of their member's needs. Many also made specific submissions on design criteria contain within the proposed TGD such as dimensions of sanitary accommodation and ramps.

Submissions by DOs highlight their dissatisfaction by the continuance of government to require developers to meet minimum standards rather than optimum standards or best practice that undoubtedly would improve access for all. DOs were also questioned as to their opinion on the recently introduced DAC. However only 24% were aware of the introduction of this system and of these, none have been approached to advise either developers or government on aspects of the certificate. The DAC places the onus upon those designing new buildings to confirm that their design complies with Part M. DOs who responded felt that this system will reduce monitoring and enforcement by BCAs who may in future rely on random "spot checks" of this self-certification system. DOs felt that this could be damaging to the overall status of accessibility legislation in Building Control, whereas BCAs felt the opposite as they place the same importance on a DAC as a Fire Certificate. This identifies a need for greater communication between the two agencies in order to develop greater trust and dissemination of information relevant to both bodies.

o) Understanding of Reasonable and Adequate Provision under Part M

Less than half of respondents (42%) explained in 1999 what they understood by the term "Reasonable Provision". Understandings included:

- people should not inadvertently be excluded from a building
- accessible, but not fully
- it is confusing… some effort to be made to improve access?
- provision for independent access to be made to enable people with disabilities gain access to the built environment
- requires the owner to make a new premises/extension accessible if they can reasonably afford to
- access to all main areas and facilities
- it is of practical use

As this term was removed from Part M in 2000, respondents in 2010 were asked what they understood of the replaced term "adequate provision" and 64% provided explanations that included;

- reasonable accommodation based on context
- accessible to specific individual's needs
- access to public areas should facilities and resources allow
- sufficient access that allows circulation and use of required facilities
- access to and use of all public spaces independently

It is clear that the exchange of terminology has made little difference to the perception of DOs as to what provision is provided for under Part M. As seen in the comments made the interpretation of both reasonable and adequate vary greatly depending on the individual's perception. The success of Part M in providing access relies on designers adopting an optimum interpretation such as "access to and use of all public spaces independently" rather than an interpretation such as "accessible, but not fully". For Part M to be implemented in the spirit it was intended the proposed revision should remove such terms and provide a more prescriptive definition that is unambiguous.

p) Sufficiency of Part M in Providing Access

When asked their opinion on Part M, 31% said in 1999 that they felt that it was sufficient to provide access for people with disabilities to the built environment. 11% either did not know or left the question blank. Reasons given for it being insufficient included the fact that it only applies to public buildings and not housing. Other reasons given included, "the lack of monitoring for compliance with the regulations" and "the regulations are too broad". Although 31% in 1999 felt that it was sufficient in providing access, 51% felt that Part M needs revision. Areas where revision is necessary included the fact that it only relates to public buildings (3%). Also more emphasis is needed for people with sensory disabilities (3%). In 2010 the number who felt it was sufficient rose to 52%, this may have been due to the interim amendment of the legislation in 2000. Reasons cited for its insufficiency included the continued lack of provision for those with sensory and intellectual disabilities and the ignoring of more sophisticated design solutions especially in escape in the event of an emergency. 56% of DOs felt that this revision of Part M is necessary and now is the opportune time for them to voice their dissatisfaction prior to the finalisation of the current proposed draft. These opinions still reflect recommendations originally cited by the Commission on the Status for People with Disabilities back in 1996 indicating that little confidence has been built in the legislation during this time.

q) Sufficiency of the TGD in Providing Access

In 1999 31% also felt that the TGD to Part M was sufficient in providing access, 40% felt it was insufficient, while 14% did not know or left the question blank.

Reasons for it being insufficient included the TGD being too vague (1%), too technical (1%), inaccurate (1%) and it does not address the needs of people with sensory disabilities (5%). A suggested amendment to the TGD in 1999 was that the tactile warning strip to indicate stairs to people with visual impairments should start 400mm from the first or last step and should be 600mm wide so the person with a visual impairment has time to consider the approaching stairs/steps, as well as adding a standard for illumination levels and colour contrast. This was not amended in the 2000 revision and is not part of the current proposed draft. Other reasons for the TGD being insufficient in 1999 included the fact that it is too technical and needs to be more efficient and user friendly. Many did not understand what a TGD was and called for increased publicity and awareness on the legislation involved. In 2010 a similar number (56%) to those who felt Part M was insufficient also felt its TGD was insufficient. These figures are comparable to those observed in 1999 indicating that the interim amendment in 2000 did little to improve confidence in the legislation. One key observation stated that; "their was much hope for the 2000 revision of Part M to provide more independent access and this again was hoped for prior to the publishing of the long awaited 2009 draft – the failure of revised versions to provide for improved independent access is unacceptable and effects our members civil rights as citizens of this country". This emotive statement refocuses attention as to the purpose of the legislation ~ to promote independent living. Failure to move towards a design for all strategy is clearly affecting the status of civil rights of people with disabilities who are often forgotten regarding the same rights as everyone else. Failure to enter in to the spirit of Part M diminishes these rights.

r) Encouragement of Accessible Environments

77% of all respondents in 1999 revealed that they did actively try to encourage accessible built environments. The means by which they tried to achieve this included, media (4%), contact with local architects or engineers (13%), access consultancy (27%), and lobbying BCAs (15%). These methods, when further expanded, revealed that these groups give talks on access to groups in the tourism sector, lobby their BCA on access initiates, hold awareness demonstrations for developers, keep continuous contact with architects and engineers, and monitor planning list for new developments.

One group was in the process of marketing an access consultant practice at this time. In 2010, 88% of DOs stated that they are actively trying to encourage accessible environments. A notable addition to the 1999 responses was the number of DOs (80%) who use "provision of information" as a means to encourage accessible environments. As reiterated throughout this research the communication of information is fundamental in the provision of choice and the improvement of current facilities. DOs are using many sources such as websites, media, advocacy services and printed literature to provide both advisory and factual information that could improve access. If such information were to be collated in a formalised approach, such as the auditing tool of the "LADDER" concept then DOs could combine their resources to provide a seamless indication of accessibility for all types of disabilities over their locality and hence provide a consistent approach to encouraging attainable success and improved accessibility. Other methods that have expanded since the nineteen nineties such as access consultancy (40%) could link in with such a system and strengthen their other activities in media campaigns (16%), contact with local architects or engineers (32%), and lobbying BCAs (36%).

s) Barriers to Access

When asked in 1999 what they thought the current barriers to access in the built environment were, 46% rated ignorance as the greatest barrier. 28% felt that finance was the greatest barrier. 25% thought that attitudes need changing to remove the barriers to access, whereas 23% ranked the lack of legislation as the greatest barrier. The barriers identified in 2010 were startlingly similar with ignorance (56%) still being high in the estimation as the main barrier to access. Finance still ranked second with 32% of respondents feeling this was a significant barrier, followed by people's attitudes to disability (20%). 24% of DOs still feel that legislative provisions present a barrier to access and perhaps this is reflective of the failure of subsequent amendments to take cognisance of more sophisticated design strategies such as universal design. A comparison of the findings of Section C are summarised in Table 4.8.

SURVEY QUESTION	1999 = 35 RESPONSES	2010 = 25 RESPONSES
Does you premises comply with Part M?	**Yes 34%** **No 40%** **Don' Know 26%**	**Yes 36%** **No 28%** **Don' Know 36%**
Are you aware of the proposed revision to Part M?	Question not posed in 1999 survey	**Yes 52%** **No 48%**
Were you asked to make a formal submission on the draft document?	Question not posed in 1999 survey	**Yes 40%** **No 60%**
Did you make a submission on the draft 2009 Part M?	Question not posed in 1999 survey	**Yes 44%** **No 56%**
Are you aware of the Disability Access Certificate (DAC)?	Question not posed in 1999 survey	**Yes 24%** **No 76%**
Have you been approached to advise in relation to the DAC?	Question not posed in 1999 survey	**Yes 0%** **No 100%**
Do you feel that Part M is sufficient for providing access for people with disabilities?	**Yes 31%** **No 58%** **Don' Know 11%**	**Yes 52%** **No 36%** **Don' Know 12%**
Do you feel that Part M needs to be revised?	**Yes 51%** **No 49%**	**Yes 56%** **No 44%**
Do you feel that the current TGD is sufficient for providing access for people with disabilities?	**Yes 31%** **No 40%** **Don' Know 14%**	**Yes 30%** **No 56%** **Don' Know 16%**
How do you try to actively encourage accessible built environments?	**Media 4%** **LA Contact 13%** **Consultancy 27%** **Lobby BCA 15%**	**Media 16%** **LA Contact 32%** **Consultancy 40%** **Lobby BCA 6%** **Provide Info 80%**
What do you believe are the current barriers to access?	**Ignorance 46%** **Finance 28%** **Attitudes 25%** **Legislation 23%**	**Ignorance 56%** **Finance 32%** **Attitudes 20%** **Legislation 24%**

4.8 Comparison of 1999 and 2010 DOs Survey Results Section C

4.4.5 Section D; Access Auditing

t) Use of Access Audits and Access Surveys

80% of all respondents had carried out an access audit or access survey by 1999. A total of 97% at this time agreed that access auditing was a beneficial tool to providing a more accessible built environment for people with disabilities. It was felt that audits promote awareness into the access requirements of people with disabilities as well as highlighting the future improvements required to make a built environment more accessible as well as creating awareness to the barriers to inclusion.

Other respondents felt that access auditing is; "only beneficial if it is looked at in conjunction with other access issues like mainstreaming and inclusion, and it must be accompanied by public information programmes" or "it is a tool that makes people with disabilities more aware of access issues". One respondent stated; "there are many varying opinions on what access is, an access audit highlights the fact that access does not just mean a building being wheelchair accessible". There was a both a high number who have carried out access audits and those who feel that access auditing is a beneficial tool. When compared to 2010 a significant increase to 92% of all DOs had completed such work. The question must be posed as to the location and use of this vast array of data collected? As previously noted data held by DOs is generally held in hardcopy form. Such methods do not allow for easy updating causing the information to date and stagnate rapidly. The use of more sophisticated IT based data collection and communication systems such as the proposed "LADDER" concept could be seen as part of future success of these organisations. The current insular operation of DOs creates a missed opportunity that could provide a valuable information source to all. It is however encouraging to see that the use of access auditing has increased with 96% feeling it is a beneficial tool in the improvement of access. One DO stated; "access auditing is a great device for both creating awareness and setting a benchmark". As with the case of BCAs if a standard operating procedure such as the access auditing tool based on Part M were adopted then a seamless inter-county, interagency approach could be instigated that would provide uniform accessibility information to all.

u) Training in Relation to Access

With respect to training in relation to access issues, 33% had received some training in access issues in 1999. This training came from a range of sources including the NDA, the CUA, Access Officers and people with disabilities. By 2010, this figure had only increased to 56%. It was hoped this figure would be higher, but unfortunately training in Ireland has not developed as envisioned and the only comprehensive access auditing course still remains in Northern Ireland and may be deemed expensive by under resourced DOs.

Training in this and other aspects of access and disability must be prioritised by DOs if they are to keep abreast of current legislative developments and if they are to be taken seriously by enforcement authorities.

v) Communicating Access Information in a GIS

In relation to the combination of access auditing and Part M with a GIS system, 12% felt in 1999 that it would be a beneficial tool for the display, analysis and storage of accessibility data. 76% felt that it would not be beneficial. In 2010 there was a significant increase observed with 52% of DOs feeling it would be beneficial. This may be due to an increased understanding of IT since the nineteen nineties, and the increase in the use of other mapping systems such as satellite navigation. The significant number of those who stated they did not know (36%) may indicate a lack of understanding of the capabilities of the system, as some stated that they did not know what GIS was. To those who are not familiar with GIS it is difficult to imagine its capabilities and ideally a practical demonstration to each DO may have allayed these concerns. However this was not feasible in the context of the time and resources of this research. It is envisioned for the "LADDER" concept to be a success for this sector training in GIS would be required. Although the value of part one of the concept (access auditing based around the TGD) is significant its full potential could not be realised without movement onto part two (GIS). A summary of the comparison of these findings is located in Table 4.9.

SURVEY QUESTION	1999 = 35 RESPONSES	2010 = RESPONSES
Have you ever carried out an Access Audit or Access Survey?	**Yes 80%** **No 20%**	**Yes 92%** **No 8%**
Is Access Auditing to beneficial tool in improvement of access?	**Yes 97%** **No 3%**	**Yes 96%** **No 4%**
Have members of your group received training for access or access auditing?	**Yes 33%** **No 67%**	**Yes 56%** **No 44%**
Do you consider the combination of access auditing and GIS beneficial?	**Yes 12%** **No 76%** **Don't Know 12%**	**Yes 52%** **No 12%** **Don't Know 36%**

Table 4.9 Comparison of 1999 and 2010 DOs Survey Results Section D

4.4.6 Summary of Disability Organisation Survey Findings

The re-administration of this survey after a time period that saw much advancement in terms of anti-discrimination and equal status legislation along side revision of the access standard, Part M produced some significant outcomes.

It was initially found that although the response rate was lower in 2010, those who did respond had an active involvement in equal status and ant-discrimination activities along side accessibility, and this may have prompted their response to the survey. All of these organisations were formed in the nineteen nineties when the accessibility movement was at its peak. It is encouraging that since this movement lost momentum many organisations have continued to operate. It was however surprising to learn that the incidence of people with disabilities working in DOs has not significantly increased. This requires further research as to whether it is lack of opportunity, education or physical accessibility that limited their presence in this workforce that undoubtedly requires their unique insight. Barriers to access more than a decade on had not altered with ignorance still cited as the main cause. It was however promising to learn that relationships with Local Authorities have improved significantly over the last decade with many DOs having BCAs or planners as part of their composition. BCA relationships have also strengthened with many DOs citing that their attitude to disability was positive and Local Authorities were to the greater extent accessible to their needs. However, at the time of survey administration there was ongoing "work to rule" being implemented in Building Control Departments that limited the contact DOs have with BCAs, if this were to continue long term it could seriously damage the trust and relationships that have developed in this time. DOs have also increased their activity in relation to examining plans of new developments, access auditing and advising developers and service providers on the requirements for access for their members.

Large amounts of accessibility data are now being collected. However it was disappointing to find that in general this data was being retained in difficult to manage hardcopy files. These files lose relevance and date very quickly, are difficult to interpret, update and disseminate to a large volume of interested parties. Only 52% knew of an accessibility guide for their area highlighting the failure to use such information to its full potential. It is felt that the adoption of a formalised approach to data collection such as the auditing tool as proposed by this research would greatly assist DOs. This system would also provide a wealth of pertinent information to other interested parties.

It was observed that just one fifth of all DOs actively liase with other DOs. This is unfortunate as if such organisations pooled their resources, they could not only provide accessibility information on a broader spectrum of buildings, and they could also provide a seamless approach that would represent all aspects of disability.

Many DOs lose some of their credibility in their lack of knowledge of new developments such as the DAC and the lack of training may account for this. However, many were aware of the proposed revision of Part M and had made submissions on its provisions. Although a decade has passed many DOs premises still failed to meet the minimum accessibility requirements under Part M. Although not legally required for pre-1997 premises, it was hoped that some would make the necessary alterations in the spirit of the legislation. Most are still not satisfied with the provisions of Part M in providing effective access especially with the use of terms like " adequate" remaining in the most recent draft, DOs feel this term is far too open to individual interpretation that can result in minimum rather than optimum standards being applied. Although DOs are still unsure as to the capabilities of the proposed "LADDER" concept it is clear that if they are to have a significant impact on improving the status of people with disabilities, they must reform their data collection methods and accept more sophisticated methods of storing and communicating information. If this was implemented through a formal approach that could link in with other like minded organisations, then a holistic approach could be seen a local and national levels.

4.4.7 Limitation of Survey as a Methodology

There were some disadvantages identified in using a postal questionnaire. The first of these was the difficulty in verifying who completed survey. Was it actually the Building Control Officer or a student on placement? The lack or researcher/respondent interaction was also an issue as it made it impossible to probe one-word answers or blanks. This was especially important where surprising comments were cited. It was therefore not possible to attain more descriptive information on individual aspects. It was also recognised that responses received may not be representative of entire population, as some BCAs or DOs may be more likely to respond if they have an interest or good reputation in the subject area.

Some of these limitations were identified during the pilot test phase of the research and measures were put into place to overcome them. Careful design of a questionnaire that was short, uncomplicated and user friendly assisted in this respect. It was hoped that in the second round of the questionnaire in 2010 that some interviews could have been carried out in person with some of the key respondents. Unfortunately when contacted they declined the invitation due to the ongoing industrial action within Local Authorities. Although DOs were also contacted and some interviews were arranged unforeseen logistics of physically meeting the representatives unfortunately prevented achievement of this aim. The 70% response rate from BCAs was encouraging considering their "work to rule" regime and some commented on the form that they wished to remain anonymous as response to such surveys could constitute a breach of their industrial action. The taking of such a risk highlights the level of importance responding BCAs place on disability access.

Another possible limitation of this methodology was the time line in which it was conducted. As the survey did not have a direct material affect on the implementation of the "LADDER" concept it may have been more beneficial to conduct the survey after its completion in order to clearly demonstrate from the outset how accessibility data could be communicated in this form especially for DOs who had a noted lack of training and expertise in IT. This group especially would have benefited from a practical presentation of the "LADDER" concept. It may also have been advantageous to select members of the DOs and take them to the auditing site to test the validity of "LADDER" concept as was done with the two "Access for All" participants. This would have eliminated the need for the follow up questionnaire. Carrying out the survey through person-to-person interviewing may have also assisted in this respect and perhaps using a smaller research population would have facilitated this. However this would have made identifying the opinions of the many varying DOs very limited. Chapter 2 identified other grounds for not utilising such methodology.

4.5 SURVEY RESPONSES IN THE SAME LOCAL AUTHORITY AREA

4.5.1 Introduction

From the questionnaire responses in 1999 there were found to be correlating replies from BCAs and DOs who represented the same Local Authority (LA) area. There were 12 correlating responses of the BCAs and DOs in the same area; Wexford, Waterford County and City, Cork County and City, Clare, Tipperary NR, Limerick City, Galway City, Monaghan, Meath, Dun Laoghaire-Rathdown, and Dublin Corporation. In the 2010 survey it was found that only three responses of BCAs and DOs from the same area were received and it was therefore decided that this was not a significant sample to perform comparisons upon. Also the design of the questionnaire and its content had altered significantly making it difficult to draw comparisons. This methodology aimed to provide a basic introduction into thematic mapping and an investigation as to whether correlations of activities in the same LA area were or could be in future linked to improving access for people with disabilities in these areas. The eight common questions from the 1999 survey were combined to examine the relationship between variables. This analysis is a very important aspect of improving accessibility, as it combines opinions of organisations representing people with disabilities with the opinions of the regulatory body. If two organisations were found to be like-minded it may provide a potential area(s) to trial the proposed "LADDER" concept. The eight similar questions related to liaisons, access auditing and access guides, training, opinions on Part M and its TGD, use of GIS and their opinions on the proposed "LADDER" concept.

4.5.2 Thematic Mapping

Data was analysed through a process of thematic mapping, whereby a map is enhanced according to a particular identified theme that in this case was accessibility data. Thematic mapping is a powerful method of visualising and communicating data. It can be difficult to detect patterns, incidence rates or trends from lists of data, whereas if thematic shading is used the data becomes clearly visible on a map. Themes represent the data with shades of colour fill patterns, symbols or graphic functions. There are many types of thematic mapping methods available in MapInfo, the software utilised in this research.

The type chosen for this research was "Individual Value Maps". This method was chosen as it shows points, lines and boundaries that are shaded by individual values contained in a particular field. In this case the field values were accessibility values from the access audit. Both numeric (measurements) and nominal (Yes/No) data can be used in this type of mapping. MapInfo gives each individual value its own colour. Thematic mapping also allows extra attribute data to be added to the map using the "Update Column" function. This has the advantage over the other systems identified in that individual data attributes can be displayed by linking the map to the browser window. Other systems examined (Appendix VI) did not use GIS and used crude illustrations based on a "thumbtack on a google map". Valuable detailed attribute information was not provided. In this research thematic mapping is initially used to identify location of survey participants and correlating responses. It is later utilised as part two of the "LADDER" concept whereby access audit results are linked to the map as a decision-making and data communication tool.

Thematic mapping provides a decision-making function so detailed that attributes that would contribute to a particular individual's accessibility needs can be easily accessed. Thematic mapping also has the advantage of modifying a map once it has been created using the "Modify Thematic Map" function so that additional attributes or people with disabilities can be added to build on a decision-making query. This was also absent in the other systems examined. The thematic legend may also be customised. In MapInfo there is a choice of legends, either cartographic legends where information from any layer can be displayed or theme legends, where the thematic map information is displayed. The theme legend was used in this research as it had the advantage of being editable after the thematic map was made. Another advantage of using the thematic mapping process was that when the maps have been created they could be saved and used for future reference. This is not possible in other systems examined. Thematic maps are saved as "Workspaces" that have the advantage of opening all tables and windows at one time automatically.

4.5.3 Results of Correlating Responses of BCAs and DOs in same LA Area

Three thematic maps were generated as both an introduction to GIS and to give an indication of the geographical location of respondents, and to identify areas where both the BCA and DOs in the same area responded. The first Thematic Maps, Map 4.1 and 4.2 illustrate the response rates of the BCAs, (17 in total) and DOs (18 areas in total) in each area. From these maps it was evident that there were fewer response rates from BCAs in the midlands and west of the country. BCAs in the south and on the east coast mostly responded. This may be due to the greater incidence of urban centres in these areas such as cities like Cork, Waterford and Dublin. A response was also received from Galway city. Such areas have greater populations and thus have higher instances and experiences of people with disabilities and catering for their needs. These areas also denoted in their survey responses a more acute awareness of the requirements of Part M. These areas also had higher instances of enforcement action. These factors may combine to a greater interest in the subject area by these BCAs, prompting a response to the questionnaire. A similar correlation was noted for the DOs. Many responses from these groups were also from central urban areas. Their interest in this study may also reflect the larger populations present. However this response pattern may also be an indication that their urban centres are less accessible than rural areas and therefore city based disability organisations are more interested in participating in accessibility research? People with disabilities in rural areas may also rely more on cars to access their urban environments, whereas urban dwellers may interact with streetscapes on a more personal level and hence have a greater vested interest. DOs that responded in the urban centres were generally affiliated to government funded disability organisations or organisations associated with a particular disease and therefore may have greater funding and resources than their rural counterparts to participate in research.

Map 4.3 combines the responses of both groups to illustrate co-ordinating responses in the same area and again the large urban centres presented greater response rates. From the examination of surveys LAs and DOs in these areas had greater staffing and resources so therefore were afforded the opportunity to develop a greater interest in accessibility promotion.

The importance of interagency working between BCAs and DOs was identified from survey results as fundamental in improving the status of people with disabilities. The significance of combining and examining results of groups in the same area meant that if correlating positive results were observed in the same area these areas could possibly be identified as areas where the "LADDER" concept could be further tested. If BCAs and DOs in the same functional area were found to have similar views on the promotion of access then they may be ideally located to promote interagency co-operation through the implementation of the "LADDER" concept.

The first of the eight similar questions from the original questionnaires related to the BCAs and the DOs awareness of an access guide in their area. Both BCAs and DOs in just one LA area, Limerick City, knew of such guides. This raises the question as to whether this guide may have been created in collaboration or consultation with each other. In relation to access auditing four correlating responses were found who had carried out an access audit in their area. Monaghan, Cork City, Limerick City and, Galway City all had BCAs and DOs who had both carried out an Access Audit. This indicates that groups based in city areas are more active in physically determining access to buildings. Alternatively, this may be due to the sheer volume of building stock and disabled population in these areas. This may indicate a relationship between the groups whereby if a BCA is actively auditing the DO may also decide to contribute or conduct a comparative audit or vice versa. When the results of Access Audit and Access Guide were combined it was found that only Limerick City had BCAs and DOs who had both implemented an Access Audit and had knowledge of an Access Guide. To develop a successful access guide one must firstly conduct an audit. This indicates that although access audits are being carried out in other areas neither BCAs nor DOs are using the results to form access guides. These groups should be working together using their varying resources to produce guides for their areas. Areas that were in synchronisation with each other in these aspects could pose as potential candidates for future development of audits and guides and testing or future acceptance of the proposed "LADDER" concept. The next corresponding question related to Liaisons between DOs and the BCA in their area and vice-versa.

Only two of the 13 correlating groups agreed that they liased together on issues pertaining to access in their area. The two areas in this case were Monaghan and Dun Laoghaire/Rathdown. That means that 11 groups did not simultaneously acknowledge their meetings, casting doubt on the value of such liaisons. Training in relation to accessibility issues for people with disabilities, was another corresponding question. Two groups of BCAs and DOs in the same area had received training in relation to accessibility issues: Monaghan and Cork City. Where both sets of key stakeholders commit to such initiatives there is substantial optimism for the improvement of overall access in these LA areas. It was also found that one area, Monaghan had both the BCA and a DO who liased on access issues and received training. From this query a pattern emerges of active BCA and DOs in the same area. BCA and DOs in Monaghan seem to be both very active in similar aspects of disability. When the result in relation to training is combined with the result relating to liaisons on accessibility issues this theme of Monaghan being a more active area is once again highlighted. Much training is carried out by DOs that in turn could strengthen interagency relationships and progress the development of the accessibility agenda.

The sufficiency of Part M and the TGD was also examined and in three of the correlating responses, both the BCA and the DOs believed that Part M and the TGD were sufficient. These areas were Wexford, Waterford County and Dun – Laoghaire Rathdown. If key stakeholders in these areas both believe the standard is sufficient, neither will promote exceeding or revising the standards. Therefore minimum access requirements (as required by Part M) in these LA areas may be all that is required for developers, rather than promoting best practice in the spirit the law intended. It also indicates that although many found Part M and its TGD successful in providing access for people with disabilities only three groups agreed it was working in their area. This indicates that in the remaining areas either the BCAs or the DOs are unhappy with Part M and its TGD. This may also be indicative of the levels of access in these areas. On further investigation two correlating BCAs and DOs, Limerick City and Galway City felt that Part M and the TGD were insufficient.

This may instigate proposals at local and regional levels to lobby government to improve or amend standards or locally promote improved standards that in turn could have the long-term effect of improving physical access. Each BCA and DOs were also questioned on their use of GIS. As 97% of DOs had never used GIS it was unsurprising that no BCA and DO in the same area were both using GIS. This indicates it could be difficult for the "LADDER" concept to be accepted in these areas if the BCAs did not take the lead role in relation to GIS.

Both groups were also asked their opinion of combining Access Auditing and GIS for the manipulation, storage and display of accessibility data for people with disabilities. Two BCAs and DOs in the same area agreed that it was a beneficial tool. These two areas were Dublin Corporation and Waterford City. If these organisations shared their information on accessibility and skills on construction and IT they could provide a substantial improvement to access and the status of people with disabilities in their areas. Cork County and Meath had no common responses between BCAs and DOs in these areas. These results are summarised in Table 4.9 where it is evident which areas have similar attitudes and procedures in relation to accessibility issues and are potentially like minded in their approach and therefore may prove a valuable interagency team to use and further develop the proposed "LADDER" concept. Waterford County and Tipperary North had no issues in common and therefore not included in the table.

	ACCESS GUIDE	ACCESS AUDIT	LIASON	TRAINING	PART M	TGD	GIS USE	GIS & A.AUDIT
WEXFORD					BCA & DO	BCA & DO		
WATERFORD CITY					BCA & DO	BCA & DO		BCA & DO
CORK CITY		BCA & DO		BCA & DO				
LIMERICK CITY	BCA & DO	BCA & DO						
GALWAY CITY		BCA & DO						
MONAGHAN		BCA & DO	BCA & DO	BCA & DO				
DUN LAOGHAIRE RATHDOWN			BCA & DO		BCA & DO	BCA & DO		
DUBLIN CORP								BCA & DO

Table 4.10 Correlations of Responses between BCAs and DOs in the same LA Area

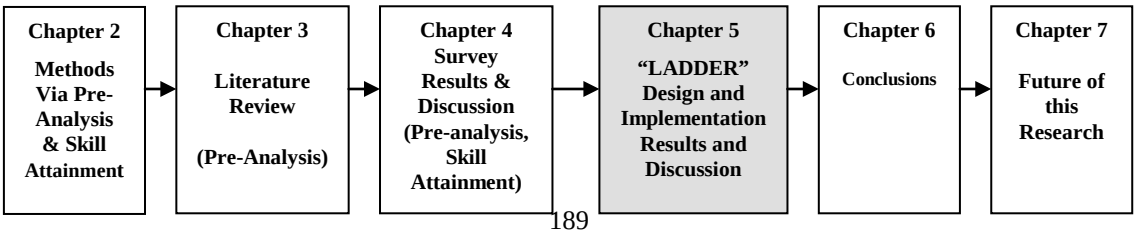
4.5.4 Summary of Combined Responses

The combination of this information may give an insight into how interagency working of key stakeholders such as DOs and BCAs could assist overall accessibility and the desire for the improvement in accessibility in the identified areas where similar opinions lie. BCAs and DOs in three areas have similar opinions in three aspects of the questionnaire. This indicates that the BCAs and DOs in Waterford City, Monaghan and Dun Laoghaire/Rathdown presented similar attitudes and positions to disability. These areas may therefore be suggested as the three most suitable areas where the proposed "LADDER" concept could be initially tested. If these organisation's interdepartmental liaisons, access guides, training, access auditing and skill sharing were to be developed by these "like-minded" key stakeholders it is envisaged that the proposed "LADDER" concept could be successful and real progress could develop in improving the status of people with disabilities in Ireland. A limitation of this process was that is was not possible to repeat the process in 2010 due to the lower response rate and correlating responses not being observed. However it is interesting to note that responses were once again received from BCAs and DOs in Dun Laoghaire/Rathdown highlighting their continued common interest in the subject.

4.6 SUMMARY

A review of the literature identified found that in examining the area of access for people with disabilities the researcher must consider the individual, the disability and the built environment. From detailed examination of each of these it was found that a "Supportive" approach to disability research should be adopted whereby the individual and the environment are examined in tandem while incorporating participatory research of people with disabilities. This allows the contemplation of previously unconsidered issues. This approach was then applied to the design, development and testing of the "LADDER" concept as outlined in Chapter 2. The "LADDER" concept was developed in a number of stages that amalgamated surveys of the key stakeholders, design of an access audit and thematic mapping system, testing, evaluating and developing the "LADDER" concept to the point of route mapping while incorporating participatory research throughout.

It was found from the surveys of BCAs that although they have a keen interest in improving access for people with disabilities in their areas, they neither have the time nor resources to dedicate to the collection of accessibility data required by the proposed "LADDER" concept. It was found from the survey of the DOs that they clearly wish to promote the status of people with disabilities. However they do not have the expertise or funding to progress the issue into the technological era. Combination of these two skill and resource sets could allow for a very effective means of launching the "LADDER" concept. DOs could collate access information and BCAs could communicate the information in a manner that can both be used for decision-making for people with disabilities and monitoring, enforcement and improvement of standards. This could reform the current use of access information. Waterford City, Monaghan and Dun Laoghaire/Rathdown presented similar attitudes and positions to disability and were suggested as the potential areas where the proposed "LADDER" concept could be initially tested. Chapter 5 continues the examination of results by presenting and discussing the results of the Design and Implementation part of the "LADDER" concept development.



5.1 INTERVIEW RESULTS OF BUILDING OWNERS/MANAGERS WHO PARTICIPATED IN THE ACCESS AUDIT

5.1.1 Introduction

In order to assist to development of the "LADDER" concept, at the beginning of each of the access audits the owner or manager of each of the premises in the pilot test area of the audit were interviewed in relation to various aspects pertaining to the running of their premises. Questions investigated aspects such as, when the premises were built, if they were altered, the incidence of visits from people with disabilities, the type of disabilities encountered and their opinions on combining access auditing and GIS for accessibility data. There were a total of 157 buildings selected for the access audit. Thirty-eight premises chose not to participate, which left 119 participants, on whom person-to-person interviews were conducted prior to the commencement of the physical audit. Of the 38 who chose not to participate the main reason stated was the risk of their identity being exposed although complete anonymity was guaranteed. They felt that if inaccessible features were identified there was a risk that this may impact upon business or stimulate legal proceedings against them. This is a possible indication that building owners were aware that their premises might not be fully accessible.

5.1.2 Interview Results

The first question in the interview related to the duration of time that each business had operated from its current premises. A total of 41% had been at their current premises since the introduction of Part M of the Building Regulations. 43% had either built or made a material alteration of the property since the introduction of Part M. This established that these premises would have been subject to the requirements for access under Part M and theoretically should comply with its provisions and meets the minimum accessibility criteria. 3% of all participants had received a visit from a Building Control Officer who was inspecting for compliance with Part M. Over three-quarters (78%) had never received such a visit, while 3% were unsure. BCAs are required to inspect just 12% - 15% of new developments so this low inspection figure was not unexpected; premises in existence prior to 1992 require no inspection for accessibility requirements.

The onus was therefore on the owners of 57% of premises to provide access on a "self-regulation" basis. As the access is never examined the results of the audit would provide evidence as to whether this system of self-regulation is sufficient. Another question posed during the interviews related to the frequency of visits to the building by people with disabilities. Over a third (34%) had daily visits, 28% had visits on a weekly basis, and 16% had visits on a monthly basis. 8% of interviewees felt that they would receive a visit from a person with a disability on a fortnightly basis, whereas 12% said that they would rarely receive a visit from a person with a disability. Only two percent commented that they had never received a visit from people with disabilities. This means that people with disabilities are actively trying to use the services of 117 premises indicating the market value of this group. This figure also indicates that people with disabilities are also actively trying to integrate within society and use the same services accessible to everyone else (Figure 5.1).

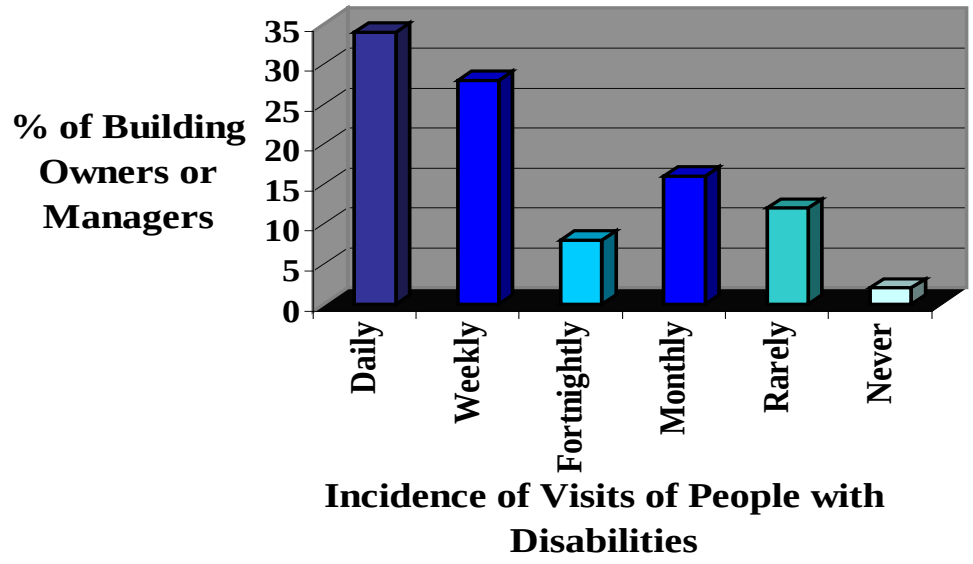


Figure 5.1 Incidence of Visits of People with Disabilities

Categories of people with disabilities who visited the buildings in the pilot test area included: people with physical disabilities (50%); hearing impairments (12%); visual impairments (7%); people with learning/cognitive disabilities (1%) and combination of people of varying disabilities (29%);. 1% perceived that none of these categories included the type of disability of people visiting their premises (Figure 5.2).

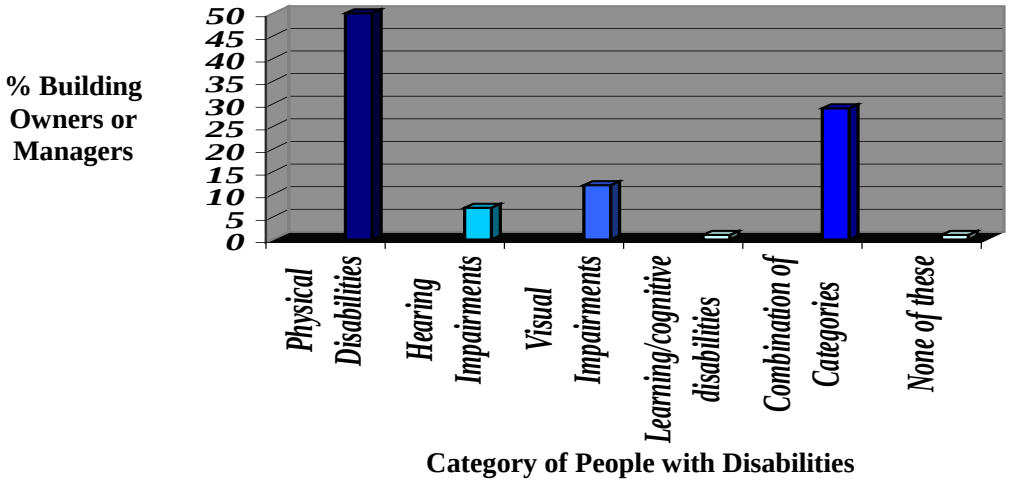


Figure 5.2 Categories of Disability of Individuals visiting the Pilot Test Area

The interview also included a question relating to staff training. It was found that 61% of all building owners/managers employed staff members who were trained in some way that would be of benefit to people with disabilities, for example first aid. Of the 119 buildings audited, only 12 building owners/managers had some kind of emergency procedure in place for the evacuation of people with disabilities in the event of an emergency. This attempted to identify if the needs of people with disabilities had been considered. The result implied that a large number had considered their needs in relation to daily customer service activities, but they had not considered less obvious issues like fire safety. The final interview question explained the project in full and asked the owners or managers if they thought that the "LADDER" concept was a good idea. A total of 91% agreed that it was a good idea. 6% felt that is was not beneficial, while 3% did not know either way. This interview also required that the owner/manager signed a permission slip to allow the implementation of the audit on their premises. The full interview questions are shown in Appendix VIII.

5.1.3 Summary

The interviews indicated 43% of premises should comply with the audit requirements as they were developed since the introduction of Part M. Information was also gathered as to the low rate of inspection by the BCAs. Upon completion of the audit this will be compared to actual compliance levels observed.

The interview also provided a deeper insight into the demographics of the individuals using the pilot test area on a daily basis. Although CSO figures were previously analysed (Chapter 2) they do not provide the detailed data of category of disability and their use of services as 98% of premises actively receive visits from people with disabilities. This indicates the need for the communication of accessibility information to those individuals trying to access these services. This also indicates how service providers may in future facilitate access audits of their premises as required in the "LADDER" concept due to their clear market value.

5.2 "LADDER" TESTING THROUGH THE COMBINATION OF ACCESS AUDIT RESULTS WITH GIS THEMATIC MAPS

5.2.1 Introduction

The multi-dimensional approach to the design of the "LADDER" concept was outlined in Chapter 2. One of the objectives outlined was to pilot test the "LADDER" concept by implementing the access audit and combining the results with a thematic mapping process. As the possibilities of mapping such a large amount of data are limitless some boundaries were be placed on the data to reduce it to an easily manipulated level. All the data from the eleven sections of the access audit were examined in detail and then organised into overall accessibility ratings for each of the three categories of disability. The three categories decided upon were wheelchair users, individuals who are mobility impaired and individuals who are sensory impaired. The accessibility ratings were calculated by combining overall results of each of the eleven individual sections to reduce the data to a manageable level. With the data at a manageable level it was then inputted into a GIS where numerous queries were carried out and a number of resulting thematic maps were created. Each of the maps created demonstrates the capabilities of the "LADDER" concept in providing a decision-making tool and a tool for communicating levels of accessibility/inaccessibility. As the database from the access audit was so large an exponential number of thematic maps could have been created. Consequently sample selections of typical thematic maps were chosen to demonstrate examples of this innovative means of using access data, and examples of the decision-making function of the "LADDER" concept.

5.2.2 Demonstration of the Data Collection Function of "LADDER"

A total of thirteen examples of the application of the proposed "LADDER" concept on the pilot test area are demonstrated in this chapter. As described in Chapter 2 (Figure 2.2) to design and develop the proposed "LADDER" concept a multi-dimensional approach that included participatory research was adopted. The design and implementation of the access audit was one of these dimensions. The auditing criteria were based around the TGD to Part M. Appendix V outlines the eleven sections (105 audit criteria in total) of the measurement criteria under which data was collected during the access audit phase of the "LADDER" concept. The audit is designed in a manner whereby when future amendments are made to Part M, revisions to the audit can easily be incorporated. The audit criteria used in this pilot test was designed around the Building Regulations 1997 that were in force at time of auditing. The design of the audit was greatly assisted by utilising the skills attained from the access-auditing course. The use of regulatory criteria for the audit was chosen firstly to assess the regulatory standard, secondly to assess the level of compliance of the building stock in the pilot test area and thirdly to use a standard already in daily use by designers. This was in the hope that this would assist future acceptance of the proposed "LADDER" concept. This design would also evaluate the effectiveness of the TGD in providing access for all while simultaneously assessing the ease of which such a standard could be transposed into the "LADDER" concept that could potentially be used by DOs and BCAs to improve accessibility.

Using a legally binding document such as Part M as measurement criteria and highlighting the ease at which it can be implemented to key stakeholders could prove a strong device for promoting change. Identifying levels to which buildings are non-compliant when compared with minimum legal requirements is a valuable tool in improving accessibility. Publishing of such results in the public domain by DOs or initiation of legal proceedings based on audit results by BCAs will have a dramatic influence in promoting accessibility. Access auditing using Part M could hopefully be promoted as a self auditing tool by designers and developers to assess their own compliance rather than waiting for external audits.

Conducting the access audit on 119 buildings using 105 audit criteria based around three categories of disability generated an extremely large volume of data. This data was initially stored in Excel spreadsheet format. In this format the information was ineffectual, reduced to thousands of numerical representations such as door widths, grab handle locations and toilet dimensions. To extract a meaningful written report was impracticable as was similarly found with DOs and BCAs responding to the survey. The time taken to physically audit each of the 119 buildings using an auditing questionnaire that contained 105 queries, most of which required physical measurement, was extensive. This coupled with the completion of person-to-person interviews with each of the 119 owners/managers resulted in each audit taking up to one day (depending on the size of the building) to complete and collate. The use of the palm pilot to store the information and the design format of the audit greatly simplified the process. However the physical access audit took almost six months to complete. This was a long period to spend on such physical fieldwork and there were difficulties encountered in relation to the time required to build upon the database and the repetitiveness of the work. This may be perceived as a limitation. However in order to get an insight into the pilot test area as a whole, a wide range of disabilities and to test the full capabilities of the "LADDER" concept and the legislation this level of assessment was preferred. The time and effort identified to complete this work is also a clear indication as to why many BCAs were unsure of the level of compliance of buildings with Part M. Although many had clear policies and opinions on disability, Part M is just one of the aspects of the Building Regulations that require monitoring by an already under resourced BCA as identified in the survey who clearly do not have the time or resources to conduct the detailed audits required. The audit does however clearly identify exact areas that are not in compliance, making it very easy to recognise what is required to resolve the problem. This shows that the "LADDER" concept not only can be used in decision-making it can also be utilised to identify inaccessible criteria that key stakeholders such as DOs can then target for improvement.

Unfortunately the pilot test area was long established and therefore plans of the buildings were unavailable from owners to assist in the auditing technique. Some sketches were taken during the audit to assess flow and internal circulation.

Although the audit provided valuable accurate details the inclusions of plans or photographs of the findings would have been beneficial to the display of results. During the piloting of this audit the sample group were asked if photographs could be taken. Unfortunately all categorically refused to allow this as they feared that this could reveal their identity and if found to be inaccessible that this could damage their business/reputation. This indicates that they feared they may not be accessible and such inaccessibility could damage their reputation in people with disabilities accessing their service. This, however, does reinforce their acknowledgement of the market value of people with disabilities to their business. Some owners also feared that if their premises were outside the accessibility criteria that it could be publicised and affect business or initiate legal action taken against them. Some were unwilling to comment on why they did not want to participate in the research. Other non-participants consisted of empty units, private residences or people who were not interested in participating due to lack of time or interest in the subject. The anonymity of the pilot test area is however a limitation of the access audit as the provision of photographs could have clearly demonstrated examples of accessibility or inaccessibility. Such photographs could have been linked to the thematic map to clearly illustrate access provisions to a person interested in visiting a service.

Ideally the access audit could have been conducted through the active participation of people with disabilities from the "Access for All" programme. Who better to assess access than those who have knowledge of the requirements on a very personal level? Unfortunately due to insurance reasons from both the university and the building owners an immediate barrier was in place to prevent this. Time required carrying out each audit, the location of the pilot test area and the limitation on funding and resources also made it not possible to avail of their expertise at this stage. However, during the "Access for All" programme many access audits were carried out with the participants of other areas, and the insight gained from them in this respect was applied to the design and implementation audit of the pilot test area. As mentioned, a total of thirteen "decision-making" maps are demonstrated in this chapter. The first two maps relate to the location of the buildings and the four categories of the buildings in the pilot test area. These maps are shown with the underlying base map of the pilot test area to ground the map to a geographical location.

The base map was reproduced under permit from the Ordnance Survey of Ireland. The remaining eleven maps each have accessibility decision-making queries performed on them to communicate accessibility information. They are also shown with the underlying base map present. The 119 building owners/managers that agreed to participate in the study were analysed in detail and then divided into four sub-categories. This was so that the data could be reduced to a more manageable level for examination at closer detail. Data could be reverted to its original format at any stage if required. Table 5.1 outlines the categories into which buildings were assigned.

CATEGORY	CATEGORY INCLUSION	NUMBER IDENTIFIED
Recreation	restaurants, public houses, hotels, swimming-pools, game centres and take away food premises	32
Education	colleges, schools, libraries	3
Commercial	retail premises e.g. food and clothes shops	63
Business	professional services e.g. doctors, solicitors, opticians	21

Table 5.1 Breakdown of 119 Buildings into Sub-Categories

The four categories "Recreation, Commercial, Education and Business" were sufficient for the purposes of this research. However, if the system were to be used for more practical purposes than testing and demonstration of a concept, these four categories could be broken down further. For example "Commercial" could be broken down into many sub-categories like Supermarkets, Hairdressers, Drapery or Pharmacies. However, due to the volume of the data being collected it was decided to limit the data to the assigned categories in order to reduce the data to a manageable level. The maps that follow examine the pilot test area in two ways. Firstly taking it as a whole (i.e. 119 participating buildings) and secondly breaking the area down according to the designated category, depending on the decision making query being made. These four categories were combined with various elements of the 105 access audit criteria and the three categories of disability; wheelchair users, individuals who are mobility impaired and individuals who are sensory impaired. Table 5.2 outlines the elements combined to test the "LADDER" concept on the pilot test area, this provides an indication of the scale of data generated in an access audit.

Categories of Building (4) (119 buildings in total)	Audit Criteria (105)	Disability (3)
• Recreation • Commercial • Education • Business	• Entrance • Approach • Usage of Facilities • Sanitary Conveniences • Audience/Spectator Facilities • External Steps • Ramps • Stairs • Hotel & Other Guest Rooms • Internal Circulation • Lifts	• Wheelchair • Mobility • Sensory

Table 5.2 Elements combined in the development of the "LADDER"

Over 10,000 elements of data were gathered in the implementation of the access audits. Surveys as an alternative could never have provided such detailed results. The access audit provides comprehensive step-by-step analysis of each aspect of accessibility. Table 5.2 displays how the "LADDER" concept was designed in a manner that organises the data in a convenient format. Four building category options can now be combined with between one and eleven various audit criteria data sets (105 criteria in total) to provide accessibility information to three different disability groupings. The first map (Map 5.1) illustrates the location of the 119 buildings whose owners/managers agreed to participate in the access audit. The second map (Map 5.2) shows the breakdown of these 119 into their assigned categories. Access auditing as with any audit is a thorough systematic approach in assessing compliance with pre-determined criteria. Selection of these criteria is entirely dependent on the purpose of the audit. Selecting the TGD to Part M not only allowed for a meticulous examination of the implications of the TGD on a visual and practical scale, it also allowed for an assessment of the actual accessibility of the pilot test area. The manner in which the audit is carried out also provided the opportunity to create a detailed summary of what was required to mitigate against inaccessible features identified. This is also known as an Access Action Plan, such plans allow for continuous re-evaluation or assessment of the building in relation to access and the improvement of existing facilities the benefits of such plans were discussed in detail in Chapter 3. The result of the access audit demonstrates how close or far away a particular factor is from being accessible.

As the TGD is so specific in its measurements it is very easy to develop specific recommendations in order to make plan for improvement. Reports can be easily generated highlighting the issues that require attention and the manner in which this can be achieved. These reports can also act as a beneficial tool in reporting good or innovative accessible design features that others can take example from. The access audit provides results on the accessibility of a building only at a given moment in time. As environments are ever changing audits will require continuous repetition throughout the lifetime of the building to monitor for improvements and deteriorations. Each operator of the premises was afforded the opportunity to make contact at a later date to both receive the results of their audit and to avail of an Access Action Plan. This initiative was offered so that the audit was not just a paper exercise and that it could make a real improvement to accessibility. It was unfeasible to revisit all 119 premises and therefore each was supplied with my contact details and requested to make contact in one month if they required results/advice. Unfortunately none of the 119 made contact and therefore no Access Action Plans were issued. This indicates that although many appeared enthusiastic at the time of the audit this quickly diminished when the normal routine of business resumed and may imply that self-regulation is not a priority and will not improve access in the long term.

As outlined in Chapter 2 the development of this phase of the "LADDER" concept took into account training for access auditing, design of criteria for auditing, analysis of legislation, development of audit criteria, interviewing of owners/managers, construction of equipment for auditing and correlation and communication of results. Combining each of these techniques provided a mechanism for the physical measurement of actual levels of accessibility against the current legal requirement, the benefits of which are discussed later in this chapter. It is was found that access auditing is an exceptional tool for measuring accessibility and requirements for access, as long as it used in a manner that takes account of personal, often subjective, experiences of people with varying disabilities. Access auditing not only highlights levels of access it also provides an efficient tool for recommending solutions to inaccessibility. Access auditing can also be used to test auditing criteria for their effectiveness in providing access for specific disabilities.

Adopting the TGD of Part M as the audit criteria is an excellent tool for BCAs and DOs to audit new and current building stock in order to identify current levels of accessibility and highlight the requirements for improvements. Where deficiencies are established an attempt to promote change in the overall accessibility of the built environment can be implemented.

Map 5.1 illustrates the location of the 119 buildings whose owners/managers agreed to participate in the access audit and the subsequent Map 5.2 shows the breakdown of these 119 into their assigned categories. These two introductory thematic maps are the base maps that the future "LADDER" concept demonstration maps are built upon. "LADDER" demonstration maps will be presented and discussed in subsequent sections in a manner that provides possible suggestions for potential uses and advantages of the use of the proposed system.

5.2.3 Demonstration of the Data Communication Function of "LADDER"

5.2.3.1 Introduction

The decision-making and data communication element of the "LADDER" concept was demonstrated through a process of thematic mapping in a GIS. The package chosen for use in this project was MapInfo. This package was chosen for a number of reasons. It was found from the survey of BCAs that MapInfo was the most commonly used GIS package within the LAs. MapInfo is also a GIS package that is Windows based and therefore easy to use and install on a PC. MapInfo provides the tools to input, manipulate, analyse and present geographically referenced data, including both graphic and attribute data (Korte, 1997). MapInfo was used to digitise the scanned map of the pilot test area and convert it from a vector image to a raster image. Data may be entered in either vector or raster format depending on what is available. Attribute data from the access audit was directly imported from Excel and opened in MapInfo. Detailed software training was a valuable skill attained to progress this methodology. There was however a limitation identified in MapInfo when digitising that is it is not possible to share boundaries. For example when digitising two buildings side by side the connecting wall has to be drawn twice as they cannot share a common boundary. Therefore it was necessary to draw a second set of lines and nodes on top of existing lines and nodes in order for the two sets of boundaries to overlap. This is not topologically correct as there were then two lines representing one boundary.

The 119 buildings were separately digitised for the thematic mapping. Due to the large pilot test area selected, the level of mapping created a scale of map that produced reduced detail. The research area necessitated such expanse in order to be in a position to use every aspect of the eleven sections of the TGD. In increasing this scope to acquire varying levels of accessibility of many features the system could be tested to a greater extent. The data from the access audit could have been entered directly into the MapInfo software. However, as the data was collected on site using a palm-top computer it was less time consuming and more efficient to import the data directly from Excel. Excel also allowed the data to be manipulated with overall calculations of the accessibility of individual features to be calculated.

This would not have been possible in MapInfo, as it does not have the appropriate statistical functions.

5.2.3.2 Thematic Mapping of the "LADDER"

As over 10,000 elements of data were gathered an exponential quantity of thematic maps could have been created. However as this research aimed to demonstrate the "LADDER" concept, only a set amount of maps were required for demonstration purposes. One of the objectives of this project was to display the potentials of the "LADDER" concept. However during thematic mapping levels of accessibility were also found and noted. Therefore this section will also discuss practical applications of thematic mapping as a decision-making and communication tool for key stakeholders as well as highlighting the accessibility levels identified in the pilot test area. The first of the decision-making queries that is demonstrated was in relation to the accessibility of "Entrances" of "All 4 Categories of Buildings" in the pilot test area to "Wheelchair Users". From Map 5.3 it can be clearly seen that over half (77 buildings or 65%) of all buildings had entrances that were accessible to wheelchair users. This type of query combines data from one section of the access audit, one category of disability and all four building categories that were audited. It communicates information to wheelchair users that a high level of buildings had entrances that were accessible to their needs. It also means that 65% of all participating buildings had doors with a minimum clear opening width of 775mm and an unobstructed space of at least 300mm on the side of the door next to the leading edge. They would also have had a leaf of a double door with a minimum clear opening width of 775mm, accessible entrance lobby and they did not have standard revolving doors present (which are currently forbidden). This is a high positive result for levels of accessibility for wheelchair users. The thematic map clearly represents the data with the accessible buildings strongly evident. This would not have been clearly evident from spreadsheet files or other written data. This is probably one of the main predetermining factors of whether a wheelchair user would decide to frequent a premises or not. For DOs to be in a position to display, communicate and update this data in its area would be a valuable resource for all involved.

The second decision-making query demonstrated related to the accessibility of "Entrances" of "All Categories of Buildings" in the pilot test area to "Wheelchair Users" and "Mobility Impaired Users". Map 5.4 demonstrates that 60 buildings or 50% of all participating buildings had accessible entrances to both wheelchair users and mobility impaired users should they decide to access the service. This type of query combines data from one section of the access audit, two categories of disability and all of the buildings audited. It illustrates that when mobility impaired users were included the amount of accessible entrances was reduced by 15%. This use of the "LADDER" concept provides valuable information for those intending to access these facilities. Here the accessibility rating dropped slightly with 50% of all of the buildings being accessible to both categories of disability. This decrease was due to the addition of extra accessibility measurement criteria from the audit or different interpretation of general requirements. For example the requirement relating to the self-closing devices would affect people who have restrictions of mobility to a greater extent than people who can move themselves in a manually propelled wheelchair. The question relating to the layout of the lobby would also be of greater relevance to the wheelchair user than a mobility impaired user. Despite these variations 50% of all the participating buildings had accessible entrances for both wheelchair users and mobility-impaired users. The thematic map clearly highlights these buildings. It is also very clear from the thematic map the 50% of buildings that had entrances that were inaccessible. Applying the specific TGD criteria clearly demonstrates that what can be accessible for one impairment may not be accessible for another. Displaying this data in an excel document in a submission on a town's development plan would not be an efficient means for a Building Control Officer to increase accessibility requirements, whereby depicting a street well known to all involved in a thematic map would clearly identify the issues to all.

The third decision-making query performed combines the databases relating to access of "Entrances" of "Recreational Buildings" for "Wheelchair Users". From Map 5.5 it can be seen that 15 of the 32 (47%) Recreation Buildings had entrances that were accessible to wheelchair users. This query demonstrates how the "LADDER" concept can be built upon, by combining a section from the access audit, a category of building type and a category of disability to cater for a specific individual's needs.

This query demonstrated how queries could be expanded to include more specific details. The thematic map is useful in illustrating such a query. In this example it can be clearly seen that almost half of the "Recreation" buildings were accessible to Wheelchair users. This is also a high level of accessibility. People with wheelchairs or mobility-impaired users could safely enter nearly half of "Recreation" buildings according to the audit guidelines. This could prove to be a valuable resource for DOs who are trying to promote accessible tourism in their areas. Display of such maps on their web sites would allow for a mobility impaired visitor make decisions on their travel and excursions based on up to date recreational maps.

When the audit database relating to "Internal Circulation" was combined with the building category "Business" and the disability category "Mobility Impaired Users" it was found that 15 of the 21 (71%) Business buildings were accessible in this respect to mobility-impaired users. Combining these elements of the "LADDER" concept communicates information to people with disabilities that cannot be achieved by other means such as word of mouth. This representation is demonstrated in Map 5.6. Accordingly, of the 21 Business buildings almost three-quarters of them had accessible internal circulation to individuals who have a Mobility Impairment indicating a high level of accessibility. As there were fewer buildings under consideration the results do not immediately stand out as clearly as in the previous query. Nevertheless the thematic map does illustrate clearly the "Business" buildings that have accessible internal circulation to mobility-impaired users. This means that the 15 buildings that met the audit assessment criteria had internal doors that met with the same requirements as the entrance doors. The passageways or corridors had clear unobstructed widths of 1.2m, and lobbies were constructed in a manner that allowed for sufficient space for a wheelchair user and their assistant to move clear of one door before using another. Accessibility was also high in this respect, 71% of all "Business" buildings had accessible internal circulation to mobility-impaired users. This means that once inside 71% of a business premises had safe and independent internal circulation through the building. The ease of which this information can be extracted from the database using the GIS is hugely advantageous to BCAs. More and more BCAs are being asked to account for the levels of accessibility of business and public buildings by the media, interest groups and the legislature.

The “LADDER” concept could reform current means of access data use and representation. Having data on hand in such a convenient manner that also allows for instant pictorial representation is ground breaking for such departments and although initial outlays may be high, the time and resources saved in the longer term are significant.

Map 5.7 illustrates a decision making process that combines databases relating to "Approaches" of "Commercial Buildings" for three categories of disability "Wheelchair Users", "Mobility Impaired Users" and "Sensory Impaired Users". 31 of the 63 Commercial buildings (49%) had approaches that were accessible to wheelchair users, mobility impaired users and sensory impaired users. This query demonstrates how the "LADDER" concept could allow three disabled friends of varying abilities make decisions on services that could accommodate all their needs together. As there were over 10,000 elements in the database it would have been very difficult to view the results from such a specific query in text or a spreadsheet format in Excel or its associated graphic functions. Through thematic mapping it is clearly visible that approximately half of the "Commercial" buildings had accessible approaches to wheelchair users, mobility impaired users and those with sensory impairments. In practical terms it means that people within these categories of disability could approach a building without the hazard of objects projecting into their circulation route and they could enter through an accessible main entrance that had a level approach from the road/car park. It also meant that if there was a gradient it was as gentle as possible. The approach also would have had a clear unobstructed width of at least 1m, the surface was non slip, and there was not a level approach suitable ramps or steps were provided. There was an extremely high level of accessibility considering that it was a very specific query that covered all three categories of disability. This means that at the time of the audit a person who was either a wheelchair user or had a mobility impairment or was sensory impaired could have successfully approached 51% of all the participating "Commercial" buildings in the research area. If DOs were to employ such a system for displaying data they could develop a system whereby resources could be planned and organised such as the provision of care assistants for shopping trips. With some quick mapping of an area where a person with a disability intended on shopping, it could be easily established whether a care assistant was required for the journey or not, thus freeing up valuable resources when not required.

The next map (5.8) illustrates a query that combines the "Approaches and Entrances", sections of the access audit, all four categories of building type, and "Wheelchair users" from the categories of disability.

50 of the 119 buildings that participated in the audit had approaches and entrances that were accessible to wheelchair users. Therefore wheelchair users can approach and enter 42% of all categories of buildings in the pilot test area. This query shows that many elements can be combined and still communicate a high level of accessibility (42%) of the entrances and approaches to buildings in the area. This example clearly illustrated how thematic mapping could be used to highlight which of the buildings were inaccessible in this respect. A total of 58% of all the buildings did not allow wheelchair users to safely and independently approach and enter a building in the research area according to the measurement criteria of the access audit. As more determining factors to accessibility were added fewer buildings met with all the criteria. This identifies two potential uses. Firstly the concept assists in seeing the overall compliance of a building with the legislative requirement, Part M. Secondly, as the legislation moves from self-regulation to proactive enforcement the BCAs could successfully utilise this tool for quickly accessing data on the compliance of building stock with TGD specifications.

Map 5.9 depicts the combination of the access audit sections relating to “Sanitary Conveniences and Usage of Internal Facilities”, the building category “Recreation” and the disability category “Mobility Impaired Users”. Two buildings could meet the needs of a mobility-impaired user to use the toilet and access other internal facilities. It must however also be noted that 22 of these buildings did not have sanitary conveniences that may have given rise to the low positive result. This therefore indicated that eight recreation buildings had inaccessible features. This demonstrates how the “LADDER” concept can combine two access audit sections with one building category and a disability category as a decision making function. It also significantly highlights buildings without sanitary conveniences present. However some difficulties were found in representing the results. Recreation buildings that did not have sanitary accommodation also had to be represented on the map, as well as the other building categories, the non-participants and the accessible buildings. This made the map look somewhat crowded, but the required information was still clearly visible. This map illustrated that two of the recreation buildings that had sanitary accommodation had both accessible sanitary accommodation and internal use of facilities to mobility-impaired users.

Eight of the other recreation buildings had sanitary accommodation but they were not accessible even though the internal use of facilities may have been. The use of internal facilities covered overall design and fixtures and fittings. One quarter (25%) of premises was a poor overall result of accessibility. It is clear that as more determinants for access are added fewer positive results are achieved. The ability to be able to build on or add in criteria is of great advantage to DOs. Not all mobility-impaired users would have the same degree of limitation. Some may be in a position to negotiate an inaccessible circulation space but may need a fully accessible sanitary accommodation. The flexibility of the system allows a user to individualise maps based on their personal requirements. A person with a disability could request their organisation provide them with a map specific to them and their requirements on a particular day and with GIS an electronic or printed format may be provided.

The access audit sections relating to "Entrances, Sanitary Conveniences and Use of Facilities" were then combined with the building category "Recreation" and disability category "Wheelchair Users" in Map 5.10. Once again 22 of these buildings did not have sanitary conveniences present. This query demonstrates how three sections of the access audit can be combined with a category of building type and disability to provide useful information. It also shows the level of accessibility, where only one building had entrances, sanitary conveniences and usage of internal facilities accessible to wheelchair users (nine other buildings had inaccessible features). This query posed a similar problem to the previous thematic map as it can be again seen that not all of the buildings in the category "Recreation" had sanitary accommodation. The thematic maps did however clearly illustrate that only one of the recreation buildings that had sanitary accommodation was accessible to wheelchair users. This means that there is only one recreation building in the research area that had an accessible entrance, toilet and internal use of facilities. This is not a very encouraging result as the minimum a person with a disability would require is to get into a building use the fixtures and fittings allowed and use the sanitary conveniences. Such data is invaluable for a person with a disability. The identification of the apparent lack of such facilities in the research area would be of use for Building Control Officers to make conditions on future planning applications in the area to provide these facilities where they are clearly depicted as lacking.

Map 5.11 is another example of combining two sections of the access audit to demonstrate the "LADDER" concept, "External Steps and Ramps", one category of building type, "Education" and one category of disability "Mobility Impaired Users". The result was that one of the education buildings had accessible external steps and ramps to mobility-impaired users. Out of three education buildings one was accessible according to the defined criteria. In this situation all three buildings did have external steps and ramps present allowing this individual not only make a decision about the accessibility of the physical attributes, but the decision to enter educational services. This is a very specific query where the result of only one field gave a positive result. This could be clearly seen on the thematic map. This is a medium rate of accessibility for the query performed, as one third of the buildings had accessible steps and ramps to mobility-impaired users.

As mentioned all three buildings had steps and ramps. However the thematic map does not distinguish between buildings that may have had accessible steps and inaccessible ramps and vice versa. Accessible external steps to mobility-impaired users meant that all external steps had an unobstructed width of 1m. There was a rise less than 1.5m, a landing with a length of at least as great as the smallest width of the flight, the rise of each step was less than 150mm, the going of each step was less than 280mm, and tapered treads and nosings were not used. There was a continuous handrail at a height of between 840mm and 900mm above the pitch line of the flight of steps and extending 300mm beyond the first and last steps. Accessible ramps had similar requirements and also included a requirement for non-slip surfaces, gentle gradients, and a raised kerb of 75mm on both sides, and a landing 1.3m clear of door swing. Exclusion of people with disabilities from education is one of considerable social concern as it determines future career prospects and social integration.

If DOs were to conduct access audits on all third level education buildings according to the TGD to Part M and display results using thematic maps it would clearly demonstrate to government, parents and other interest groups where the inaccessible features lie and what could be done to improve access.

It would also be a means whereby different levels of access could be highlighted for example a college may not be wheelchair accessible but could be entirely accessible for a visually impaired individual.

Map 5.12 combined the access audit sections "Entrances, Sanitary Conveniences, Use of Facilities and Internal Circulation" with the building categories "Education and Business" and the disability category "Mobility Impaired Users". This demonstrated that twelve of the combined total of business and education buildings had accessible entrances, sanitary conveniences, use of facilities and internal circulation. This means that a mobility-impaired visitor to the pilot test area can access 12 buildings in the category of business and education in relation to accessible entrances, sanitary conveniences, use of facilities and internal circulation. This query demonstrates how three sections of the access audit can be combined with two building categories and one disability category to give a representation of accessibility in the pilot test area. This was one of the more complex queries. This thematic map questioned the database for many different determining factors. Due to the fact that this was such a large volume of data involved in the query all the desired attributes were not mapped, as it would have reduced the clarity of the map. For example it was not feasible to breakdown the "Yes (Accessible)" value and the "Buildings without Sanitary accommodation" values without deteriorating the quality of the map. Instead this example showed the breakdown of the two categories "Education" and "Business" for the negative result. The overall result was quite high considering the specific nature of the query. One half of all "Education and Business" buildings had accessible entrances, sanitary accommodation, use of internal facilities and internal circulation to mobility-impaired users.

This reduction in clarity as more complex queries are performed is a possible limitation of the process. By reducing the number of premises examined in the query the results would be more clearly legible. This limitation can be overcome by developing overall accessibility ratings based combining findings in the audit. In doing so however the accessibility rating has to be specific to a category of disability such as wheelchair user. DOs are in a strong position to carry out such ratings through combination of relevant facets of the TGD.

The final map displayed to demonstrate the "LADDER" concept (Map 5.13) combines the access audit sections "External steps, Ramps, Stairs, and Lift" with the "Education and Business" categories and the Mobility Impaired "User" category. One building in the two categories of building type was found to have accessible vertical circulation in the areas of external steps and ramps, stairs and lifts. This query demonstrates when four sections of the access audit are combined with two building categories and one disability category the accessibility for given features reduces, such negative results also assist the decision making process. Mobility-impaired users were chosen so often as a parameter as it provided the greatest amount of positive results and were therefore clearer for demonstration purposes. This query also provided the same difficulties as the previous query in relation to the clarity of the map. The apportionment of the building categories was shown on the thematic map to indicate that they may not have had all the criteria of the query present; for example, lifts may not have been present. This affected the clarity of the map. If the breakdown were required to examine, for example, the negative result, the query would need to be constructed in a different manner. With the current breakdown of results for this query it can be seen that only one of the combined recreation and education category of buildings were accessible in this respect. In overlaying this map to the original Categorisation Map 5.2 it can been seen that the accessible building was an education building. One education building had accessible external steps, ramps, stairs and lifts to mobility-impaired users. One building offered a very poor result considering that a total of 35 (including "Recreation" buildings) buildings were being reviewed. Such results are very clear, yet disappointing, and should be used in the revision of future Development Plans for the area to ensure that such levels of inaccessibility are not repeated. Overlaying of data in this manner will allow for BCAs to easily target the areas that require reform.

Although concepts like "Disabled Go" and "Direct Enquiries" (as mentioned in Chapter 4) provide people with disabilities with limited information on accessible features they do not provide information on inaccessible features that is of almost equal importance to people with disabilities. These internet based tools do not allow for detailed analysis of the combination of features or disabilities as is permitted the thematic map.

They also have no legal standing and use aspirational access criteria therefore no follow up action may be taken where problems are identified. Provision of data is often by self-assessment and voluntary so may not include unsatisfactory results or unacceptable services.

5.2.3.3 Summary

There were a total of thirteen “accessibility” maps produced to test the capabilities and demonstrate the output of the “LADDER” concept. The majority of examples addressed the needs of people with physical disabilities. This was mainly due to the fact that the audit was based around the TGD to Part M, which does not have many specific requirements for people with sensory disabilities. Throughout the demonstration of these maps many potential uses and advantages of the “LADDER” concept were identified such as assisting in monitoring and enforcement of legislation. There were many more queries possible, but as complexity of the queries increased, the number of results decreased, sometimes to zero indicating access levels present. Overall it was found that the levels of accessibility varied depending on measurement criteria. Thematic mapping could at times become complex depending on the amount of parameters that were included in each of the queries. However with careful planning of the queries the desired results could be clearly ascertained. Where fewer parameters were included more positive results were seen giving a clear indication of overall accessibility standards observed. A system of access rating was employed to observe an overall level of accessibility of all the buildings in the entire research area. This rating system was based on the overall percentage of buildings that were accessible based against the audit criteria. The results were then inputted into a rating scale ranging from “bad” to “excellent” levels of accessibility. Overall it was found that results on average fitted into the “medium to good” points in the access rating scale. Such a rating scale is useful in attaining summary/headline information on an area that has been audited.

Thematic maps created utilised the function of overlaying of attribute data. As the varying datasets produced from the access auditing using the TGD criteria were over-layed upon each other as each thematic/decision-making query was produced. For the “LADDER” concept to be optimised the results relating to each building needs to be integrated with other aspects of the urban environment including street access and public transport in order to create a seamless approach to accessibility for people with disabilities. At the time of research such datasets were unavailable.

This is unfortunate as it would have been very interesting if it were possible to overlay data such as accessible public transport onto the thematic maps produced in order to achieve an overall picture of independent accessibility. The thematic maps successfully illustrated a system of managing and presenting accessible and inaccessible environments using the TGD. If this was to be effective on a practical level some adjustments may need to be made. For example the buildings could be reduced down into more than four broad categories to make it more specific to a user. The TGD could also be broken down further to target just one type of disability or one specific criteria for access.

As was found from the interviews with building managers the frequency of visits by people with disabilities was high with over a third of buildings receiving daily visits. Only two percent said that they never received such visits, therefore almost all buildings in the research area received visits from people with disabilities and hence could have a strong market value in this demographic. Relating this back to CSO population figures (10% of people are disabled), approximately 1,500 people in the pilot study require that these buildings to be accessible to them, and without physically visiting them they have no way of telling if they can accommodate their needs, which vary greatly. From the interview results it was also found that 50% who visited the buildings in the research area had physical disabilities. A combined total of 19% had sensory impairments and one percent had learning/cognitive disabilities. This indicates that approximately 300 people visiting these buildings are not sufficiently accommodated by Part M. The main advantage of using thematic mapping for decision-making and communication of accessibility data is the visualisation of both accessible and inaccessible features in the built environment. The thematic maps created from specific queries reforms the use of access data by allowing the user to clearly see and interpret the resulting “live” data in “living maps”. Such data is not only of benefit to people with disabilities but could also be of use to those temporarily incapacitated (e.g. broken leg), those using buggies or those with restricted movement (e.g. heavily pregnant ladies).

More general benefits of GIS include the fact that it can store point, line and area features and store data in a readily accessible format that is conducive to further analysis such as linking to additional databases like transport lines. Further advantages are discussed in the next section 5.3.

5.3 GIS AS A COMMUNICATION AND DECISION-MAKING TOOL

5.3.1 Overview

As discussed in Chapter 3, one of the most important functions of a map is route planning and orientation. To find a route from one point to another without any prior cognitive imagery of the area is almost impossible without the use of a map. In Ireland there has been very little research carried out in relation to the joining of GIS with data on access for people with disabilities. Many have examined access on the broader social scale but few have scrutinised its actual implications in decision making for day-to-day living for people with disabilities. The social implications of the proposed "LADDER" concept are far reaching and will not just improve physical accessibility, but accessibility to services such as recreation and education.

The main barrier in Ireland to such a system is the availability of the two required datasets, electronic geographical information and accessibility information. Early GIS focused on natural resources and was expensive and complicated to use, making it inaccessible to individuals and smaller organisations. Fortunately personal computers have become inexpensive and GIS software has become more user-friendly meaning that those who chose to engage in the process do not require a firm foundation in geography or IT (Steinberg and Steinberg, 2006). The expansion of current electronic geographical data is ongoing in Ireland. This expansion is at a slow pace in comparison with European counterparts, although the popularity of satellite navigation systems has advanced this in recent years. These databases will develop in a manner that is easy to use, adapt and update, the only disadvantage being the cost involved. BCAs already have the expertise and necessary IT systems and support in place to commence communication of accessibility of information of their individual Local Authority services. Provision of accessibility information of these services has already been required under the Disability Discrimination Act 2005.

Therefore combing the two is a natural progression for communicating this information to the disabled community. Unfortunately data relating to disability access of non-state services is much more difficult to acquire, update and manage, especially in a consistent manner. As Steinberg and Steinberg (2006) identified, variability of data is a difficulty in time and space as data collected is representative of a moment in time and the difficulty arises in collating trends and obtaining closely linked "moments" to gain an ongoing representation.

DOs and their members who access the built environment on a daily basis are ideally placed to gather and update this data provided it is done in a structured coordinated approach that will provide a cross boundary, seamless and consistent indications of accessibility. Providing continuous linked "moments" as "live" information will enhance the decision-making and hence communication function of the "LADDER" concept. GIS combines information that appears on first examination to be unrelated allowing rapid communication, collaboration and decision-making transforming the manner in which needs of the user are serviced (Tomlinson, 2007).

The product of the proposed "LADDER" concept is clearly a map. As discussed in Chapter 3 mapping in Ireland at present takes little account of accessibility data except for the odd superficial symbol of a wheelchair accessible toilet. It could be felt by people with disabilities that this is all that is important to the able-bodied map creators who by a superficial mention have "dealt" with people with disabilities. People with disabilities will feel more valued and included in society if their needs are more accurately reflected. The map itself is a significant representation of how society views the needs of people with disabilities, if at all. Imrie and Edwards (2007) examined the relationship between identity and space and the use of the space each person individually occupies. They acknowledged how use of space has a major influence on the way that people feel not only about themselves but of how society feels about them. A person can go from feeling free and independent to feeling trapped and humiliated solely through the space in which they are interacting, much like the experience of the "Access for All" participants when taken out of familiar spaces.

As a research tool GIS provides a great range of opportunities for examining these relationships in space often incorporating additional information not normally considered. GIS has become more accessible to non-expert users and therefore it opens a wide range of new and interesting opportunities for its use (Steinberg and Steinberg, 2006). Taking the time to accurately gather detailed information on accessibility and map it specifically for individual users is a significant means of acknowledging the requirements of people with disabilities in a contemporary way. By drawing a map of an area and communicating to people with disabilities the facilities accessible to their individual needs in that area, it extends a hand of welcome to all who intend to use the space. It informs people with disabilities that they are seen the same as everyone else. They have been thought of and provided for in the same manner as able-bodied users. Even if in time, a built environment becomes fully accessible until such mapping becomes second nature people with disabilities will continue to be unable to make informed decisions and therefore feel socially excluded for the environment they live in.

Until maps are routinely generated taking into account the ever changing broad ranging needs for all users then so-called "political silences" shall continue to be reinforced. Whether a map is to be generated by a government body, a tourist organisation or a disability access group it will always, whether consciously or not, reflect the attitudes of those who plotted it. Producing a map of a city centre that does not for example, indicate locations of steps, marginalises people with disabilities to an extent where they cannot make independent decisions on a journey based on a map alone. People with disabilities are currently relying on word of mouth, previous experiences and a "lottery" system to make decisions on their daily and consequent social interactions. A person with a disability must be independently in a position to access up-to-date reliable accessible data in a user-friendly format so that they can live an active inclusive independent lifestyle. Paper maps and other electronic maps identified in this study cannot provide this possibility in a real time easy to use manner. Steinberg and Steinberg (2006), however, have identified how GIS has developed since the initial inception its use and capabilities have expanded over a wide variety of disciplines and applications in both public and private sectors.

Combination of the two identified sectors public (BCAs) and private (DOs) is the ideal scenario for the acceptance and progression of this "LADDER" concept. Until mapping seamlessly incorporates the needs of its entire population people with disabilities can neither feel welcome by society nor make informed independent choices on accessing basic services and society in general. Maps had become the authoritarian images that society used to reflect and represent the built environment it has created. Once this has been displayed in published text the map acquired an authority that is hard to adjust. Creating digital time specific "living" GIS maps with rather than for people with disabilities will revolutionise the dictatorial nature of the traditional authoritarian image. Vujakovic & Matthews (1994) described how "cartographic silences reinforce political silences". Such silences can be quashed by the presentation of "real" rather than subjective cognitive data in a manner that provides policy makers and stakeholders with a tool to build society a more accessible and inclusive future for all. These maps must be developed with people with disabilities and their individual experiences and needs and GIS is an excellent tool to facilitate such variances.

5.3.2 Possible Limitations identified through "LADDER" Testing

It is envisioned that linking accessibility data with key stakeholders and diverse disciplines such as engineers and geographers will provide an interlocking overlapping database that seamlessly represents the needs of an entire population. Provision of "living maps" that individually cater for everyone's needs could revolutionise how people interact in society. Through the testing and demonstration phase of the "LADDER" concept four issues have been identified that may however limit the acceptance and progression of the proposed system. The following sections aim to identify means of overcoming such limitations.

1. The first concern in relation to the widespread application of such a system is the acquiring and updating of the stock of accessibility data. DOs are ideally placed to develop and conduct access audits to acquire the required accessibility data. If these audits were designed around the TGD to Part M the ensuing data would be of valuable use by BCAs for both monitoring and enforcement.

The implementation of access audits and subsequent data organisation is labour intensive. Not only would the audits need to be carried out with great attention to detail, each audit would also require continuous updating to keep the "LADDER" concept "live" as the urban environment continues to change. The level of updating would be entirely dependent on available time and resources. Suggestions to reduce the need for updating could include publishing the thematic map on a web site and allowing people to post their comments on levels of accessibility experienced from a users perspective or how a feature may have changed since the date of the audit. It is not feasible that thematic mapping could be applied to an entire city. It is envisaged that the system should initially relate to urban centres or education campuses, areas where people with disabilities need to access to achieve social inclusion. In the area of educational campuses, students could be brought on board to help keep a system up to date. Urban centres are more difficult to manage. However the experiences of the general public who have disabilities or other difficulties in circulating the urban environment could be drawn upon to help update the system. Other groups such as vintners associations, chambers of commerce, restaurant associations and retail groups could also be targeted. However site specific areas such as shopping centres, leisure complexes and central business areas are ideal candidates for the system.

2. The second obstacle to the use of the "LADDER" concept in such a way is the lack of training and accessibility to the IT involved. It is envisaged that once the obstacles to obtaining and updating the access audit information have been overcome the data would be transferred to the BCAs for input into a GIS. It is acknowledged that this party would have different interests in this data than perhaps the DOs, but the initial organisation, input and manipulation of the data would greatly assist the progression of the system. Using the regulatory standard, Part M as the audit tool allows for a seamless consistent approach that allows the connection of accessibility datasets on regional and national scales. BCAs could then use the data in assessing compliance with Building Control Regulations, drafting of policies and action plans and reviewing of Development Plans. Although this mapping would be of use by the DOs, ancillary mapping of facets of direct relevance to each group would need to be carried out.

In order to achieve this the DOs would require training and resources in IT and GIS. The computer technology would need to be accessible and user friendly at the point of use within DOs. Methods of adapting the final user interface to support such users can be explored and options such as "view-only" maps that would allow the users to access select specific data move through that data and print information required. It is envisioned that basic interaction with the map would be via this user interface and would be accessed by the end user via a DOs website or stand alone intranet stations in public spaces. Such a system would allow for map overlay of the viewing of several maps at one time. More complex interfaces that require a high level of skill and user interaction would only be feasible through the provision of necessary training. In some DOs this may not be feasible and the interagency working between the DOs and the BCAs would be greatly enhanced through the provision of a designated Access Officer in each BCAs. The effectiveness of Access Officers is discussed in detail in Chapter 7.

3. The third impediment to the success of the "LADDER" concept may be the map itself. As the access audit produces an exponential volume of accessibility criteria the data must be reduced to a manageable level. The level at which the data is reduced is entirely depended on its end user and their reasons for accessing the data. For a map to be of value it must be clear and unambiguous, and with such detailed data this may only be carried out by developing overall accessibility ratings combining relevant results of data gathered. Church and Marston (2003) examined accessibility "measures" and they estimated access ratings or levels of access through an overall activity of a specific individual impairment. In doing so they began at a starting point and followed on to the multiple locations of activity, travel mode, distance and time. Their accessibility measure even took into account cost. The resulting equations proposed provided a mechanism for decision-making for people with disabilities for a "relative access" measure. Although an extremely valuable option, applying such a complex model to an accessibility rating in the context of thematic mapping would be implausible as firstly the mathematics involved would strongly discourage involvement of DOs and secondly the data generated would become too detailed and too technical to reduce it to a usable level.

Although block colour was chosen to represent overall access in this research it is possible to develop a system whereby symbols could represent access, for example the wheelchair symbol for wheelchair users and the ear symbol for hearing impaired. The use of symbols would however get very complex when mapping aspects such as gradient and door width. Qualitative and quantitative analysis must be carried out on the data and its proposed use. From this an overall accessibility rating can be decided upon reducing the data to a manageable mapping level. Handy and Niemeier (1997) determined access ratings through the examination of spatial distributions of potential destinations, the ease of reaching each destination and the magnitude, quantity and character of the activities found there. The accessibility rating must however also be based on the experiences of people with disabilities in accessing a building based on the audit criteria (in this case the TGD to Part M). It is only through the combination of these results and presenting them to a potential user, can an aspect be described as accessible or inaccessible or in some instances accessible with assistance. Sanitary accommodation is a good example of this. A person in a wheelchair may find that even if a toilet facility has all the necessary space required, without the relevant grab rails the space becomes inaccessible for them to use. Whereas a wheelchair user with limited leg use may be in a position to successfully use the facilities without the required grab rails. This indicates that the development of any accessibility rating must carefully bear in mind the often subjective requirements of the intended end user.

4. One final concern for the "LADDER" concept is the fact that people with visual impairments cannot see thematic maps generated in MapInfo. If however the system was combined to a system similar to the TACIS project (Appendix VI) where a braille version of thematic maps may be produced. Another limitation is that it may be difficult to use for people who may not have cognitive capacity to understand computers or people whose disability restricts them from using computers.

In summary, to gain an insight into the real status of people with disabilities, access audits must be carried out by specific DOs including those who represent people with sensory impairments. These DOs would also benefit from the results of audits by highlighting problem areas in attempt to have them resolved or improved. However, if data were to be transferred to BCAs in an effort to influence change at governmental level, some form of central co-ordination would be required to correlate data to a useable level.

Ireland has been slow in building electronic geographical data bases, with even satellite navigation systems still in their infancy. Building on geographical databases along side disability accessibility databases and improving accessibility to both is imperative to improving the availability and quality of accessibility data, thus reforming the current use of access data in Ireland. In doing so, access to the built environment will be greatly enhanced. However, this can only be successful if co-ordinated by an Access Officer interlinking the two parties. Communicating accessibility information via a thematic map as demonstrated by the proposed "LADDER" concept is an ideal mechanism to achieve this, as data can be over-layered with other datasets such as transport, community care services, tourism information etc. This could provide a seamless interconnecting information resource that provides a decision-making tool that could assist in the elimination of current barriers to independent accessibility and social integration. The "LADDER" concept could also be made easily accessible to all through publication on the internet or stand-alone intranet stations in public spaces. Such developments are not feasible using traditional cartography or electronic maps. Providing people with disabilities with continually updated accurate "live" accessibility information in a user-friendly format prior to their interaction with a built environment will greatly influence their perceptions of access. This may empower them by providing the confidence and knowledge required to live inclusively in society. This combined with the communication of inaccessibility information to the enforcement authority demonstrates the power of this "LADDER" concept in truly improving access on a practical scale.

5.4 IDENTIFIED ACCESSIBILITY LEVELS OF PILOT TEST AREA

The testing and demonstration of the "LADDER" concept identified varying levels of accessibility. These levels varied with the type of building categories, nature of disability and access audit criteria. Both positive and negative results assisted the decision-making process. Table 5.3 summarises results of thematic maps according to the accessibility rating system. Overall accessibility rated from "bad" to "excellent". This variable rate of accessibility indicated that the audit participants in the pilot test area did not prove to be very accessible from the parameters set, with the average rate observed being between "medium to good". As mentioned all building owners/managers were all afforded the opportunity to receive results and Access Action Plans however none of the 119 participants accepted this proposal.

Thematic Map Title		Access Rating	% of Participants
5.3	All Buildings that have Entrances that are accessible to Wheelchair Users	**Good**	**65%**
5.4	All Buildings that have Entrances that are accessible to Wheelchair Users and Mobility Impaired Users	**Good**	**50%**
5.5	Recreation Buildings that have Accessible Entrances to Wheelchair Users	**Medium**	**47%**
5.6	Business Buildings that have Accessible Internal Circulation to Mobility Impaired Users	**Good**	**71%**
5.7	Commercial Buildings that have Accessible Approaches to Wheelchair Users, Mobility Impaired Users and Sensory Impaired Users	**Good**	**51%**
5.8	All buildings that have Accessible Approaches and Entrances to Wheelchair Users	**Medium**	**42%**
5.9	Recreation Buildings that have Accessible Toilet and Use of Internal Facilities to Mobility Impaired Users	**Poor**	**25%**
5.10	Recreation Buildings that have Accessible Entrance, Toilets and Internal Use of Facilities to Wheelchair Users	**Bad**	**13%**
5.11	Education Buildings that have Accessible External Steps and Ramps to Mobility Impaired Users	**Poor**	**33%**
5.12	Education and Business Buildings that have Accessible Entrance, Toilets Use of Internal Facilities and Internal Circulation to Mobility Impaired Users	**Good**	**50%**
5.13	Education and Recreation Buildings that have Accessible External Steps, Ramps, Stairs and Lifts to Mobility Impaired Users	**Bad**	**3%**

0% to 19%: Bad 50% to 79%: Good 20% to 39%: Poor
80% to 90%: Very Good 40% to 49%: Medium 90% to 100%: Excellent

Table 5.3 Accessibility Rating from Thematic Maps

The initial survey of the building owners/managers indicated that Part M applied to 43% of buildings in the research area as they had been either built or had made a material alteration of the property since the introduction of Part M. The average result of "medium to good" (i.e. between 40% to 79% of features accessible) indicates that many buildings were meeting with Part M requirements. Through closer examination of individual buildings it was found that 88% of the buildings that received higher accessibility ratings were in fact those that Part M applied to. This demonstrates the significant role legislation plays in improving access standards.

5.5 "LADDER" EVALUATION THROUGH FOLLOW-UP SURVEY AND END USER NARRATIVES

5.5.1 Introduction

Once "LADDER" testing was complete evaluation was conducted in two ways. Firstly each of the BCAs and DOs who responded to the first questionnaire were issued with a follow up questionnaire. This questionnaire was devised after the interpretation of the survey results, as it was found that respondents did not fully understand the implications of the proposed "LADDER" concept. The follow up contained just one question relating to their opinion on the benefits of this research upon seeing a practical demonstration. Secondly the "LADDER" concept was also demonstrated "live" to two people with disabilities to gain an insight into their opinions on the "LADDER" concept from an end user perspective.

5.5.2 Results of follow up Questionnaire

From the 17 responses of the first questionnaire, 17 follow up questionnaires were issued to the BCAs. Of these 16 were returned. This was an excellent response rate of 94% compared to the initial response rate of 62%. Of the 16 responses received 100% agreed that this is a beneficial tool for storing manipulating and displaying accessibility data for people with disabilities. From the 35 responses received from DOs of the first questionnaire, 35 follow up questionnaires were issued. Of these 28 were returned. This was an 80% response rate again higher than the original survey (70%). This highlights the effectiveness of issuing short concise questionnaires.

Of the 25 successful responses 100% agreed that the "LADDER" concept is a successful tool for decision-making and communication of accessibility data for people with disabilities. The cover letter and questionnaire are in Appendix IX. This question related to the benefits of the "LADDER" concept was posed at three stages firstly when the BCAs and the DOs were surveyed. Secondly the Building Owners/Managers were asked about it during the access auditing phase of their premises and finally the BCAs and the DOs were re-questioned about it again in a follow up questionnaire.

Response Groups	Effective	Not Effective	Don't Know
Initial Building Control Authorities Questionnaire	14	2	1
Initial Disability Organisations Questionnaire	12%	76%	6%
Building Owners from pre-Access Audit Interviews	**91%**	6%	3%
Building Control Authorities Follow Up Survey	**16**	0	0
Disability Organisations Follow Up Survey	**100%**	0	0

Table 5.4 Summary of Responses relating to the Effectiveness of "LADDER"

5.5.3 End User Narratives

In order to get a more practical insight into the opinions on the "LADDER" concept proposed end users were approached to experience a demonstration of the "LADDER" concept. These end users were selected from the "Access for All" programme who had also assisted in the foundation of the design of the access audit and the "LADDER" concept. Both Subject A and Subject B were shown the decision-making functions of the proposed "LADDER" concept and asked to express their feedback and opinions on how useful this would be in their daily activities in accessing services individual to their needs. These users were asked to provide an activity they required a location for and the query was demonstrated for them on the PC. The transcribed narratives are as follows;

Narrative 1: Subject A an individual with a mobility impairment that limits the use of her left leg and left arm. Subject A walks with the use of a walking stick. She posed the query of how to access a cinema that had no steps and an accessible toilet.

"I have used a computer before for the internet and email so I thought I knew how to use them but seeing all the different information for the map flashing up so quickly on the computer frightened me a little. When all the complicated typing was finished and the map was on the screen on its own it made it really clear as to where I could find the cinema. By placing the mouse over the cinema I also got lots of information about the inside of the cinema including the toilet, stairs and lifts. If I was going to a new area and was looking to go somewhere I hadn't been before it would be great to get this information first. But I don't know if I could handle making the map from scratch I am not that good on computers".

Narrative 2: Subject B an individual confined to a wheelchair with upper body strength that allows manual propulsion. He posed the query of how to have a night out that included a wheelchair accessible, bar, nightclub and restaurant.

"I like to go out at the weekends and usually go to the same place every week. I have been going there since I was 18 and now feel much older than the other customers. I feel that I don't go to many other places because I don't know how accessible they will be or what the people will be like. I love gadgets and even use the internet on my phone so if I could get information on other places to go I might try them. The computer showed me one hotel that had everything I needed under one roof and it also told me if it was accessible to blind people (my cousin is partially blind). It would be better if it would tell me if there was an accessible bus stop nearby as I would not bring the car if I was out. If this was on the internet I would use it but I would like if someone else maybe emailed me the map or it was a bit easier to use".

To understand the implications of disability the individual must be considered and understood, and come to the forefront on every deliberation of the issue. Credible disability research must be carried out with the close involvement of the target group, people with disabilities. End user testing aimed to achieve two objectives, firstly did the user understand the "LADDER" concept and secondly did it complete the required task. From examination of both narratives it is clear that the "LADDER" concept met these objectives. However some adjustment would be required to allow the "LADDER" concept become more user friendly. From Subject A it was found that she is an older participant with little IT experience. She would prefer a system whereby the information was provided directly to her rather than her having to seek it out. Provision of information to her could be in the form of a continually updated register of accessible premises sent to her. If this were to be provided by DOs that she is affiliated to then they could customise the output individual to her needs.

Subject B on the other hand was far more computer literate and was very interested in how the map was generated. A user with such IT skills could theoretically apply the "LADDER" concept themselves. Developing the "LADDER" concept to the extent where it could be downloaded as an application for a mobile device such as an "I phone" would be of great interest to users like Subject B. Other "LADDER" access points such as the internet or stand alone information points would also assist decision-making for users proficient in computing. Subject B's observation of the "LADDER" concept not being combined with transport links is very valid, and for such a system to become a seamless interaction with the built environment such databases should and potentially could be over-layed onto the thematic map. However currently this data is not available in the required format.

5.5.4 Summary

Initial feedback on the perceived benefits of the "LADDER" concept was optimistic. When the system was described in the initial questionnaire there was little interest with 76% of DOs feeling it was not going to be effective in communicating accessibility. However when these and other key stakeholders where shown a printed version of the final output of the "LADDER" concept interest dramatically increased with almost all of the 161 of those queried agreeing that it is an effective mechanism for communicating access information. The very high response rate identified the benefits of using simplistic visual questionnaires to achieve a rapid, decisive response. Although the approach to identifying this information was simplistic it was determined that some of the key stakeholders may have not understood what GIS is or may have perceived the mapping concept using GIS as being complicated, therefore in attempt not to overload the user with information a very simplistic questionnaire was issued. The radical difference in responses through the provision of a map identifies the value of visual information in communicating data in an innovative and attractive manner. It was also determined that end user's opinions should be obtained to evaluate the "LADDER" concept from a user perspective. By demonstrating capabilities to Subject A and Subject B some interesting advantages and disadvantages of the "LADDER" concept were noted for example the usability for non computer literate users and the lack of interaction with other datasets such as transport.

5.5.5 Other Aspects for Consideration

Although the testing, demonstration and evaluation of the proposed "LADDER" concept was found to be successful with more benefits than shortcomings identified, there are other issues that require consideration. Is this approach to the provision of access information the right one? Providing credible up to date access information was identified as the key to empowering people with disabilities improve their status in society. Past experience, word or mouth, surveys and access guides are all vehicles for providing this information. However none of them meet all the criteria necessary for the provision of individual empowerment. Combining detailed technical auditing with a mechanism for handling and interpreting data provides a user-friendly visually pleasing tool for providing access to such information. But is this option commercially viable, do the key stakeholders have the resources to use the system to its full potential? Through the surveys it was identified that the BCAs have both the expertise and IT requirements to handle the data. What they lack is manpower. DOs neither have the training or the finance to fund the expensive IT element of the process. However they do have a wealth of experience and time to conduct detailed audits. Combining the strengths of these groups could result in a dynamic partnership that could deliver a service that could dramatically alter the status of people with disabilities.

Although no commercially viable on an individual level of a single organisation, an inter-agency approach though an interlinking Access Officer could make its viability extremely attractive. It must be also considered whether users, both the key stakeholder and the ultimate end user, would accept the system. From surveys of the key stakeholders, it was clearly evident that they have a keen interest in promoting access and already are endeavoring to assist in this respect. However this is often through an ad hoc disjointed approach that has many inconsistencies. Data collected is not being used to its full potential. Adoption of a standard operating procedure that interlinks seamlessly both regionally and nationally in a relatively simplistic manner must prove an attractive practical option for those with a true interest in promoting change.

End users such as individuals with disabilities will perhaps find the system difficult to comprehend initially, due to the previously unconsidered element of visually representing the data in a map. However, as was seen in the end user evaluation once the main features have been described the effort required to contemplate the system's potentials far outweighs the benefits received. Once the data have been collected and organised by those with the necessary expertise, a user-friendly system would be place that provides easy access to up-to-date accessibility information.

The alternatives to the "LADDER" concept were considered in Appendix VI such as access guides and although many offer attractive user-friendly systems none of them encompass the multitude of advantages the proposed "LADDER" concept offers. The empowerment of the individual in decision-making using "live maps" is an obvious advantage. However the shared seamless interagency approach to collecting and communicating this information in a consistent flexible manner provides not only for improved regulatory enforcement and identification of user's needs it also provides a credible mechanism for advancing the access agenda and ultimately improving the overall status of people with disabilities in society.

The next section Route Mapping proposes some considerations as to how the "LADDER" concept could be further developed to create an even more seamless approach to providing access information to urban environments.

5.6 ROUTE MAPPING

5.6.1 Introduction

From the outset of this research a decision was made to try to advance the use of the "LADDER" concept beyond just communicating accessibility data to individual buildings. As stated by Ollie (1997) over a decade ago "A city is only as accessible as its weakest link". This still holds true today and all aspects of a built environment must be considered, as people with disabilities need to use the circulatory space of the streets surrounding these buildings to gain access to them. In order for a seamless approach to be made to mapping access, the accessibility of circulation routes in the pilot study area next to individual buildings were taken into consideration in a similar manner. A decision was therefore made to develop and investigate a process of Route Mapping to assess and present the accessibility of streets and footpaths in the circulation space surrounding the pilot test area. Aligning this information with the accessibility of buildings would allow a user make decisions in a more complete manner, obtaining the information to allow travel through an entire area or streetscape that could meet their defined needs.

The measurements pertaining to footpath width were however taken from the approach section of the TGD to Part M and combined with other subjective parameters (outside the scope of Part M) to examine overall accessibility. Data was obtained during the access audit relating to the footpaths adjacent to the buildings of the pilot test area. This data was used to test the feasibility of Route Mapping in two ways. Firstly the entire pilot test area was mapped using three features from the data that was collected. These features were footpath width, obstacles on the route of travel and surface conditions. Secondly a selected section of the pilot test area was examined to greater levels of detail using similar parameters. Accessibility in both areas was examined in relation to wheelchair users and mobility impaired users only. The needs of those with sensory impairments were not taken into account. This examination took a number of subjective matters into account. Subjective matters can greatly influence the accessibility of a footpath for mobility restricted users and these are not incorporated in the TGD to Part M. These issues were identified from interaction with "Access for All" participants.

Subjective parameters assessed and identified included loose gravel, poorly laid cobblestones, slippery surfaces, head clearance, poor drainage (slippery footpaths), cyclists using paths, kerbs not dipped, poor lighting, overgrown vegetation, paths sloping sideways, poor cleaning (rubbish, dog fouling etc), poor roadwork maintenance (signage, rough surfaces, holes), mobile structures e.g. wheelie bins, benches, poorly parked cars. Permanent structures were also taken into consideration including lamp-posts, bus stops, dust bins, man-hole covers, pedestrian lights, parking meters and bollards. It was originally perceived that such obstacles could have been thematically mapped using symbols in MapInfo. Symbols would have been an excellent pictorial manner to present accessibility data. However, this unfortunately proved too intricate when working in such a small detailed area and resulted in the data being unclear and ineffectual. A mapping process similar to the access audit was then adopted to illustrate the accessibility of "regions" of routes.

5.6.2 Expansion of "LADDER" to "Route Mapping"

The maps are broken into two types, those of the entire pilot test area and those of a selected sample section. The purpose of this was to firstly examine an entire circulation space for overall levels of common accessibility and to secondly to examine one specific section of the pilot test area for more detailed or subjective measures of access. The entire circulation route of the pilot test area was randomly broken down for examination purposes into 59 100m sections or "zones" of footpath. For the purpose of this research a zone is defined as; "A physical region of space of approximately 100m in distance". 100m was chosen as during the "Access for All" experience it was found that this was the average distance a person with a disability travelled from their vehicle to access a service. The entire pilot test area was firstly mapped according to footpath width as set out by the TGD to Part M and this is depicted in Map 5.14. From this it can be seen that 54 zones of the 59 zones had footpath widths that would allow circulation by people with mobility impairments and people who use wheelchairs not taking obstacles or impediments into account. The second Map 5.15 illustrates the overall footpath accessibility taking obstacles found in this section of street of the pilot test area into account. Obstacles that were taken into account included hoardings, dustbins, bus stops, railings, lamp-posts, and dishings.

From this illustration it can be seen, using thematic shading, that 39 of the 59 zones of the route were accessible in this respect. The third map 5.16 illustrates the accessibility of this section of the pilot test area when obstacles and overall surface conditions are taken into account. This map illustrates that 29 of the 59 sections of the route were accessible when footpath width, obstacles and surface conditions are taken into consideration for those with physical disabilities.

These first three maps, summarised the overall accessibility of the circulatory space of the entire research area. This process illustrated that of the entire 59 zones in this area only five zones had inaccessible widths. This is a very important result as theoretically 85% of the pedestrian circulation routes of the entire research area had enough space to allow for accessible routes of travel for people with disabilities. DOs could utilise such as system for providing their members with baseline information on what streets could be suitable for wheelchair access in their area and then lobby their LA to improve the areas that are not.

Map 5.17 illustrates the area that was chosen for more detailed examination of the possibilities of route mapping. The selected section contained twelve footpath sections or zones of the entire pilot test area. Four destination points, A, B ,C, and D were appointed to the map to create a potential route of travel. A was a parking bay, B was an atm, C was a newsagent and D was a doctor's surgery. These points were selected to simulate a typical scenario of a person with a disability accessing such services. The sections were examined individually in respect of accessibility of footpath width and the effects of obstacles and surface conditions on accessibility. The first query performed on this data related to the accessibility of the footpath width of this selected route. From Map 5.18 it can be seen that all twelve sections of the selected route were accessible in terms of footpath width. Theoretically a person in a wheelchair or who has a mobility impairment could travel from point A to B (car to atm) and from B to C (atm to newsagent) and C to D (newsagent to doctor's surgery). This map did not however take obstacles or surface conditions into account. The next thematic map Map 5.19 further expanded the mapping of footpath widths in zone one to zone twelve inclusively by displaying a graduated breakdown of the footpath widths. From this Map it can be seen that each zone falls between 2,010mm and 4,990mm all of which are above the recommended limit of 1,200mm. Map 5.20 is the first map to take obstacles in the route of travel into account. The obstacle that was taken into account in this instance was dishings. It can be seen from this map that two of the twelve zones of the selected route had dishings that were inaccessible to wheelchair or mobility impaired users. Therefore if they wished to travel from point A to point B (car to atm), they would be impeded in zone five.

A similar scenario exists if they tried to travel the route B to C (atm to newsagent), where zone seven has inaccessible dishings. The next map, Map 5.21 adds lamp-posts to the criteria to be examined. The same two zones, five and seven were highlighted as being inaccessible. It was not possible to differentiate which if either of these two zones contained lamp-posts that restricted the route of travel. It was still possible to decipher that taking the route from A to B and B to C would lead to impediments to accessibility meaning that the person with a disability may not be in a position to complete the journey.

These maps demonstrate that taking obstacles and surface conditions into account, the level of accessibility was greatly reduced. In the worse case scenario when both obstacles and surface conditions were taken into account almost 50% of the entire research area was inaccessible for wheelchair and mobility-impaired users. It must be noted as was with the access audit of the buildings, that these results would change with the natural changes within the circulation routes. Therefore the database would need constant updating to be of significant value. A limitation of this process is that if the audit were implemented at another time of the day or year, the same degrees of accessibility may not have been observed. Transient issues such as parked cars, vegetation, rubbish etc. could all materially affect the levels of accessibility of an area. Local Authorities could however develop a system to routinely monitor or audit their areas for such issues so that preventative plans can be implemented.

When an individual section of twelve zones was examined in closer detail in relation to width, obstacles and surface conditions a similar pattern to the entire research area was found (maps 5.18 to 5.25). For example when bus stops were added to the list of accessibility criteria it can be clearly seen in Map 5.22 that zones nine and three had bus stops that impeded the route of travel. In this case, not only are zones five and seven inaccessible, now zones three and nine are also inaccessible in this respect. Therefore travelling from point A to B or B to C or C to D is not possible taking these obstacles into account. Map 5.23 adds hoardings and railings to list of potential obstructions. Now the accessibility of footpath width, dishings, lamp-posts, bus stops, hoardings and railings are all being taken into account. From this it can be seen in Map 5.23 that zone eight and eleven have been added to the number of inaccessible routes of travel. At this point there are no options for accessible mobility between points A to B, B to C, and C to D. This indicates that a person with a disability could not carry out a basic task of leaving their car to go to an atm, and on to a newsagent and then on to a doctor surgery without encountering significant difficulty. Map 5.24 adds dust bins and phone boxes, to list of potential obstructions. From the illustration it is clear that zone eight and eleven and potentially the zones that were previously deemed accessible had some of these obstacles present which made the route inaccessible to wheelchair or mobility impaired users.

This makes travelling between any of the designated points impossible without encountering impediments to access. The final map then takes surface conditions as well as all the previously mentioned obstacles and footpath width into consideration for accessibility of the route of travel between zone one and zone twelve. From Map 5.25 it is seen that out of the twelve zones only five remaining zones are accessible according to the criteria set down. On the addition of extra accessibility determining criteria, many of which were subjective, the levels of accessibility significantly reduced to the point where it was not possible for a person with a disability to independently travel between any of the four points A to D. Such representations could greatly assist DOs in lobbying to promote and improve levels of actual accessibility in their local areas. Although some of the criteria could be debated, such as a large pothole rendering a route inaccessible, such presentations would provide a valuable insight into the difficulties faced by people with disabilities who are trying to independently access services and society on a daily basis. If such data were made easily accessible to people with disabilities they would be in a position to plan their journey in advance. This could prevent a loss of independence due to inaccessible features present, alternative destinations or routes of travel could be selected.

The process of Route Mapping did not evolve as initially envisioned. The presentations of the final maps were not as visually attractive as envisioned as it was found that the use of symbols in the mapping process did not produce clear user-friendly maps. However the system was found to be an effective means of managing and analysing the data to extract overall levels of accessibility information of external circulation spaces for access for people with disabilities. The theme could be developed for an entire urban centre if a more practical access rating system was developed and applied to the accessibility data to reduce it to a more practical and manageable level. Route Mapping could only be fully effective if it formed part of a seamless approach to mapping access for people with disabilities by incorporating other data relating to buildings, travel and other services intertwined. Such representations of accessibility data would provide a valuable "real-time" insight into the difficulties faced by people with disabilities.

These individuals are trying to independently access services and society on a daily basis and this system may assist key stakeholders in progressing the evolution of access to the point where it becomes the norm.

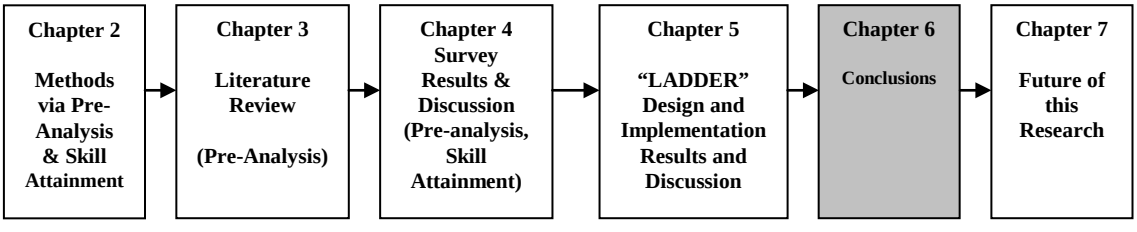
5.6.3 Summary of Route Mapping

Overall the Route Mapping process demonstrated two interesting findings. Firstly the levels of accessibility diminished significantly when extra accessibility determining criteria are included. Secondly that this process of mapping a route of travel illustrates where inaccessible features lie and how far along a route a person with a disability may travel without being impeded. People with disabilities must be provided with the information to empower them to plan a route of travel without be impeded en route. The "LADDER" concept aims to provide such solutions not only with physical but also social relevance. Enabling people with disabilities make informed decisions on buildings that they wish to access, via routes they wish to travel, presents a bespoke system of decision-making corresponding to their individual needs. This in turn generates independence. The acceptance of this process combined with the thematic mapping of buildings and even transport links through an interdisciplinary collaboration by DOs and BCAs could revolutionise the status of people with disabilities and their right to live independently in their communities.

5.7 SUMMARY

The survey of the owners of buildings provided a valuable insight into their interaction with people with disabilities and what they believe are the requirements for accessibility and the issues that are restricting them in fulfilling their full potential in this respect. Design and implementation of the access audit collected a large amount of accessibility data relating to a typical urban landscape while also evaluating the legislation on access. Thematic mapping in GIS was then carried out to test the decision-making and communication element of the "LADDER" concept. Outcomes generated resulted from the design and development of a multi-dimensional methodology that encompassed the individual, the disability and the built environment.

The "LADDER" concept was also evaluated post testing and this was carried out in two ways. Firstly by providing a demonstration using a visual example to the key stakeholders and building owners. This provided a very positive reaction with all respondents agreeing it was a good concept. Secondly potential end users with disabilities were shown a practical demonstration of the "LADDER" concept and although they both agreed it was a good concept they had some initial reservations. The design, development and examination of the "LADDER" concept generated many interesting and encouraging findings. Amalgamating each factor of the methodology in a logical manner and evaluating the "LADDER" concept through targeted groups created a bespoke decision-making and communication tool that was developed further into the area of route mapping in order to investigate additional potential of such a system. As described by Duncan (2007) for areas where full accessibility has not been achieved the communication of available accessibility data can be seen as an important progressive step towards achieving universal design. The "LADDER" concept proposed in this research goes a long way to making such an aim achievable. Chapter 6 highlights conclusions of this research and Chapter 7 identifies future considerations for this research.



6.1 INTRODUCTION

A significant gap in service provision for people with disabilities in Ireland exists whereby they are unable to access, in a user-friendly manner, concise up-to-date information on accessibility of built environments they intend to visit. This is necessary in order to decide and plan daily activities and live as independently as possibly in society. The research question posed was; could a system be developed to efficiently collect and communicate accessibility information in a sophisticated, user-friendly manner? This research's primary aim intended to bridge this gap in service provision by developing the "LADDER" concept:

> **"a tool to collect and communicate "live" accessibility information for people with disabilities to empower them in independent decision-making for daily activity planning".**

The conceptual framework underpinning this aim lay in the design of "LADDER" or **L**ive **A**ccessibility **D**atabase for **D**isability **E**mpowerment and **R**eform. This concept aims to "elevate" the status of people with disabilities by providing them with reliable up-to-date accessibility information. This will not only empower people with disabilities to live independently but will also reform current accessibility data collection and communication procedures to the benefit of all people with disabilities in accessing the built environment. "LADDER" is aimed at both people with disabilities and key stakeholders who have an influence over the status of people with disabilities, such as regulatory bodies and organisations representing the needs of people with disabilities. This chapter presents the conclusions identified following the implementation of this framework. In the investigation of this primary aim, a primary conclusion will be presented. This chapter will also examine more detailed summary conclusions based on the primary aim and the three associated objectives and conclusions drawn from specific areas of research.

6.2 CONCLUSIONS

6.2.1 Primary Conclusion

Participation in the "Access for All" programme identified a very important aspect to accessibility. When people with disabilities were presented with unfamiliar built environments, inaccessibility of information relating to access options severely decreased their independence to the point where they no longer participated.

Providing accurate up-to-date accessibility information in a user-friendly manner as demonstrated by "LADDER" matches the skills of a person with a disability to the built environment they intend to visit, thus generating empowerment critical to independent living. The "LADDER" concept that was designed, developed, tested, evaluated and built upon was found to be an efficient data collection and communication system for assisting people with disabilities in making independent decisions on daily activities in unfamiliar built environments using live data. "LADDER" was also identified as a valuable tool for supporting key stakeholders such as Disability Organisations and Building Control Authorities in monitoring, enforcing, promoting and improving accessibility. It was found that their previous collection and reporting of access information was unsatisfactory. The "LADDER" concept collected valuable accurate live data, condensed this data to a manageable yet meaningful level and presented it in a user-friendly manner with much potential. This concept provides a much needed response to the research question posed.

However, for the "LADDER" concept to achieve its full potential on physical and social scales it would require sympathetic implementation through a collaborative, supportive approach between the key stakeholders. Combining their skill sets and experience by working together through a shared Access Officer would achieve this aim. It was also found that Ireland has finally in place a framework of equal status and anti-discrimination legislation along side strong Building Control legislation. This combined with many significant government strategies outlined indicates that never was there a more opportune moment to accept and develop such an innovative holistic approach.

6.2.2 Secondary Conclusions

An understanding of the foundations of the individual, the disability and the built environment, upon which this research lies, combined with the requirements of people with disabilities (empowerment for independent living) and key stakeholders (enforcement and promotion of access) supports the conceptual framework of this research. The investigation of the primary aim was supported by examination of three secondary objectives. This section summarises specific conclusions and how they were determined following investigation of these secondary objectives.

The subsequent section then provides more detailed conclusions based on the individual methodologies applied. The primary aim and secondary objectives were investigated through a multi-dimensional approach to the design of the conceptual framework. This multi-dimensional design was vital, as each of the pre-requisites to providing access (the individual, the disability, the built environment) were considered, examined and addressed in the design and implementation of the methodology. This framework incorporated the following methodologies;

Part 1 Pre-Analysis and Skill Attainment

- Literature Review
- Participation in "Access for All" Programme
- Survey of Building Control Authorities
- Survey of Disability Organisations

Part 2 Design and Implementation of "LADDER"

- Interviews of Building Owners/Managers
- Data Collection through Access Auditing
- Data Communication through Thematic Mapping in GIS
- "LADDER" Evaluation through End User Testing and Follow Up Surveys
- Route Mapping

The following summary conclusions are drawn from the application of each of these methodologies in the investigation of the three secondary objectives of this research. The first of the three objectives aimed to;

> **"gain an insight into the interaction of people with disabilities with the built environment by working, lecturing, living and travelling with of group of people with varying disabilities".**

This objective was investigated using three elements of the conceptual framework, firstly the examination of associated literature, secondly participation in the "Access for All" programme and thirdly the survey of Disability Organisations. The following significant conclusions were drawn from the implementation of these methodologies;

- Identifying, examining and building upon the three fundamental requirements for improving access; the individual, the disability and the built environment provided an essential framework to research the identified objectives, design the methodology and implement and interpret the results. Adopting this holistic approach and developing the ethos of the proposed "Supportive" model of disability that effectively and intrinsically intertwines the three factors for determining access, provides many solutions. Adopting this radical philosophy enriched the subsequent multi-dimensional, inter-agency approach to the design and implementation of the "LADDER" concept.

- The review of literature identified gaps and themes requiring further examination, one such theme was models of disability. Examination of models of disability allowed for the consideration of previously unconsidered viewpoints. It allowed for the identification of Building Control Authorities' subscription to the medical model and Disability Organisations' subscription to the social model. Both parties should adopt the proposed "Supportive" model (which it appears Disability Organisations are now slowly moving towards). This holistic model eliminates bias and reflects universal design principles. This combined with working together in close collaboration using a system like "LADDER" could greatly enhance the status of people with disabilities.

- The research spanned a ten year timeframe and from an examination of available literature on the defined subject areas it was found that the core areas of disability, access auditing and GIS were rapidly developing in the nineteen nineties. Interest peaked in these areas in the late nineteen nineties and since then, especially in the areas of models of disability, universal design and access auditing momentum has slowed considerably with few new perspectives in Irish literature evident. It is concluded that this was possibly due to a movement within the legislature and lobbyists away from structural access requirements towards populous anti-discrimination and equal opportunities legislation and strategies developing since this time.

- It was identified through participation in "Access for All" that independent living is a basic human right for people with disabilities that can be made possible through empowerment.

Empowerment is a critical element of this research, and it was identified that it can be realised through freedom of choice that relies on the collection and communication of accurate up-to-date accessibility information. The "LADDER" concept is an excellent method to collect and communicate access information to facilitate a decision-making process that assists such empowerment essential for independent living.

- The use of participatory research by interacting with, learning from, and consulting with people with disabilities both individually, and as part of formal organisations, enhanced the understanding of the subject matter, design of the methodology and the credibility of outcomes. The attainment of skills such as Disability Awareness, Sign Language, First Aid, Care Assistance, Manual Handling and Presentation techniques enhanced this element of research. Such skills assisted in gaining of trust of individual participants and understanding the interlinking dynamics of the individual and the disability.

- The "Access for All" experience identified a loss of independence in people with disabilities when they were presented with unfamiliar environments. People who normally lived independently in their own communities suddenly became disempowered in unfamiliar environments. Accessibility options became a lottery due to lack of access information. This reinforced the motive for this research and reiterated the gap in service provision. The "LADDER" concept designed can reform current means of data collection and communication in Ireland and restore the independence such individuals lose in unfamiliar places.

The second of the three objectives identified aimed to;

"investigate the opinions of key stakeholders into the barriers to the provision of access, the statutory requirement for access and access information for people with disabilities".

It was identified from an early stage that if the "LADDER" concept were to be a success in collecting and communicating access information, then it would require acceptance by key stakeholders who endeavour to improve access for people with disabilities. It was therefore important to gain an insight into their opinions, as this assisted the credible design and implementation of the "LADDER" concept.

Such experts are familiar with the barriers to access, the statutory requirements for access and how access solutions can be achieved. From the implementation of the survey methodology the following summary conclusions are drawn.

- The surveys of the Building Control Authorities and Disability Organisations were concluded to be a worthwhile source of information into the reasons current levels of access exist and how they may be improved. Revisiting the survey following a time where significant advancements were made in legislative and policy provisions added considerable value to the findings of both surveys. A key finding remains that they each group collects valuable access data but neither utilise this data in meaningful or user-friendly formats to improve access and hence the status of people with disabilities.

- The surveys of the Building Control Authorities indicated that their has been little or no acceptance of best practice or universal design strategies by designers or legislature, and the best option still available is to promote optimum compliance with Part M in the spirit in which it was made. Building Control Authorities have embraced training, access auditing and are proficient in GIS, but they are not using data they possess to its full potential. Subscribing to the "LADDER" concept based on accepted regulatory standards could radically reform, improve and standardise the collection, communication, monitoring and enforcement of access requirements, to the point where regional and national comparisons and recommendations can be made in a consistent manner. The "LADDER" concept was found to have strong capabilities for identifying inaccessible features, thus highlighting breaches in legislation that could be of great benefit for Building Control Authorities in monitoring and enforcement.

- The surveys of Disability Organisations indicated that a lack of training and finance are still major barriers to them realising their full potential in their promotion of accessible environments. Their relationships have improved with Building Control Authorities but not with other similar groups. They have progressed in the area of access auditing but not IT.

If they adopted a more unified approach with other groups representing all types of disability using a standardised computerised approach such as the auditing function of the "LADDER" concept they would have a means of seamlessly representing access data for their area. Linking their experiences of existing built environments with Building Control Authorities' training, proficiency and experience of new built environments through a shared Access Officer could reform current data collection and communication methods in a manner beneficial to all parties. The "LADDER" concept provides intricate detail relating to accessibility criteria for individual types of disability. If utilised by Disability Organisations, through a collaborative approach with other like-minded organisations, this could greatly improve the status of people with disabilities in Ireland, especially at this opportune moment where legislative and strategic policies are finally in place.

- Combination of the responses of Building Control Authorities and Disability Organisations in the same geographical area provided some interesting outcomes. It is concluded that areas that responded were those with greater populations. These groups clearly have higher instances and experiences of people with disabilities and catering for their needs. These areas also demonstrated a more acute awareness of the requirements of Part M and had higher instances of enforcement action. The combination of this information may give an insight into how "LADDER" could be accepted and governed. Building Control Authorities and Disability Organisations in Dun Laoghaire/Rathdown continued to present similar attitudes and positions in relation to disability and access. This is therefore suggested as the most suitable area where the "LADDER" concept could be initially tested.

The third and final objective aimed to;

"design, develop and test a systematic access auditing package and decision-making tool based around Part M of the Building Regulations, the statutory requirement for access for people with disabilities to the built environment".

Access auditing was determined to be a vital component to the collection of reliable, accurate accessibility data. GIS was identified as a feasible solution for effective decision-making and data communication. Therefore both aspects required detailed examination. Criteria chosen in the design of the audit mirrored the legislative requirement and therefore also required more detailed assessment. This objective was investigated using five elements of the conceptual framework that included; Interviewing of Building Owners/Managers, Data Collection through Access Auditing, Data Communication through Thematic Mapping, "LADDER" evaluation through End User Testing and Follow Up Surveys and finally Route Mapping as a development of the theory.

- The approach to the methodological design through a progression from pre-analysis and skill attainment to design and implementation allowed for a multi-dimensional pragmatic, systematic approach to the investigation of the research aim. This not only provided a coherent progression and development of the research, but also provided for the attainment of skills and knowledge that will enhance any future research or further development of the "LADDER" concept.

- Interviews of building owners/managers in the pilot study area provided a valuable insight into the market value of people with disabilities accessing their services. People with disabilities regularly availed of services they provide. However, many feared the identification of inaccessible features in their premises might provide negative publicity and effect business. However, this concern was short lived as none of the building owners/managers availed of the opportunity of receiving an Access Action Plan to improve access. It is concluded that unless required by law, service providers were unwilling to invest in improving accessibility options for people with disabilities.

- Universal design has, as yet, not been widely accepted in Ireland and many designers still rely on designing for compliance with minimum requirements of Part M rather than other more progressive theorems. Therefore after careful consideration, Part M was accepted as the framework for designing the access audit.

Universal design mirrors the principles of the proposed "Supportive" approach to disability, linking the individual, the disability and the built environment. This will ultimately improve independent living.

- The collation and provision of access information was identified as an important element of universal design and the acceptance of the proposed "LADDER" concept is an interim solution to acknowledging universal design and progressing the universal design agenda in Ireland. Any future acceptance of universal design in Ireland can easily be transposed into the "LADDER" concept.

- The use of access auditing in the design of the "LADDER" concept was found to be the optimum method of collecting and organising access data. It facilitated the collection of large amounts of detailed, accurate accessibility data in a user-friendly manner. It was concluded that universal design has not yet been accepted in the design industry in Ireland and therefore by incorporating the regulatory standard (TGD of Part M) into the auditing tool a nationally acceptable, cross regional, seamless concept beneficial to designers, legislature and lobbyists can be realised. Although shortcomings in the requirements of the TGD were identified it is concluded that the application and monitoring of its current provisions, if carried out in the spirit of the law it was intended, would provide people with certain disabilities with an adequate level of independent access as defined by the regulations.

- Achieving a Certificate of Competence in Accessibility Auditing greatly assisted in the understanding of elements of the built environment that effect access. This skill attained also influenced other aspects of the methodology as many valuable connections were made through fellow students many of whom worked in Building Control. These contacts assisted the design and implementation of access audit criteria and survey questionnaires. In light of completion of this research it is however noted that this course would greatly benefit from the involvement of people with disabilities especially in the identification and auditing of subjective matters impinging on access such as those identified in Route Mapping.

- The use of thematic mapping in GIS for analysis, decision-making and communication of access audit results proved to be a valuable tool that produced user-friendly visual displays of data in the form of living maps. This not only assists key stakeholders in identifying, monitoring and improving access, but also empowers people with disabilities in activity planning and making decisions in their daily lives, using accurate up-to-date data. This will reform current inefficient methods of data collection and communication. It was however concluded that users would require some level of proficiency in IT in creating the maps. However, very little skill is required to read or understand the maps. People with disabilities must however, be in a position to trust maps generated as it places their independence in the hands of those who generate them. Utilising the multi-faceted design of "LADDER" combined with the suggested interagency approach using a shared Access Officer would assist in generating such trust.

- Through the demonstration of the "LADDER" concept in the pilot study area it was found that a "medium to good" (i.e. between 40% to 79% of features accessible) rating of accessibility was calculated. This provides a valuable, flexible, dataset of information that if made available to people with disabilities in an easily accessible, timely manner, could greatly empower their independence and integration within society. This rating also highlights that much work must be done by the key stakeholders to improve access and increase this rating to a much more acceptable scale in order to improve the current status of people with disabilities. It was also interesting to find that the buildings that received higher accessibility ratings were in fact those that Part M applied to. This important finding identifies the significant role legislation plays in improving access.

- The evaluation of the "LADDER" concept using both potential end-users and follow up surveys was concluded to be a worthwhile exercise. Demonstration of live mapping to people with disabilities highlighted difficulties that such users may have. However, the proposed system of governance and communication (presented in Chapter 7) developed as a result of issues identified will alleviate such difficulties.

Presentation of an output of the "LADDER" concept in a follow up survey of key stakeholders, although simplistic, proved fruitful. Preliminary surveys had highlighted a lack of understanding of the potential of GIS in the area of access. Presentation of actual visual depictions of access, upon which this theory lies, generated huge interest with the majority of respondents feeling it was a worthwhile concept. Such positive interest (following initial reservations) assisted in the development of the potential mode of implementation and governance of the system.

- The expansion of the "LADDER" concept into the area of Route Mapping was found to be a valuable progression of the research as it extended beyond the regulatory requirement into the examination of subjective matters that also effect access. Examination of circulatory access data was a natural progression in providing a unified system of data communication. To facilitate a seamless approach to accessing the entire built environment the "LADDER" concept must be amalgamated not only with circulatory route access information, but other datasets such as transport, to allow for the combination and overlay of limitless accessibility options. Unfortunately such data is currently unavailable in relating to the research area examined and mapped in this research.

6.3 CONCLUSIONS ON SPECIFIC AREAS OF RESEARCH

6.3.1 Use of Participatory Research

The reason for deciding to participate in the "Access for All" programme was to gain an insight into the daily interaction of people with disabilities with the built environment by working, lecturing, living and travelling with them. Apart from the key finding of participants being disempowered due to lack of access information in unfamiliar environments, some other interesting conclusions were also drawn. The involvement in this programme far exceeded any preconceived objectives resulting in an experience that allowed for an active participatory involvement in the lives, (twenty four hours a day, seven days a week over a three month period) of a group of people with wide ranging abilities. It both separated and combined the individual and the disability, an approach that is essential in examining accessibility.

Incorporating this component into the methodology not only enhanced the design of the "LADDER" concept but also allowed for participatory research by using the opinions of this group in the design of the access audit, surveys, "LADDER" design and the practical evaluation by potential end-users. Just as the "Access for All" programme empowered participants to advocate for improved access in their communities, it is hoped the "LADDER" concept will empower people with disabilities and key stakeholders to reform access information provision to assist independent living. Although at times there was the potential to get very involved and almost lose a sense of bias, it is concluded that the levels of knowledge and understanding acquired during this time were unattainable from any published text and provided a backbone the investigation of this research assisting an understanding of the fundamental requirements for improving access; the individual, the disability and the built environment.

The involvement of Disability Organisations and their members who had disabilities as part of participatory research was also concluded to be of great assistance to the research. Although they were not directly involved in physical fieldwork of the pilot study area their opinions and experiences greatly influenced the evaluation and progression of the "LADDER" concept. Their identification of weaknesses in Part M and its enforcement combined with their opinions on barriers to accessibility and to their achievement of their full potential, focussed the research on how "LADDER" could evolve, be applied and accepted by key stakeholders on a practical level.

6.3.2 Survey of Building Control Authorities

Surveys of Building Control Authorities and Disability Organisations were conducted in 1999 and again in 2010 to achieve an understanding on how access has progressed in light of significant legislative and policy reform. The first time the survey was administered was just one year after the introduction of Part M. The second survey was however, implemented ten years after a subsequent revision to Part M. This ensured that key stakeholders were more familiar with the provisions and implications of the legislation. This methodology realised a greater significance to the queries initially posed. It is concluded that Building Control Authorities are the only group who have the power to legally, as well as physically, improve physical access for people with disabilities.

It became evident, however, that they are bound under the strict provisions of regulatory standards that do not embrace best practice or universal design. It is, therefore, felt that the proposed "LADDER" concept designed around this standard rather than an aspirational design guide, is an ideal tool to assist not only in their monitoring and enforcement of Part M, but in the communication of the data they hold on accessibility. Access auditing and GIS and training in these areas has been greatly accepted by Building Control Authorities over the last decade, validating the importance they have placed on these areas. This also is an indication that they are now in a position to embrace a concept such as "LADDER". They have collated a large amount of accessibility data in an ad-hoc inconsistent manner that once collected often remains in hardcopy or database format for the sole use of their department. The potentials for the communication of valuable access information are being lost. Building Control Authorities need to reform current modes of data collection and communication using a concept such as "LADDER". Such datasets are updated regularly making the potential to retain a live system very realistic, yet currently unachievable. Although two examples were found to be using the internet to provide some limited access information none incorporated their GIS skills to expand the detail of information provided.

Building Control Authorities unfortunately do not have regulatory power over existing buildings and therefore need to link with Disability Organisations who are already actively auditing these environments. Interagency working is the key to improved access. The relationship must be based on a formal approach with both sides utilising the same "LADDER" concept and submitting access data through a shared Access Officer so that a holistic seamless depiction of an area can be achieved, maintained and effectively communicated to people with disabilities both locally and nationally. The mode of governance and communication of this system provides the solution to the unification of these parties and therefore must be carefully considered. A proposal in this respect is outlined in Chapter 7.

It was found that over the decade subsequent to the initial survey, Building Control Authorities still subscribe to the medical model of disability, whereby they will ensure ramps are provided for wheelchairs rather than accepting the more progressive "Supportive" approach of universal design.

Such a finding has significant implications for addressing access issues both at local and national levels. Subscription to such a prescriptive model shackles a Building Control Authority into use of minimum design criteria and perhaps is the reason for the lack of acceptance of universal design in Ireland. They need to promote universal design and best practice as they are currently still adhering to basic minimum standards. In fact, many Building Control Authorities still use the TGD as their sole reference material. They also need to stress the importance of universal design to government especially at a time where Part M is up for significant revision. However, neither of these improvements will be realised until they adopt a more "Supportive" approach and actively assess who in their communities have a disability, what type of disability they have and how their enforcement of legislative provisions can improve their status. None of this is being carried out at present. There was still much confusion as to their roles and responsibilities, although it was clear that communication of access information was not one of them. Part M is still not perceived as a significant priority for them and survey results identify that elements relating to Health and Safety and Fire Safety take up the majority of their resources. Many Building Control Authorities indicated that this is due to the perceived fear of bodily harm and significant repercussions if such provisions were not enforced stringently. Consequently promoting compliance with basic minimum requirements of Part M are muted as the most efficient use of limited resources allocated to this "non-life threatening" area.

If Building Control Authorities collect their information in a formal approach like adopting the proposed "LADDER" concept as a standard operating procedure, not only will they improve access in the longer term they will also provide a mechanism whereby people with disabilities can make independent choices in the interim. Continued failure of Building Control Authorities to act consistently or publish detailed access information they collect, or to adhere to agreed standard operating procedures for inspection and enforcement, damages their credibility in acting in the true interests of those they represent.

It is clear that valuable relationships have been formed with Disability Organisations in their areas; these relationships were not good in 1999 and took a long time to develop.

It is therefore disappointing to see these relationships being damaged by industrial action. Building Control Authorities should apply for a derogation to resume such voluntary relationships and develop them in a more formalised approach by joining local organisations together through the assistance of their Access Officer, in order to offer a formalised unified approach to improving access and communicating access information in their area.

Although Building Control Authorities are progressive in making statements in their Development Plans pertaining to promoting universal access it is clear that universal access is not being incorporated in designs in Ireland. Although some have moved beyond the Development Plan towards more innovative schemes it appears to be an ad-hoc approach that is often as stated "aspirational". Little advice or information is provided on the requirements of, or promoting compliance with Part M let alone universal design. Although Part M is the current regulatory requirement, Ireland must move beyond this and begin to actively promote universal design on a formalised approach. This must span university tuition, legislative provisions, enforcement bodies, voluntary organisations and media campaigns. The current disjointed "lip-service" approach to universal design has left Ireland an identical position to over a decade ago. Once considered the norm, universal design principles could easily be transposed into the "LADDER" concept and enable this system to achieve its full potential of communicating access information for all.

Unfortunately, even in its revised state, for the time being, Part M remains. Therefore, Building Control Authorities must maximise its current potential for achieving access, although they are still equally divided in their opinions as to its effectiveness. Although Part M operates by a process of self-regulation many Building Control Authorities were actively monitoring development for compliance, however, not consistently or in sufficient detail. Most felt that if adequate provision was provided in the spirit it was intended then it would be a successful provision. The long awaited Disability Access Certificate is welcomed by nearly all Building Control Authorities with many already having granted such certificates.

Although this system was perceived as self-certification the willingness of nearly all Building Control Authorities to still (in theory) favour active mandatory monitoring for the requirements of Part M, (albeit at the rather late site construction phase), is welcomed as it reiterates their commitment to the standard. Some have even increased their target inspection rate from the required 10%-15% to greater than 20% of all new developments, although there is no data available data to confirm this. The proposed "LADDER" concept is timely; it would easily assist them in continuing this trend of increased inspection rates. It is strongly recommended that all Building Control Authorities strive to exceed the targets that have remained unchanged in seventeen years. It is unacceptable that 85% to 90% of all new developments still go uninspected for Part M compliance and the trade off between the rates of inspection versus available resources must be addressed. Availability of data relating to enforcement action was found to be unsatisfactory with little or no data specific to Part M available. There was however, some limited specific information available in relation to appeals available to An Bord Pleanala. A figure of 3 appeals since the introduction of Part M appears low. Greater attention must be paid to providing accurate statistical data on enforcement and the attachment of conditions to planning applications in relation to Part M.

Building Control Authorities should endeavour to stringently use their powers to ensure developers are meeting their legal obligations and place as much importance on the Disability Access Certificate as is traditionally placed on Fire Certificates. For example if the certificate is not applied then the premises cannot open or be utilised, this would quickly raise the profile of the importance of accessibility. It is also concluded that to fully understand the requirements of the TGD to Part M an access audit on each aspect of the TGD should be carried out bearing all people with disabilities in mind. Otherwise, it is difficult to draw assumptions on its sufficiency. All Building Control Authorities should be required to do this prior to making submissions to the current proposed amendment.

However, increased levels of enforcement observed coupled with their keen interest on making submissions on the new draft Part M indicate that there has been a recognisable shift to capitalise on the provisions in place in attempt to improve access.

Enforcement action can be initiated up to five years from the date of completion of a development. This allows Building Control Authorities to use the "LADDER" concept retrospectively to assess such developments for compliance if post-construction accessibility issues are subsequently identified. The results of which could form a strong basis for legal proceedings. However, many still feel that Part M will remain a system based on goodwill for best practice. Building Control can never move towards universal design unless government provides a seamless link to planning legislation alongside adequate resources, training and staffing to promote access.

One notable comment from the 2010 survey was that if Building Control Officers find themselves in court they may have failed in their duty to communicate educate and advise those they provide a service. Although perhaps an overly harsh perception it highlights the importance of the role of communication in promoting access whether it be at developer or end user stages. Communication has been identified as fundamental to improving access and access options and although Building Control Authorities still do not communicate information they have. A decade on, nearly all feel that the proposed "LADDER" concept is a beneficial tool for communicating accessibility information. However, it was felt that some would not be in a position to develop such a methodology due to the lack of time and resources for collection of the data (access auditing) especially in the case of existing developments.

It is concluded that Building Control Authorities are ideally positioned to promote accessibility through interdepartmental (planning departments) and interagency (Disability Organisations) collaboration and through more stringent promotion and enforcement of their powers. Application of the "LADDER" concept to plans, new developments and developments up to five years old would greatly assist not only their monitoring and enforcement, but would also provide an information source that could improve of access options for all. Using such information as part of Development Plans, training, annual reports, report writing, access guides, warning notices, enforcement orders and prosecutions would all assist in promoting access and highlighting inadequacies in the current planning and building control systems.

"LADDER" would provide a mechanism for the recording of standardised statistical information both locally and nationally relating to the nature of inspection, issue of DACs, enforcement and prosecution. This is currently absent in the sector.

6.3.3 Survey of Disability Organisations

Disability Organisations were identified as the linchpin to providing comprehensive information on access to people with all types of disabilities. Not only do they actively measure access of current building stock, they also represent and advocate for the needs of a wide range of people with disabilities. However a key finding of this research was that Disability Organisations, more than ten years on, still lack the necessary training and finance that could enable them to achieve their full potential in improving the status of their members in society.

Almost all agreed that the similar barriers to access are still evident with ignorance remaining the greatest barrier. To overcome this many Disability Organisations have remained active in providing an advisory service to key stakeholders. They also actively participate in assessing new developments and advise developers and service providers on the requirements for access. Unfortunately similar barriers to their success in providing services beyond this that were evident in the nineteen nineties remain today. Disability Organisations were also found to have a disjointed, ad hoc inconsistent approach to data collection and communication. Access data was handled very poorly with much of the data collected lost in hardcopy file format. An approach that has remained since most of them were formed in the early nineteen nineties. They have received little or no training and they have no defined tools or standards that they base measurement upon. Advice given is still often based on aspirational rather than achievable standards. This system makes any data collected virtually useless for the purpose of conveying consistent and reliable live information on built environments in their area. To retain credibility Disability Organisations must source and allocate resources for ongoing training and development so that any research that they carry out or any advice they provide is perceived as valuable. This continued lack of resources remains a key barrier to the fulfilment of their potential in improving status for people with disabilities.

Disability Organisations are access auditing both their new and existing built environments. However, their continued reliance on hard copy files to store this data means there has been little or no progression in improving communication of such accessibility of information to their members. Disability Organisations' lack of training and development in the area of IT is inhibiting them in providing a more sophisticated use of the information they have gathered. The provision of specific training in this area could greatly advance both their effectiveness and integrity. It is recommended that in order to realise the full benefits of the "LADDER" concept training in the use of GIS is a prerequisite.

It is concluded that Disability Organisations are ideally placed to collect and update accessibility data using the access auditing element of the proposed "LADDER" concept for both new and current building stock. Once training is received they could move towards actively mapping this data to a GIS. This will both assist the promotion of improved accessibility criteria and the provision of accessibility data for people with disabilities in their community. Disability Organisations could also successfully utilise "LADDER" for a wide range of activities to promote access including planning care assistant placement, local tourism, education, recreation and personal mapping plans. The current lack of availability of local, up-to-date access guides remains a major problem and the potentials for "LADDER" in tourism are boundless. Disability Organisations must move towards more sophisticated methods of data collection, storage and communication if they are to be taken seriously by the legislature and if they are to improve the status of their members. Adopting a formal approach such as the auditing function of the proposed "LADDER" concept offers a standardised tool that will not only highlight breaches in the legislation, but will also provide a source of both accessibility and inaccessibility information on a standardised national scale that will assist their members to live independently.

Disability Organisations have progressed in a number of areas such as representation of their members on issues of equal status and anti-discrimination. This reflects their ability to adapt as new legislation is introduced. This however, may account for a lower than expected response rate to the survey, as access to the built environment may have been reprioritised.

Most however, do still have an active interest in improving physical accessibility and have developed important relationships with Building Control Authorities, planners and developers with some having these professions now present on their committees. These are vital relationships to the improvement of access as they can reflect the direct experiences of their members to those who have significant power to influence change. It was found that a more positive outlook is now felt for these relationships and more trust has built between the groups, especially in light of the dramatic improvement of the accessibility of Local Authority premises. Unfortunately as previously mentioned these relationships are in danger of collapse if current industrial action is not relaxed. Relationships with other Disability Organisations have unfortunately yet to develop as successfully with many groups operating in isolation. It is recommended that Disability Organisations within the same Local Authority area should pool resources and experience in order to seamlessly represent needs of all types of disabilities. By forming a local area access committee they could represent a larger more varied group of people covering a broader geographical area. Each organisation operating independently will not provide the all-inclusive approach required. The continued under-representation of those with sensory or intellectual disabilities in built environments and in law is clear evidence of this.

Disability Organisations have also kept up-to-date on the progression of Part M and many made submissions on the current proposed draft. Many feel the current revision will be ineffective especially in its provision for those with sensory disabilities and the continued reliance on the term “adequate provision”. Disability Organisations must be more vocal in their submissions on this legislation and clearly publicise their evident dissatisfaction on the minimum compliance, self-certification system based on adequate provision. However, many of their own buildings are still inaccessible and people with disabilities are still under represented in their workplaces. Such premises must be made accessible and this must be a priority for Disability Organisations who cannot be seen to discriminate against those they represent. Some Disability Organisations lost credibility in this respect and many were even unsure if their premises were accessible or what the requirements were. It is concluded that Disability Organisations offer a much-needed service in providing advocacy services for their members. They are actively measuring and effecting change of built environments in their areas.

In doing so they have amassed a significant amount of valuable information that if utilised to its full potential could improve social inclusion and integration of those they represent. Access audits however are "snap-shots". The built environment is fluid and will alter in its lifetime and Disability Organisations are in the optimum position to review and update audits on an ongoing basis to highlight both improvements and deteriorations. Acceptance of a formal system of data collection such as the access auditing function of "LADDER" in conjunction with other disability organisations would allow a seamless representation of accessibility information in their area that lends itself to ease of updating. Disability Organisations could further promote accessibility beyond the current unsatisfactory legislative requirements by further breaking down the access audit based on Part M into separate audits based on different disabilities.

By taking the TGD criteria and auditing it for access for a person for example with a visual impairment (using the actual experience of the visually impaired person) the audit results would clearly highlight the inefficiencies of the TGD along side what is needed to create efficient access. Feeding such information back to the relevant Building Control Authority and other key stakeholders could further promote the improvement of the accessibility of the built environment. Such information could be linked inter-county providing a standardised national picture that once based on the regulatory standard could provide a realistic catalyst for action. It could also provide a tool for changes at local level through the provision of Access Action Plans to service providers willing to improve access. However, the most significant development would be for Disability Organisations to reform their current modes of data collection and communication. Communication of accessibility information direct to their members will provide them with choice and assist them in their daily independent decision-making, a process currently based on luck. The implications of which are far reaching on personal, social and political scales. Combining this with their long-term goal of influencing amendments to Part M towards universal access could truly create an environment more accessible to for all.

6.3.4 Part M of the Building Regulations

6.3.4.1 TGD of Part M as a Tool for Access Auditing

It is only through measuring and identifying inaccessibility that access can be improved in current and future building stock. The main conclusion on the use of the design criteria of the TGD as an auditing tool element of the "LADDER" concept was that it is the only viable option that would be readily accepted by both the design and construction industry and enforcement officers that will realistically assist the progression of the status of people with disabilities in Ireland within the current legislative framework. It was found from this research that designers use the TGD's minimum criteria for formulating their plans and demonstrating compliance rather than universal design criteria. Although Ireland is now suitably equipped with anti-discrimination and equality legislation to underpin building legislation the minimum criteria in the TGD are still currently perceived as optimum. By adopting the TGD as audit criteria not only does it assist in monitoring and enforcement it also provides a uniform national approach that will communicate levels of access in a consistent manner throughout the country. This will allow the data from the "LADDER" concept to be connected at inter-county boundaries seamlessly.

It is also concluded that the TGD to Part M was a sufficient source of measurement criteria for the purposes of demonstrating the access audit element of the "LADDER" concept. The TGD follows a very logical, pragmatic route from external approach, steps, ramps and access to internal circulation, lifts, stairs and use of facilities to hotel/guest bedrooms, sanitary conveniences and audience spectator facilities. The design of the TGD allows conversion into an auditing tool with relative ease making it straightforward and user-friendly for both Disability Organisations and Building Control Authorities. This provides a measured assessment of the accessibility of a building along side its compliance with current legal requirements.

However, it is also concluded that inefficiencies were found in the TGD for providing effective independent access to all people with disabilities. Survey respondents commented the TGD was often confusing, has a poor layout and should provide clearer guidance.

There is little reference to circulatory access of streets and footpaths and it does not sufficiently address the needs of those with sensory, medical and psychological limitations. They also noted the need for more concise accessible design curricula in the education of architects/designers. Although the TGD provides a measured assessment of a building and its compliance with current legal requirements, it does not give a true insight into the overall accessibility of a building for all people with disabilities. It was felt that even through examination of the current draft revision, as a stand-alone document, Part M could not succeed in providing independent access for all. The standard aims to achieve "adequate access" and if the standard was fully applied in the spirit in which it was intended, rather than mere minimum compliance, then adequate accessibility could possibly be achieved. Adequate is not however deemed enough to empower independent living. "Adequate" permits minimum levels of access that do not take into account personal difference, comfort and subjective issues such as building management or weather conditions.

6.3.4.2 Promotion of Part M to Improve Access

From this research it is concluded that despite inadequacies identified, requirements of the TGD to Part M were not being successfully promoted through Building Control Authorities, Disability Organisations and the commercial/public sector. It they were adopted in the spirit they were intended then higher than "medium to good" levels of access would have been identified in the access audit. This could be due to lack of resources, training and in some cases understanding as to the requirements of Part M. A number of proposals such as education, design competitions and interagency collaboration were made in this research that may assist in addressing the inadequacies outlined relating to Part M and its associated TGD. For these proposals to be successful there must be a seamless interagency approach to their review and future implementation. The current proposed amendment of Part M would only be of benefit if it were implemented through close collaboration with all key stakeholders including Disability Organisations. Phrases like "reasonable" and "practicable" have resulted in the poor access standards evident today. The revision must be less ambiguous and ideally should replace the term "adequate" with "access and use of all areas independently" if true empowerment is to be realised.

Legislative amendments must incorporate changes to the Local Government Planning and Development Acts for a seamless approach to be possible. More detailed proposals are outlined in Appendix III.

It is concluded that strategies must be put in place like building blocks with a firm foundation in forward thinking legislation. The proposed revision of the TGD to Part M can only be of benefit to people with disabilities if legislation is enacted to also address access to the circulatory environment of streets, footpaths and transport systems. All of these areas must be to the fore of Local Authority Development Plans rather than mere "lip-service" or aspirational reference. Reference to universal design in Development Plans must also be reviewed as to effectiveness, application and implementation across Local Authority areas. Amendment of building control and planning legislation also requires a strong penal system to encourage compliance with legal requirements. The proposed self-certification system (DAC) is welcomed however the limited rate of monitoring and site inspection is by no means an effective system of enforcement. Observations from survey respondents that the DAC has not embraced the principles of universal design must be taken on board. Even if Ireland gets to a point where designers embrace universal design, they must do so in a manner that also meets legislative demands. The introduction of universal design into law in the Disability Act 2005 and the creation of the Centre for Excellence in Universal Design, although in their infancy, will no doubt enhance the potentials of the "LADDER" concept.

Co-operation between departments in Local Authorities is critical, and Part M must be considered at the earliest stages of all developments. Relationships with Local Authorities and disability organisations must be strengthened. Collaboration between developers and designers with Local Authorities needs to be encouraged. The formation and development of these relationships can effectively be facilitated by the presence of a full time designated Access Officer in each Local Authority area. It is concluded that the solution to unification is the interagency cooperation and liaison of key stakeholders. This is the only means to tangibly improve access for all and Chapter 7 identifies how this unification can be achieved as well as examining the potential role for access officers and possibilities for improving enforcement and compliance of Part M.

6.3.5 Data Collection and Communication Component of "LADDER"

6.3.5.1 Access Auditing for Data Collection

Access Auditing was concluded to be an excellent tool for assessing accessibility and collecting access data for people with disabilities. The access audit is a measured assessment against pre-determined criteria. Therefore, it can be designed as diverse or as simplistic as the auditor prescribes. Once the audit criteria have been selected and the auditor has acquired the necessary skills, it is straightforward to assess any environment for accessibility for any level of disability. Although clear precise standards of access of each individual factor audited can be identified, it has however, traditionally been difficult to give an overall accessibility rating for a building or circulation route for more than one type of disability. One inaccessible feature could render an entire building inaccessible to certain disabilities. For example if a restaurant is located up a number of steps yet has accessible toilets the entire building could be deemed inaccessible to a wheelchair user, although it is accessible to an ambulatory user. The "LADDER" concept is excellent in overcoming such difficulties, allowing each element to be individually represented, or not, depending on the circumstances or data required. Accessibility rating systems were also developed in this research that allowed overall representations of access to a building to be portrayed. However sometimes such ratings by their nature may become subjective and dependent on the type of disability involved. Although this is a possible limitation to a broad ranging audit, the results of the audit clearly identify individual barriers to accessibility that can then be remedied through either physical alteration or freedom of choice through prior knowledge of the user.

The audit conducted in this research attempted to demonstrate the use of wide ranging audit criteria on access while also evaluating the legislation. It is concluded that the result of the auditing process in this research was efficient in attaining the required level of detail of accessibility information to demonstrate the "LADDER" concept. This also highlighted accessibility levels of the pilot study area and deficiencies in the legislation. It was found that over three-quarters of the premises targeted for the audit agreed to participate in the research that shows an initial willingness on the behalf of these sectors to become actively involved in accessibility issues.

However, none of the 119 participants availed of the optional provision of advice, results or a detailed Access Action Plan questioning their true interest in the subject area. Not withstanding its difficulties, it is concluded that the access audit is the most thorough and accurate means of obtaining detailed accessibility information and assessing the built environment for access. This process can only be successful if the administrator has clear and concise objectives, suitable training in access auditing and designs accurate audit criteria customised to the commissioner's/individual's needs.

6.3.5.2 GIS for Decision Making and Data Communication

It was identified early in research that maps may be perceived as authoritarian images due to the perceived bias of the creator. Although thematic maps could theoretically still be prone to such bias it is envisioned that by utilising the suggested collaborative "Supportive" model approach combining the experiences of key stakeholders, and the multi-dimensional approach to the methodology, that such bias could be practically eliminated. Displaying access data using the "LADDER" concept overcomes the traditional authoritarian approach. Although upon initial examination the concept may appear to be a refined thematic mapping approach, the conceptual framework of the multi-faceted design of "LADDER" generates a unique, bespoke, flexible system. This system not only combines the individual the disability and the built environment, it also links these pre-requisites to a system of governance and communication with key stakeholders following the "Supportive" model approach. The interlocking dynamics of these interactions links data collection successfully with data communication dispelling the once authoritarian image of the map.

Data collected from the access audits involved the use of 105 audit criteria against 119 buildings for three categories of disability. This resulted in an extremely large body of data and highlighted the difficulties in meaningfully interpreting, managing or presenting such data especially in tabular, graph or hard copy format. The "LADDER" concept has the power to simplify as well as clarify the representation of such data. It is therefore concluded that managing and presenting the results of the access audit was very successful using thematic mapping in GIS.

Although only a limited number of maps were presented as a demonstration of the "LADDER" concept, it is possible to create an exponential amount of maps depending on the motivation for their generation. This indicates the potentials of the system in illustrating the accessibility or inaccessibility of many features including circulatory access. The maps that were created from this research were effective in clearly showing both the accessible and inaccessible features of buildings in the research area. Maps also indicated clear breaches in compliance with requirements of Part M.

Many examples were also given throughout the discussion as to how Disability Organisations and Building Control Authorities could use thematic maps for collecting, managing, and communicating their data to promote accessibility. Therefore it is concluded that both parties would find "LADDER" a valuable tool for their professions that would reform how they currently collect and communicate access data. However as Disability Organisations were found to have a lack of funding and skills to develop in this area of IT, the optimum approach would be if they were to work in tandem with their local Building Control Authority who although have the necessary skills and IT do not have the staff or time to maintain and update audit data. Chapter 7 outlines how this dynamic could work.

In addressing the overall aim of this research it was found that one of the key benefits in the use of GIS provided a decision-making structure for people with disabilities to attain bespoke information on accessible/inaccessible features in their area and hence empower them to live independently. Future development of the "LADDER" concept could theoretically provide users with access to live information at home, on the internet, on a mobile phone or at stand alone information points in areas such as shopping centres. The diversity and flexibility of GIS means it has the potential to be received by industries such as tourism, transport or education to expand information provision for people with disabilities. Thus allowing them to decide their own route in life rather than those predetermined by outdated hardcopy access guides or word of mouth. Provision of reliable information is the key to empowerment and independence. As mentioned, it was found from the access audit that levels of access rated from "medium to good".

People with disabilities could not be aware of such levels of accessibility apart from physically visiting the premises or trusting word of mouth. The collection of accessibility data and the presentation of this data using the "LADDER" concept may remove the current lottery system and save people with disabilities a physical visit to buildings that may not meet with their individual accessibility requirements.

It was found that for carrying out basic enquiries, thematic maps gave very clear representations of accessibility in the form of living maps that facilitate simple updating as circumstances change. However, it is concluded that when more complex queries were formulated and numerous audit criteria and types of disability were added to the query, fewer positive results were achieved. Access levels decreased, thus making maps less visually attractive for the purposes of demonstration in this research. The purpose of this research was to design, test, evaluate and develop a theory and therefore a very broad, yet representative, pilot study area and audit criteria were chosen. By adding more and more criteria fewer positive results were observed, decreasing the clarity of the map but highlighting important levels of inaccessibility. Although choosing a smaller research area with fewer audit criteria may have provided more positive results and more attractive maps, the purpose of the "LADDER" concept was to communicate "live" data whether accessible or not.

A limitation of the communication of accessibility data in a GIS is that it is not appropriate for use by people with limitations of sight, as they are unable to see the maps or the commands. This may be overcome by combining the system with the TACIS project that was discussed in Appendix 6. TACIS also uses MapInfo and could possibly be expanded to accommodate the "LADDER" concept. MapInfo was concluded to be a sufficient and appropriate software tool to handle accessibility data from access audits for the storage, manipulation and communication of such data. Although MapInfo does not have strong statistical tools associated with it the accessibility data needs little analysis due to the successful design of the data management element in the access audit function of the "LADDER" concept.

It was however, found that the data used in the thematic maps quickly became dated; the built environment is not static and is constantly changing, requiring any access audit database to be updated on a regular basis. The design of the audit and the thematic process allows for ease of updating of the data as it becomes available, a process not so easily managed in hardcopy or tabular files. However keeping such a system updated through the physical access auditing is labour and time intensive and as discussed, the management of data in this way could only be truly beneficial if Disability Organisations and Building Control Authorities work together in a co-ordinated manner.

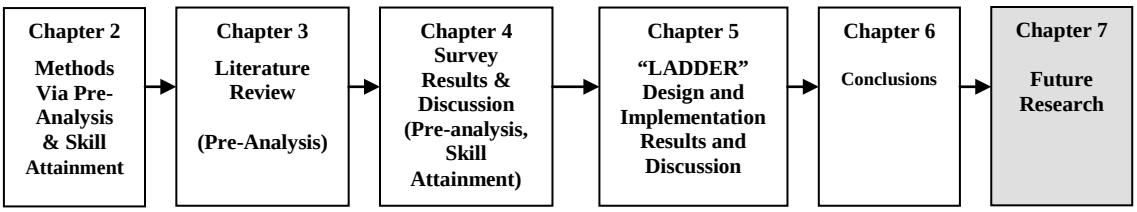
6.3.5.3 Route Mapping as a Development of the "LADDER" concept

It is concluded that access information of buildings alone is not sufficient for people with disabilities to make independent access decisions. Accessibility cannot solely be viewed in terms of access to a stand-alone building it must be viewed as intertwining links of a chain, a flaw in any of which could result in a totally inaccessible environment. It is concluded that links such as the streetscapes, transport and other services must be intertwined to provide a seamless picture of the entire experience a person with a disability undergoes. This research endeavoured to advance the "LADDER" concept to examine and include circulatory space beyond the scope of Part M. Route maps identified often overlooked aspects of the open built environment that effect access, including subjective matters such as rubbish, vegetation and seasonal criteria such as fallen leafs. Route mapping of the circulatory space did however prove far more difficult that originally estimated. This mapping incorporated issues relating to subjective assessments of access. It was originally hoped that symbols and pictures could be linked to an access rating system to represent such features. Although given careful consideration, the resulting Route Maps lacked clarity and therefore the system as demonstrated in Chapter 5 was selected. Overall Route Mapping was concluded to be a success and a vital link in the accessibility chain. The progression of the "LADDER" concept into the area of Route Maps in this research provided the necessary link between buildings and the circulatory environment in which they are located. Although Route Maps (generated from subjective rather than regulatory assessment) did not produce maps as aesthetically pleasing to the user as initially envisioned they did present valuable data for empowerment in an easily accessible form.

Failure to examine this link would have made the information relating to the access of buildings irrelevant, as the person with a disability could not have decided upon a route to get to the building. Integrating route mapping with transport accessibility information is the natural progression of this work, as it would enable decision-making on a continuous seamless accessible route of travel from base to a destination. Unfortunately such data was not available for the pilot study area at this time and therefore this aspect is examined in more detail in Chapter 7.

6.4 FUTURE RESEARCH

Although many recommendations were made in this chapter relating to specific elements of this research there are issues that require greater consideration. With the legislative and key anti-discrimination strategies finally in place, it is an opportune time to progress the "LADDER" concept. Therefore, in Chapter 7 a number of key recommendations are made as a direct result of this research. This attempts to identify firstly, the realistic future of the "LADDER" concept, and secondly, how to progress other aspects identified that influence access and the progression of the status of people with disabilities.



7.1 IMPLEMENTATION AND GOVERNANCE OF "LADDER"

It has been identified that the "LADDER" concept is an application with not only individual but also social relevance. A number of practical uses have been identified throughout this research as to potential uses of the "LADDER" concept in society. Careful implementation and governance by Building Control Authorities and Disability Organisations through an interagency approach, can achieve the key social implication of reforming current systems of data collection and communication. The system could also be used in many current topical government strategies from the formulation of Development Plans at Local Authority level, to the provision of information under the requirement of Key Sectoral Plans for public buildings. "LADDER" may also be used to the demonstrate compliance with Disability Access Certificates and planning of disability services such as care assistants and mobility grants. With the legislative and key anti-discrimination strategies finally in place, it is an opportune time to progress this concept. However some key issues in relation to implementation, governance and communication require clarification if this concept is to be successfully adopted.

It was concluded that the success of the "LADDER" concept lies in an inter-agency approach between Building Control Authorities and Disability Organisations. Difficulties lie in the varying models of disability subscribed to and hence their dissimilar approaches to addressing access. Building Control Authorities monitor and enforce Part M of the Building Regulations and routinely collect accessibility data on new buildings and existing buildings up to five years old. They also have the power and expertise to identify and prosecute for non-compliance with legislative requirements. They can with relative ease access audit plans of proposed developments and developments in construction. They have training in GIS and access to the required software. They have the power to influence change at policy level and provide guidance and training for key stakeholders. Disability Organisations probably have the most powerful resource, the true understanding of the daily requirements of individual people with disabilities for access to the built environment. They have an ever-growing database on accessibility of new and existing building stocks.

They have an unwavering drive and determination to continue to lobby for the right to access at all levels. They actively access audit both new and more importantly existing building stock currently unmonitored by Building Control Authorities. Both groups have valuable sources of accessibility data and individual skills and expertise. Unfortunately this data was not collected in a formalised or consistent manner. This approach means that such data cannot be used to its full potential and often lies unused in the hardcopy format it was collated. Adoption of the "LADDER" concept in this proposed manner could revolutionise the way these groups both collect and communicate this data.

It is clear that when key stakeholders communicate accessibility improves. For this interagency approach to achieve unification then the terms of governance and communication must be outlined from the outset through an approach underpinned by the "Supportive" ethos of disability. It is envisioned that this partnership could be successful through the formation of local County Access Boards consisting of Building Control Officers and members of each Disability Organisation in their area in order to equally represent the needs of all people with disabilities. This board should be chaired by the Local Authority Access Officer and should meet on a monthly basis at least. The "LADDER" concept should be initially pilot-tested in one Local Authority area so that any initial concerns could be resolved. From the first survey Monaghan and Dun-Laoghaire/Rathdown had the most like-minded Building Control Authorities and Disability Organisations, while in the second administration of this survey Dun-Laoghaire/Rathdown had the most comparable groups. In these areas both groups played active roles in promoting access through common aims such as inter agency liaisons, training, access auditing and understanding of the legal requirements. Groups in these areas already appeared to be like-minded and it is proposed that both areas should be considered for the initial pilot test of "LADDER" especially as they each represent rural and urban environments respectively.

As it was also found that Disability Organisations are still under-funded it is hoped that Local Authorities would allow them to access their electronic maps and GIS software until the feasibility of the system is established and the value of allocating extra resources is proven.

With pilot testing complete and revisions incorporated these Access Boards are proposed nationally and should be present in each of the 37 Local Authority areas. Strict terms of reference should be applied and standard operating procedures must be adopted. The proposed "LADDER" concept would form the basis of such standard operating procedures and by the acceptance of such a model based on the regulatory standard for access a consistent approach would become evident at local, regional and national levels. Each group would receive training in access auditing and adopt the TGD to Part M as their auditing criteria. Access audits would be carried out on their built environments to collect access data. Disability Organisations would concentrate on existing buildings and Building Control Authorities would concentre on new developments and developments up to five years old. The results of these audits would be submitted to the Access Board through the Access Officer who would apply part two of the "LADDER" concept and generate accessibility maps to communicate data collected. As the group would meet on a regular basis such maps would be considered as living maps that could be continually updated as changes occur.

The meetings of the Boards would consider the options for use of data. Both parties will have their individual requirements and it is envisaged that Building Control Authorities may use the "LADDER" concept for monitoring and compliance with Part M, regulatory enforcement and the issue of DACs. Disability Organisations would also find the system extremely beneficial by providing a mechanism whereby their members could access information that can empower independent choice in their day-to-day activities among the many of the other uses suggested earlier. There will also be areas of common interest to both groups such as the development of local area access guides, provision of access action plans and access statements and submissions on part m and local development plans. The collation of reliable accessibility data in this manner will allow for a clear standardised representation of accessibility levels observed in each Local Authority area. Access data collected will be seamless and standardised both locally and nationally so it would be necessary to form a National Access Board to optimise use of resulting data. Their role would be to collate and interpret this data to provide a national picture of accessibility rates and the status of independent living for people with disabilities that are currently absent in Ireland.

This group should meet at least quarterly and must incorporate each of the 37 Local Authority Access Officers who chair the Local Area Access Boards. Amalgamation of data from each area would provide the first seamless representation of national access levels. The availability of such detailed uniform statistics would not only assist national service and resource planning but would also form the foundation of improving the overall status of people with disabilities. This data will also provide a clear indication on enforcement of Part M and any legal proceedings initiated. The National Access Board must liase closely with the NDA and BRAB to ensure a nationally consistent approach that represents interests of key stakeholders. The availability of such consistent information would allow Ireland to be at the forefront of the disability movement. This would encourage movement away from social and medical models of disability that many key stakeholders accept, towards a unified "Supportive" model of disability that has its basis in universal design. For too long key stakeholders have paid "lip-service" to the acceptance of universal design finally the core legislative provisions and strategies are in place and therefore now is the opportune moment to finally create a National Access Database and develop a National Access Action Plan. With the credible knowledge of current access levels, a plan can be put into place to formally dictate the manner in which universal design can be finally introduced through education, communication and attitudinal and legislative change. It is hoped that eventually Part M will be replaced by the principles of universal design and in doing so the "LADDER" concept can be revised to become a stronger tool that could communicate access information for all. Chapter 3 suggested a proposed construction of the "Supportive" model of disability. The final elements of this model are now added in Figure 7.1 generating a holistic framework to reform current access data collection and communication.

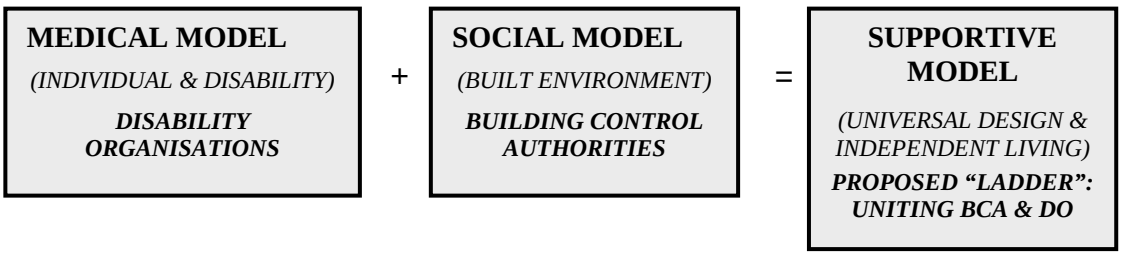


Figure 7.1 Construction of the proposed Supportive Model of Disability

This model ideally suits the development of the "LADDER" concept by combining the strengths of individual models with the skill sets of the key stakeholders under the ethos of the "Supportive" inter-agency approach to disability.

This generates a model that undoubtedly could empower independent living and improve the status of people with disabilities on not only local but also national scales.

7.2 POTENTIAL ROLE OF ACCESS OFFICERS

As outlined in Chapter 4 each Building Control Authority was required to appoint a designated Access Officer to monitor Part M. From the survey conducted it is clear that few accepted their responsibilities in this respect and very hardly any full time Officers have been appointed. An Access Officer is a very valuable resource and was identified in the implementation and governance of "LADDER" as a key element to the success of the concept. One Building Control Authority indicated in their survey response that they did not have an Access Officer on their staff as this role was fulfilled by their local disability organisation. This is an interesting model and requires further investigation. It is a viable option that the Access Officer proposed to govern the implementation of "LADDER" may originate from either key stakeholder. It is imperative however, that clear and concise responsibilities must be recommended for their role. Potential roles for Access Officers were identified during this research should include;

- Liasing between Building Control Authorities and Disability Organisations
- Chairing local and regional access boards
- Deciding on uses of access data collected using "LADDER"
- Developing and promoting accessible design and ergonomic data (including the circulatory environment, not just individual buildings)
- Making detailed submissions on Development Plans
- Examining planning applications
- Liasing between Planning and Building Control departments
- Provision of an Access Advisory Service

However for an Access Officer to achieve such goals other issues must be taken into consideration. They must be assigned the role in its entirety rather than being an add-on to the role, such as was evident in many Building Control Authorities. Including this role, as an "add on" to the Building Control Authorities' remit would significantly limit the influence of the Access Officers in areas such as planning.

In the UK a system is in place whereby Access Statements are issued by Access Officers. The developer provides these statements at an early stage to record and explain decisions made by them on access. This is similar to the recent introduction of the DAC in Ireland that allows developers to explain at an early stage what their constraints are in relation to providing access whether it is cost, space or design. This is another potential role for the Access Officer. Once provided the developer could work in connection with the Access Officer in deciding a course of action that optimises accessibility for all. It was found that some Fire Officers also act as Access Officers. This is also unsatisfactory as neither area achieves the individual supervision required. In many cases an architect or designer may feel pressurised to meet with the requirements of the client rather than Part M, this system would hopefully eliminate such pressure. The DAC may develop new and interesting means of achieving access especially if implemented in conjunction with a designated Access Officer.

It was found that there is also very little information available as to the exact nature of enforcement action in relation to Part M, as available data falls under the general title of "Building Control". The Access Officer is ideally positioned to collate and disseminate this data relating to direct enforcement and prosecution of Part M. The collation of such statistical data would greatly assist an evaluation of the legislation and the direction in which future government policies should take.

Another possible recommendation for Access Officers could be to adopt the principles set out in the "Draware" project as described in Appendix IV. The principal aim of this project was "to develop within the architectural profession, the awareness and design skills necessary to understand requirements and applications of principles to achieve universal access in the built environment". Adapting these principles during training and continuing professional development of Building Control Officers would greatly improve the scope for access for all, not just those of limited ability. Access Officers could provide such training. Combining such a scheme with innovative accessibility design scholarships or design awards would help develop future building stock to an exceptionally high standard.

7.3 POTENTIAL INTERIM MEASURES TO IMPROVE ACCESS

Legislation must be proposed that requires the provision of Access Statements and more stringent roles for Access Officers. Until this happens a number of initiatives were identified during this research that could act as interim arrangements. It is recommended that Building Control Authorities could introduce procedures within their current powers to increase compliance, examples include;

- Make detailed submissions on amendments to Part M
- Increased site inspections using the "LADDER" concept
- Development of Access Action Plans for their Public Buildings
- Development of Standard Operating Procedure for enforcement of Part M based upon the "LADDER" concept
- Detailed plan inspections bearing Part M in mind
- Pre-planning meetings with interested parties
- Training of architects and designers into the requirements of Part M and the "LADDER" concept
- Develop codes of practice for access of specific developments
- Provision of a self-assessment checklist of Part M for applicants
- Issue warning letters/enforcement notices for contraventions
- Increased liaison with Planning Departments to ensure access issues are addressed at planning phase
- Increased prosecution through the District Courts

To ensure a seamless consistent level of enforcement, systems must be also in place to appeal decisions, whether good or bad, to a third party. The current system of An Bórd Pleanala is a long laborious route that is firmly based in planning laws rather than building control. An Accessibility Ombudsman based on a national platform could provide an impartial legally binding appeal process that would take submissions from all interested parties including Disability Organisations, designers, developers and Building Control Authorities. Local Authorities appear to have become desensitised to the requirement of accessibility. Making a superficial or aspirational reference to access in Development Plans now appears sufficient. More research needs to be carried out into the role and the effectiveness of Development Plans in Ireland. Many respondents outlined in their survey responses that such Plans currently act as mission statements rather than a true reflection of reality.

More research also needs to be carried out at Local Authority level as to the demographic profile and needs of people with disabilities in their areas. This could form part of the proposed education programme throughout of Building Control Authorities in an effort to remove inconsistencies and confusion in relation accessibility. Increased public confidence is necessary, and may be achieved though promotion of awareness by each of the Building Control Authorities. An example may be carrying out access audits of their premises and using the results to make them accessible to people with disabilities. Ignorance seems to still be the main barrier to accessibility at many levels from the Disability Organisations to the Building Control Authorities to the general public. Therefore it would be important to formulate a public awareness campaign in conjunction with awareness training on disability as well as the Building Regulations. This combined with a holistic approach of Planning Departments, Building Control Authorities, Access Officers and Disability Organisations all working together with a common aim could greatly improve the requirements and presence of access. Until this partnership is realised there will continue to be an ad-hoc disjointed approach that clearly does not achieve the desired aim of providing independent access for all as aspired to by Part M.

7.4 FUTURE RESEARCH AND RECOMMENDATIONS

The aforementioned methods of implementation and governance of the "LADDER" concept coupled with the potential roles of Access Officers and Interim Measures for Improving Access are important to the success of "LADDER" and the future improvement of access in Ireland. However, a number of other key recommendations are also made as a direct result of this research;

1. The Report from the Commission for the Status of People with Disabilities was originally published in 1996 and was the impetuous for this research at both undergraduate and postgraduate levels. Many original findings and recommendations have still not been implemented. It is therefore recommended that this report be revisited in light of interim developments of disability and anti-discrimination legislation and republished with a clear focus on access and the provision of access information as the key to empowering integration and independence. Such revision requires a reasonable and achievable timeframe for the realistic attainment of goals.

2. It was identified during the search for literature that additional research also needs to be carried out at national level in relation to the incidence of disability and the effectiveness of Building Control legislation in providing access for people with disabilities. The current 12 to 15% inspection target by Building Control Authorities is unsatisfactory. Literature on this subject area was found to be dated and in need of progression. In Ireland there is little data relating to disability culture, independent living and how to narrow the disabled/non-disabled divide. There is a need to collect and examine detailed statistics on the demographics of disability and access to the built environment and monitoring and enforcement of Building Control Legislation by the NDA and the BRAB. The area of IT and GIS also requires further research in an Irish context. At present, although one third of the population of Ireland have access to a computer in their home, a similar figure do not have access to broadband (CSO, 2006). Access to broadband in terms of the "LADDER" concept could greatly assist decision-making and independent living for people with disabilities.

3. As key stakeholders in this research the NDA (who provided a scholarship for this research) will be presented with the findings of this research along with a detailed proposal of how to progress the "LADDER" concept to the next level through the terms of implementation and governance. As the National Authority on disability they are ideally placed to progress this issue through their interagency working with both other Disability Organisations and the Building Control Authorities.

4. It was identified that responsibility for the success of Part M cannot lay solely with Building Control Authorities. Without a sound legal framework, effective technical standards, adequate training of all parties and enforcement of legal provisions accessibility standards will not improve in Ireland. It is recommended that the proposed revision of Part M needs promotion through working committees, public sessions and a national long-term plan to be overseen by the NDA. Such a plan must involve all stakeholders with terms of reference that extend beyond building regulations into the realms of planning, equality and disability discrimination legislation.

5. The introduction of Access Statements, Disability Access Certificates, Access Officers, Access Action Plans must be a priority that is combined with the commitment of Local Authority Departments to increased inspection and interagency collaboration. Future legislative revisions in the area of disability must address the pre-requisites of the individual, the disability and the built environment. It is concluded that disability strategies must be put in place like building blocks with a firm foundation in forward thinking legislation.

6. Disability Organisations actively collect access data of existing buildings, whereas Building Control Authorities access audit new developments. Neither party collect data in an organised manner or use it to its full potential. The "LADDER" concept should be further explored under the governance of the NDA. As mentioned, Dun Laoghaire/Rathdown had both groups in the same area continuing to demonstrate similar opinions and policies in relation to accessibility. Monaghan had also demonstrated similar opinions in the initial survey. If the "LADDER" concept were to be tested in both of these areas representing both urban and rural environments where the key stakeholders were in synchronisation with each other, the success of the system would be optimised. A proposed starting point for the testing of the "LADDER" concept would be its application on public buildings in each of these areas. Lessons learned from this test could streamline the concept and go to form standard operating procedures to be adopted by Disability Organisations and Building Control Authorities for local and national implementation.

7. A finding that was evident in the implementation of the surveys was that the main barrier to key stakeholders not realising their full potential was a lack of funding and resources. This was especially evident in Building Control Authorities where decreased inspect rates were a direct result of poor funding. Greater financial investment and staffing must be allocated to these groups, perhaps through National Lottery funding, to assist the improvement of the status of people with disabilities. If Building Control Authorities had more staff to allocate to access auditing and Disability Organisations had more resources allocated to the training and provision of IT then the "LADDER" concept could easily be adopted and access would inevitably improve.

8. Once the proposed interagency approach has become streamlined the vision for the future of the "LADDER" concept is that accessibility data collection and communication could be modernised to a level where it can be accessed through living maps. These maps could be continually updated on the web, mobile phone applications and even satellite navigation systems. Stand-alone intranet points could be present in central business areas and shopping centres as a decision-making tool for people with disabilities wishing to avail of services. Options for feedback from end-users must also be considered which would be of great benefit for users with similar disabilities. This would create bespoke route planning through user-defined mapping that would create individual accessibility plans. The capabilities of this concept must be further investigated and exploited to the benefit of people with disabilities especially in areas such as tourism.

9. The communication of access information to people with disabilities has become a recent priority of the National Disability Strategy, therefore, the development of the "LADDER" concept could not be more timely. This strategy aims to address disability through a multi-disciplinary approach that does not define disability as a purely social or medical issue but a combination of both. This mirrors the ethos of the "LADDER" concept and if adopted by government departments to assess access could revolutionise how such information is both collected and communicated.

10. It was identified through the demonstration of the "LADDER" concept that access was identified to buildings and circulation routes. For a seamless approach, the system must be over-layed with subsidiary information such as transport links. In this way people with disabilities could make cohesive decisions from their home to their final destination and back. Currently data relating to rural and urban transport links is not available in Ireland in GIS format. Both public and private transport companies should modernise their approach to information provision by providing their data in a manner easily transposed into GIS for each local area. If information were available in such formats inter-county links could be made allowing a person with a disability make an informed decision covering a large geographical area.

11. The NDA and other disability organisations must encourage their members to get more involved in measuring and communicating access in their areas in a more sophisticated manner such as "LADDER". These systems should be developed to the point whereby their end user narratives or photos could be attached to access audit results. In this way potential "LADDER" users could access accessibility reviews to assist other potential users. This would be valuable to facilitate an accurate "live" user centred system that is relevant to all disabilities including sensory, intellectual and cognitive disabilities. This would be a valuable progression of the "LADDER" concept beyond the scope demonstrated by this research.

12. It was identified through the examination and use of Part M for the access audit that significant amendments are required to achieve a more holistic approach towards the universal design theorem. The NDA and other disability organisations must continue to lobby for change to this minimum standard while Building Control Authorities must continue to submit credible proposals to consultation documents on future amendments. When Part M has reached an optimum standard by incorporating universal design rather than minimum standard then "LADDER" could be redesigned as an access for all decision-making tool. This system could then be eventually used in industries like tourism, education and sport in providing access information for all abilities.

13. Further research must be carried out on the incidence of employment of people with disabilities and the reasons for poor uptake in certain sectors including disability organisations. The Disability Act 2005 places a clear obligation on public bodies to be pro-active in employing people with disabilities with a target of 3% to be achieved. Disability organisations should aim to exceed this target within their own organisations. It was found from survey results that there was a poor uptake of positions by people with disabilities in disability organisations. If potential employees were to use the "LADDER" concept to establish their accessibility options, then a greater number of applications for positions from people with disabilities may be received.

14. Many organisations have criticised the structure and enforcement of Part M (see Appendix III), but there is little evidence as to how anti-discrimination or equal opportunities legislation could improve the built environment in Ireland. Research must be carried out in this area in order to identify if anti-discrimination or equal opportunities legislation can assist the provision of access in Ireland.

7.5 CLOSING SUMMATION

As highlighted by the Commission on the Status of People with Disabilities (1996), who inspired this research, the lack of easily accessible information for people with disabilities is a major contributing factor to their isolation and marginalisation. This was clearly reflected when participants of "Access for All" no longer engaged in activities when information on access options were unavailable. People with disabilities must be enabled to obtain accurate access information in order to make decisions that empower independent living. Although currently in Ireland some accessibility information is collected in an ad-hoc manner; it is not being used or communicated to its full potential.

There was, until now, no accurate, up-to-date, live, uniform system to collect and communicate such information. The combination of pre-requisite accessibility factors of the individual, disability and the built environment with the multi-dimensional "Supportive" approach of the "LADDER" concept, using participatory research, resulted in an excellent means of collecting and communicating accessibility information. Adoption of this multi-dimensional approach provided credible outcomes. Data was collected in a standardised consistent manner using access auditing and results were communicated through thematic mapping that made it easy to extract concise meaning from intricate detail. The principles of the suggested "LADDER" concept should be adopted through the suggested coordinated interdisciplinary approach of key stakeholders to reform current data collection and communication techniques. Coordination of this approach by an Access Officer using the regulatory standard as the auditing template could generate a national seamless database of easily accessible living maps. This **L**ive **A**ccessibility **D**atabase for **D**isability **E**mpowerment and **R**eform could revolutionise how people with disabilities live independently within society, not only by improving their individual status, but elevating the status of all people with disabilities.

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APPENDICES

APPENDIX I

OVERVIEW OF POLICY AND LEGISLATIVE CHANGE IN IRELAND

OVERVIEW OF POLICY AND LEGISLATIVE CHANGE IN IRELAND

(a) Employment Equality Act 1998 and 2004

The Employment Equality Acts originally drafted in 1998 aim to promote equality and prohibit discrimination of people with disabilities by requiring appropriate measures in relation to access, participation and training in employment. Under this act the medical model of disability is adopted and people with disabilities as broadly defined as;

"People with physical, intellectual, learning, cognitive or emotional disabilities and a range of medical conditions". (Employment Equality Act, 2004)

Although firmly based on the individual's inability this Act is a very important piece of legislation as it allows so the social inclusion of people with disabilities, therefore enabling them to become more valuable members of society. The Act covers access to employment, pay and training and protects all persons with disabilities in employment, be that full or part time or public or private. The Act also prevents indirect discrimination such as being treated less favourably. An employer is required to take appropriate measures to enable a person with a disability to have access to employment and training unless this places "disproportionate burden" on the employer (measures for education and training are further regulated by the Education for Persons with Special Needs Act 2004). Appropriate measures have been defined as;

"Effective and practical measures to adapt the employer's place of business including the adaptation of premises and equipment, patterns of working time, distribution of tasks or the provision of training or integration courses". (Employment Equality Act, 2004)

Disproportionate burden takes into account costs and the financial resources of employer and replaces (due to a Supreme Court action) the previously controversial term of "undue hardship". The employer is not required to provide any treatment, facility or thing that the person might ordinarily provide for themselves (Equality Authority, 2006). In one recent case the Labour Court upheld a complaint from an employee with a hearing complaint requesting an appropriate telephone headset. The Court found that the cost of the headset was "nominal" compared to the employer's turnover and the employer should have also provided suitable induction training. The Safety, Health and Welfare at Work Act 2005 also has a clause applicable to working people with disabilities and states that employers must "ensure as far as is reasonably practicable, the safety, health and welfare at work of <u>all</u> employees". The Health and Safety Authority (HSA) have created a useful guide to employers by combining requirements of Equality and Health and Safety legislation and the opinions of people with disabilities. Through planning, management, risk assessment and effective control measures employers can accommodate the person their disability and their working environment to create an environment more inclusive and accessible to all (HSA, 2009). Such a holistic approach is reflective of the "Supportive" model of disability allowing all contributing factors to disability to be considered equally, the propensity of the Employment Equality Act to become engrained in the medical model is liberated by such forward thinking provisions.

(b) Equal Status Act 2000 as amended by Equality Act 2004

By 2000 the necessity to produce anti-discrimination legislation was evident and hence the Equality Act was enacted. This legislation prevents discrimination in the provision of goods and services including by people who, buy and sell a variety of goods, provide services, provide accommodation or are in charge of education facilities. These providers are required to "do all that is reasonable to accommodate the needs of a person with s disability" (Equality Act, 2004). This may require special treatment where if it was not present would hinder or prevent the person availing of the goods or service.

Service provides must reach minimum accessibility standards to avoid discriminating against people with disabilities in the provision of goods and services. However this is only required in an instance where the provision does not exceed a nominal cost that takes the resources of the service provider into account. Some sporting events, drama and entertainment are exempt under this legislation for grounds including necessity, aesthetics, custom or tradition. This Act again sees disability as a medical condition to be overcome or assisted and is not sufficient in providing access as a human right. A person must be reasonably accommodated for rather than it being an automatic right thus making the value of "equality" legislation ineffectual to an extent where many exemptions are permitted. The subsequent revision in 2004 failed to rectify this injustice highlighting once more the bias displayed when a restricted model is accepted.

(c) The Barcelona Declaration Project – "The City and the Disabled"

The Barcelona Declaration was initially launched in 1995 with the primary aim of supporting the right of people with disabilities to participate as equal citizens in our urban environments. The Declaration has no legal force but instead requests municipal authorities to make a voluntary commitment. It took Ireland six years to commit to the Declaration by establishing in 2001 a system for the promotion, adoption and practical implementation of the seventeen requirements of the Declaration among all local government authorities. These requirements include promotion of disability awareness, policies, consultations, training, analysis and assessment of aspects that impact on people with disabilities including the built environment. This was the first time in Ireland disability began to diverge from the medical plane in which it was traditionally rooted towards a socially conscious issue. To date 101 local/municipal authorities in Ireland have embraced the declaration by aiming to create a more inclusive society through the adoption of a socially influenced model of disability. This is the highest level of participation observed in the European Union where just 436 municipal authorities have signed up in total. In order to create this more inclusive society local authorities have committed to "adopt measures towards the necessary adaptation of urban spaces, buildings and services of all types, in order to allow full use by disabled persons" (European Congress 1995). This aim is underpinned by their commitment to ensure all policies and procedures also reflect the needs of people with disabilities. Local governments have slowly embraced this project and are finally beginning to see built environment accessibility as a permanent fixture on their agenda and the acceptance of terms such as "full use by people with disabilities" is a significant step towards finally embracing the concept of universal design.

(d) National Disability Strategy

The National Disability Strategy was first introduced in 2004 with the aim of building on existing legislation and infrastructural frameworks for equality to assist mainstreaming of people with disabilities in society. It provides for the right to assessments and services in health and education. The strategy also proposed the Disability Bill and measures of how to implement the requirements of the Disability Act 2005 (Department of Justice, Equality and Law Reform, 2004). The fundamental objective of this strategy was to merge existing legislative provisions to create a cohesive strategy to optimise participation of people with disabilities in their communities. A stakeholder monitoring group consisting of disability organisations and other key stakeholders has been established to ensure the strategy is implemented. The strategy requires the seamless adoption of the Disability Act 2005, the Citizens Information Act 2007 (that provides advocacy services for people with disabilities), and the Education of Persons with Special Education Needs Act 2004. This will be implemented though Sectoral Plans under the Disability Act 2005 and a multi-annual investment programme worth €900 million (Department of Justice, Equality and Law Reform, 2004).

Towards 2016 is the strategic document that amalgamates the mission and strategic objectives of this National Disability Strategy. The strategy identified specific goals such as;

"Every person with a disability would have access to public spaces, buildings, transport, information and advocacy" and " every person with a disability would be supported to enable them as far as possible to lead full and independent lives to participate in work and in society and to maximise their potential"

(Department of Justice, Equality and Law Reform, 2009)

This strategy aims to address disability through a multi disciplinary approach that does not confine disability as a purely social or medical issue but a combination of both. The subscription to this combined model approach to disability will significantly affect the success of this strategy and in an attempt to further strengthen this success detailed research was proposed to investigate the needs of this demographic. The National Physical and Sensory Disability Database was established in 2008 to provide a detailed overview on the health and service needs of people with disabilities in Ireland. To date 29,946 people with disabilities have registered with the database and provided detailed information on their personal circumstances. This allows government to plan intervention, rehabilitation, assistance and other services for people with disabilities in line with the requirements of the National Disability Strategy. The current plan runs until 2013. The National Disability Strategy was agreed with the social partners in 2006 and identified the key to achieving these goals was a continued economic growth in Ireland. A review has since taken place in light of the economic downturn and the strategy will now be reconsidered and re-prioritised in line with budgetary expenditure, however there is an ongoing commitment to ultimately achieve the identified goals although major resource challenges have been identified. The Department of Finance has invited submissions from interested parties on the current National Development Plan, one of whom, the NDA submitted detailed proposals on priorities for investment. These priorities included implementation of the Sectoral Plans, improving built environment access and breaking the barriers to social inclusion using among other things training, education and awareness. A cohesive strategy such as the National Disability Strategy is fundamental in creating real change in Ireland as combining each key factor in a timely consistent manner will move accessibility off written agendas where it has long since lingered into perceptible action. Adopting a "Supportive" approach will ensure acceptance by key players who will feel their concerns are valued and acknowledged.

(e) Disability Act 2005

The Disability Act was probably the most significant piece of legislation introduced in Ireland in the last decade to progress and improve the status of people with disabilities. It was designed to assist the participation of people with disabilities in society by supporting the provision of disability specific services and improving access to mainstream public services as part of the government's commitment to a fairer society (Department of Justice, Equality and Law Reform, 2005). This Act provides a main component for the overall framework of social inclusion legislation. The Disability Act 2005 adopts a medical approach to disability and defines disability as;

"A substantial restriction in the capacity of the person to carry on a profession, business or occupation in the State or to participate in social or cultural life by reason of an enduring physical, sensory, mental health or intellectual impairment".

(Disability Act, 2005)

The Department of Justice, Equality and Law Reform, (2005) describes how the Act provides a basis for social inclusion legislation through the following initiatives;

- The individual independent assessment of the needs of people with disabilities and subsequent plans for providing access to services such as health and education.

- Access to public buildings, services and information.
- Sectoral plans for six key government departments that will ensure access for people with disabilities will become an integral part of service planning and provision with all public areas of public offices to be accessible by 2015.
- An obligation on public bodies to be pro-active in employing people with disabilities with a target of 3% to be achieved.
- Restricting the use of information from genetic testing for mortgage, employment and insurance purposes.
- Creation of the Centre for Excellence in Universal Design that will form part of training for architects (standards, education and awareness) and promote best practice

The Department of the Environment, Heritage and Local Government was one of the first to develop one such Sectoral Plan in 2006. Devised in consultation with people with disabilities, its key objectives included;

- The promotion of universal access to public spaces and buildings under their control.
- To update standards set out in Part M of the Building Regulations and promote greater effective enforcement of these standards.
- To include the participation of people with disabilities in decision making.
- To improve access of persons with disabilities to streets, pavements, footpaths and street crossings, and access from public roads to passenger transport vehicles, through promoting an accessible barrier free pedestrian environment.

(Department of the Environment, Heritage and Local Government, 2006)

This plan initiated the current review of Part M and the Building Control Bill with the objective of strengthening enforcement powers of Building Control Authorities, both of which are fundamental to the improvement of accessibility and were discussed in greater detail earlier in this research. This Plan also committed to ongoing access audits and access action plans of public buildings and streetscapes, an underlying theme of this research. Each local authority are required to establish a steering group to monitor progress in relation to their key Sectoral Plans. The NDA have developed a Code of Practice on Accessibility of Public Services and Information provided by Public Bodies to assist government departments meet their obligations in this respect. The Disability Act 2005 also has a provision for Universal Design and a requirement for access auditing of the built environment (both discussed in greater detail in Chapter 3). The Act also introduced the requirement for training procedures and provision of Access Officers in public bodies. Access Officers are to be appointed to each public body to co-ordinate the integration (where practicable and appropriate) of their services for people with disabilities. They act as a point of contact for a person with a disability wishing to use a service and are responsible for providing or arranging for, and co-ordinating assistance and guidance, to people with disabilities accessing public services. Unfortunately they have no remit for physically assessing or improving existing levels of access. Inquiry Officers have also been appointed under the Act to deal with complaints. Public bodies for the first time are individually accountable and are required to review their current services, consult people with disabilities, implement access audits, set up advisory groups and improve access for all including staff and service users who may have a disability. This approach may have far reaching implications for the acceptance of the outcomes or findings of this research.

(f) National Disability Survey 2006

The Central Statistics Office conducted the first ever-detailed profile of people with disabilities in 2006 with the core aim of establishing the severity and impact of disability on people in Ireland. This was a follow on study to the census 2006 and for the first time acknowledged the importance of this demographic in the composition of society.

The survey was based on the social model of disability and defined disability as "the outcome of the interaction between a person with an impairment and the environments and attitudinal barriers s/he may face" (CSO, 2010). The survey drew on a list of people enumerated in the 2006 census and focused on nine different types of disability. A total of 12,661 325,800 people were surveyed on their varied levels of difficulty in carrying out their daily activities. 325,800 people in Census 2006 considered themselves to have a disability, 56% of these estimated to have a mobility or dexterity disability. Of these 300,200 are living in private households in the community (CSO, 2010). The detailed results of this survey was issued in two volumes, Volume One published in 2007 gave an overview into key findings relation to the prevalence and demographics of disability. The final report Volume Two was published in 2010 and gave a more detailed insight into the situation of people with disabilities in nine areas including built environment, accessibility and social participation. Findings in the area of built environment accessibility were:

- 37% of adults experienced difficulty socialising in public venues.
- 37% found difficulty availing of services such as banking and shopping.
- 29% had difficulty with footpaths in their community area.
- 27% felt street crossings did not meet their needs.
- 30% found difficulties with internal circulation of public buildings
- 21% found car-parking access difficult.
- 20% found approaches to buildings difficult to access.
- 35% reported problems with steps/stairs in other's homes. (CSO, 2010)

These figures dramatically increased for those with a disability over the age of 75. Unfortunately the survey did not examine what the barriers or difficulties experienced were. It is undetermined if they were physical or emotional barriers such as fear of the unknown. The overall indication from initial examination of these results indicate that about one-third experience some difficulty accessing individual built environment features, however combining multiple features in an everyday scenario would unquestionably increase this statistic. When people with disabilities were then questioned in relation to their overall social participation, the levels that experienced difficulties were startling (CSO, 2010);

Going to a town shopping:	56%	Participating in Sport:	59%
Holiday/Breaks:	53%	Taking part in Community life:	54%
Socialising in Public Venue:	49%	Attending Religious Ceremonies:	34%

These figures increased even more for those permanently residing in nursing homes or care centres. People surveyed were asked the reason for not having fuller participation in society. 60% stated that health considerations/physically unable as being the reason for not participating. Other options provided in this multiple-choice question included need for assistance (36%), and being self-conscious (20%) (CSO, 2010). Unfortunately questions were not posed in relation to their confidence, their access to information on levels of accessibility and the communication of access information, all of which are integral components of this research. However the statistics collated clearly highlight the need for improved access and communication of access information to allow for inclusion of people with disabilities in society. With such high figures observed of people with disabilities not participating in common daily activities, this research aims to go some way towards bridging this gap in services for this demographic.

(g) International Year of Equal Opportunities for All 2007

The International Year of Equal Opportunities for All in 2007 sought to make people in the EU more aware of their rights to equal treatment and a life free of discrimination. 10% of the population of the EU has a disability and in 2007 a major debate on the benefits of embracing a diverse society commenced (EC, 2007). The main objectives of the project were to raise awareness on equality rights, acknowledge diversity to make a more cohesive society that encourages participation of all.

The Irish National Strategy decided upon six initiatives to achieve these objectives. These included the provision of information and advocacy services, equality mainstreaming in planning and policymaking, progression on key equality issues and the promotion of equality competence and debate. Although the project was aimed at many other minority groups including migrants, women and the elderly many campaigns tried to encompass all groups combined. There were however some disability specific projects including the launch of an information campaign, holding a disability awareness conference and a "women and disability" seminar. Other EU members held summits, conducted surveys and promoted information campaigns and each country was encouraged to promote national competitions and awards. Ireland failed to embrace the spirit of the International Year of Equal Opportunities for All and many of the proposed strategies lost momentum with the end of 2007. Now that up to date statistics are readily available from the National Disability Survey hopefully the requirement for rights to equal treatment will assist the progression of the Irish National Strategy on disability.

(h) UN International Convention on the Rights of Persons with Disabilities

The International Convention on the Rights of Persons with Disabilities entered into force in May 2008. The aim of this Convention is to strengthen international law relating to equality by providing definitions of "discrimination on the basis of disability" and "reasonable accommodation". This Convention is seen as both progressive and comprehensive as it incorporates the perspective of social development by recognising the importance of international cooperation and the requirement to support national implementation. The Convention places emphasis on the collection and analysis of data to support such efforts and has commissioned the Committee on the Rights of Persons with Disabilities with the task of overseeing this development (ERT, 2008). Ireland signed up to the Convention in March 2009 and has embraced the human rights element of the treaty by already establishing an interdepartmental group to advise on the changes that may need to be made to the national Disability Strategy in order to allow Ireland to ratify the Convention. This group is currently working closely with people with disabilities to gauge their opinion on the requirements for equality. This Convention anchored in the medical model of disability focuses on the collection and analysis of data to support equal rights. This research aims to provide a tool for the collection and communication of accessibility data reflecting the underlying principal of this strategy.

(i) Council of Europe Disability Action Plan 2006 to 2015

The Council of Europe Disability Action Plan was launched at the EU Conference on Improving the Quality of Life for People with Disabilities in Europe in 2006 and aimed to assist member states to develop strategies to bring about full participation of people with disabilities in society and ultimately mainstreaming disability. The Plan aims to provide a comprehensive framework that is both flexible and adaptable in order to meet country-specific conditions by means of a road-map for policy makers to enable them to design and implement plans, programmes and strategies for social inclusion (Council of Europe, 2006). The Plan puts into action many of the requirements of the Convention on the Rights of Persons with Disabilities and recommends 15 action lines. These include participation in political, public and cultural life, information and communication, education and employment and the built environment (Council of Europe, 2006). As the overarching aim is to create a society that is accessible to all, the built environment has a key role in this social model plan. The plan requires the identification of existing barriers, creation of guidelines and where necessary legislation to promote access, develop training of design professionals and promote universal design. All of this is underpinned by the simplistic aim of "simplifying life for everyone" (Council of Europe, 2006). The Plan runs from 2006 to 2015 and although the Irish government has agreed in principal to adopt the Plan they are still currently assessing how the plan can be implemented and promoted at national level.

APPENDIX II

BUILDING REGULATIONS 2000 TGD M

BUILDING REGULATIONS 2000 TECHNICAL GUIDANCE DOCUMENT M

Access for People with Disabilities

Part M of the Second Schedule to the Building Regulations (as amended) Provides as follows;

Access and Use.	M1	Adequate provision shall be made to enable people with disabilities to safely and independently access and use a building
Sanitary conveniences.	M2	If sanitary conveniences are provided in a building, adequate provision shall be made for people with disabilities.
Audience or spectator Facilities	M3	If a building contains fixed seating for audience or spectators adequate provision shall be made for disabled people.
Definition for this Part.	M4	In this Part, "people with disabilities" means people who have an impairment of hearing or sight or an impairment which limits their ability to walk or which restricts them to using a wheelchair.
Application of this Part.	M5	Part M does not apply to works in connection with extensions to and the material alterations of existing dwellings, provided that such works do not create a new dwelling.

The requirements of Part M aim to ensure that;

(a) buildings other than dwellings are accessible and usable by people with disabilities, and
(b) dwellings are visitable by people with disabilities.

This document sets out the minimum level of provision to meet these requirements. However the underlying philosophy on which these requirements are based is that buildings should be accessible and usable by everyone including people with disabilities. Those involved in the deign and construction of buildings should have regard to this philosophy of universal access and should consider making additional provision where practicable and appropriate.

APPENDIX III

ANALYSIS AND THE FUTURE OF PART M

ANALYSIS AND THE FUTURE OF PART M

Analysis of Part M

Part M of the Building Regulations 2000 is divided into four separate sections M1 to M5. These sections relate to: Access and Use; Sanitary conveniences; Audience and spectator facilities and Definition for M. A copy of Part M of the Building Regulations 2000 can be found in Appendix I. Each Part of the Building Regulations has an associated technical specification guide attached or Technical Guidance Document - TGD. The minimum design criteria from the TGD for Part M can be used to define what is meant by "adequate". Compliance with the TGD demonstrates prima facie evidence of compliance with the Regulations (Society of Chartered Surveyors, 2009). The TGD also contains detailed descriptions of the minimum acceptable design criteria for providing access to the built environment for people with disabilities. However these guidelines also offer freedom to the designer as they are seen as a "guide" rather than a statutory requirement hence making enforcement difficult. "Adequate" is a very difficult provision to determine making the inspector's job equally difficult to assess. The TGD to Part M contains detailed specifications on: the Approach to a Building; Access into a Building; Circulation within a Building; Use of Facilities in a Building; Hotel and other Guest Bedrooms; Dwellings, Sanitary Conveniences and Audience or Spectator Facilities. In order to satisfy the requirements of Part M buildings should be designed and constructed in a manner that:

- People with disabilities can safely and independently approach, gain access to the building, and
- Elements of the building do not constitute an undue hazard for people with disabilities including those with an impairment of sight.

(Building Regulations, 2000)

Part M makes clear distinctions for the requirements of dwellings and all other buildings. The overall intention of the regulations is that buildings are designed in a manner that;

- People with disabilities can move around within buildings and use the building's facilities;
- Where sanitary accommodation is provided, adequate sanitary accommodation is available and accessible to people with disabilities;
- Where fixed seating for audience or spectators is provided, adequate accommodation is available for people with disabilities and;
- Suitable aids to communication are available for people with an impairment of hearing or sight.

(Building Regulations, 2000)

From examination of the Regulations it is clear that they regulate from the point where a person tries to gain entry to a premises for example the entrance steps or ramp. Unfortunately this does not take into account how the person gets from their mode of transport for example a car, to the point of entry, there are no provisions set out in the TGD for access driveways, car parks, taxi ranks etc that may all form part of the building's grounds and a person's circulation route. In 1996 the Commission on the Status of People with Disabilities accurately highlighted inadequacies in Part M of the Building Regulations 1992. One of the major criticisms of Part M is the use of the term "Reasonable". "Reasonable provision shall be made to enable disabled people to have safe and independent access to a building and those parts of a building which it is appropriate to have access" (Part M of the Building Regulations 1992). This requirement suggests that it might be "reasonable" to deny people with disabilities access to certain parts of a building, as was the case in the example from Cork (see chapter 3). This requirement was changed in the 2000 amendment of the Regulations to "adequate provision", and although it is not ideal it does place the onus on the provision to suitable meet the needs of the person and is therefore less open for debate.

It was also felt that reference to people with sensory impairments was a token gesture and that the legislation is primarily rooted in access for people with mobility problems. The Commission also outlines the lack of consideration that Part M has for the overall benefits of improved accessibility for everyone. This deficiency was not significantly addressed in the 2000 revision. The Commission also recommended removing inconsistencies between Part M and Part B, which relates to Fire Safety which were taken on board in the 2000 revision. The Commission also felt that the approach of the Building Regulations allows designers to interpret the minimum standards of the TGD as being optimum (or maximum as appropriate) requirements. This reinforces the idea that a few accessible features will do rather than making an entire building accessible to all. Such failures were exacerbated by the lack of definitions of the terms "adequate", "practicable" and "appropriate" leading to vagueness in their application. The lack of enforcement of Part M by the Building Control Authority was also criticised by the Commission and is still of relevance over a decade later;

"Lack of enforcement works to the detriment of people with disabilities as good workable access is still considered by many designers and building owners to be less essential than other aspects of the regulations"

(Commission on the Status of People with Disabilities, 1997, page 154).

The Commission issued four specific recommendations on Part M;

- eliminate inconsistencies from the TGD which work to the detriment of people with disabilities;
- ensure that each Local Authority establishes an efficient building control department with responsibility for implementing Building Regulations fully and immediately;
- make building inspections mandatory for all developments and;
- ensure Part M is enforced vigorously.

These recommendations have yet to be implemented however one practical measure proposed by the Commission that the Department of the Environment should introduce "Access Certificates", similar to Fire Certificates has been realised in the form of the DAC. The Commission hoped that such certificates would not only indicate the building is accessible but also safe for use by people with disabilities. The safety issue however was not addressed in the DAC. It has been suggested by many other disability organisations that Part M has not improved access to the built environment for many people with disabilities and after much lobbying for a voice the government established The National Disability Authority (NDA) was in 2000 to advise them in relation to the status of people with disabilities in Ireland. In 2005 they undertook an extensive review of the effectiveness of Part M. Some of their recommendations were as follows;

- A national strategy should be devised to secure access to the built environment though clear polices and targets. This strategy should develop proposals for improving access in existing premises and should be reviewed and monitored on a regular basis.
- There must be increased on site inspection to ensure compliance with accessibility requirements. The provision of a DAC does not prohibit inspection and enforcement.
- Those involved in the building profession should be trained in relation to the provision of the Regulations and associated TGD.
- A process should be formalised for the ongoing review of Part M in line with new improvements in best practice and international standards.
- The definition of disability should reference the Disability Act 2005 and extend its scope to include those with other impairments such as speech, mental health and dexterity.

- The TGD requires significant revision to increase accessibility to buildings in line with best international standards.
- The TGD should address the management of buildings and its impact on access.
- There needs to be a seamless approach to all the TGDs so that a requirement of one standard such as Part K, that regulates ramps, does not impinge on access.
- Access to entrances from streets and car parks should be required to be accessible.
- Lifetime adaptable housing should be compulsory for all new homes and 10% of new social housing should be built to these standards.

(Rogerson, 2005)

The NDA have become the "watchdog" over accessibility and continue to advise government not only on the area of access but on equality and anti-discrimination issues. It has become evident that the approach to both regulating and enforcing compliance with the requirements of part M has been some what disjointed and perhaps has led to the apparent lack of compliance noted by disability organisations. The voice of this frustration led to another call for the amendment of Part M and it will be interesting to see if the recommendations of the NDA will be considered in the proposed revision.

Proposed Amendment of Part M

Part M of the Building Regulations 2000 is currently being revised and in October 2009 the Minister for the Environment, Heritage and Local Government announced the final consultative process on proposals announced in this review. The new Regulations are due to come into force in late 2010 and are hoped to take into account a broad range of sociological issues such as Ireland's aging population. In 2006 11% (467,900) of Ireland's population were aged 65 and over, this figure has increased by 54,000 in the last decade (CSO, 2007). The CSO feel by examining population projections that this figure could increase to 25% by 2026. Taking into account infirmity and the statistic of 30% of the over 65s indicated they had a disability (Census, 2006) this adds significantly to the total number of people that require accessible environments. This revision honours a commitment made by government under Section 36 of the Disability Act 2005 that provided for the instigation of a review of Part M and associated TGDs. This review centres on improving access to building's facilities and environs for all rather than just people with disabilities. This holistic combined approach also proposes changing the title of the legislation from "Access for People with Disabilities" to "Access and Use" with the emphasis for access for everyone reinforced (Gormley, 2009). This is the first proactive step taken by government to move universal design into a more formal regulatory approach. Building control authorities were consulted in this review and noted their high number of consumer complaints on access. However this was on the basis of observation and no detailed data is available, this research aims to investigate further the basis of such complaints. The revised Regulations will require that all new buildings other than dwellings should be designed and constructed in a manner that allows people with a range of disabilities can safely and independently approach and gain access to a building, circulate within it, use relevant facilities, including sanitary accommodation within it. The Regulations also apply to approach and access and sanitary conveniences in buildings when extended. Even when revised the new Technical Guidance to Part M can be easily transposed into the proposed "LADDER" concept of this research for more current application using the universal design approach. Some of the main suggested alterations to Part M include amendment of "material alteration" (Article 11 of Building Regulations 1997) to include any alterations that would have features relevant to Part M will now require compliance with Part M. Article 13 is also proposed for revision by requiring application of Part M to buildings undergoing a material change of use to a day care centre, hotel, institutional building, place of assembly, shop or shopping centre. There are also proposed amendments in relation to approaches, internal doors and fittings of new dwellings that since 2001 were required to be visitable by people with disabilities.

The new proposed Part M of the Second Schedule to the Building Regulations (as amended) provides as follows;

Access and Use	M1	Adequate provision shall be made for people with disabilities to access and use a building, its facilities and environs.
Application of the Part	M2	Adequate provision shall be made for people to approach and access an extension to a building.
	M3	If sanitary conveniences are provided in a building that is to be extended adequate sanitary conveniences shall be provided for people within the extension.
	M4	Part M does not apply to works in connection with extensions to and the material alterations of existing dwellings, provided that such works do not create a new dwelling.

(Draft Building Regulations, 2009)

The aim of the proposed legislation is to adopt an inclusive approach to design and construction that ensures regardless of age, size or disability that buildings other than dwellings are accessible and usable, and dwellings are visitable. The underlying philosophy of these proposals is the adopting of the principles of universal design where the design and construction industries not only comply with legislative requirements but also make additional provisions where "practicable and appropriate". This is a very noteworthy amendment in the Regulations and its significance along with the concept of universal design is further discussed in this section. Based on the aforementioned proposed amendment to Part M the NDA also made a significant submission on the proposed legislation changes and consultation documents, recommendations included;

- The standards set out in Part M in many cases fall short of best international practice especially for those with vision, hearing and cognitive impairments. Pending the adoption of a more suitable revised Part M the NDA's design standard "Buildings for Everyone" or BS8300 the current UK accessibility standard should be recommended as guidance for minimum design criteria.
- Physical access to and use of a building without being able to approach it and use the facilities within that building is of limited value. The current UK Part M Regulations have recognised this and included a reference to facilities. "Access should be interpreted as including external access routes to and from a building".
- The suggested amendments to the TGD specifications for sanitary accommodation are not satisfactory for access for all and should be revised.
- There should be alterations in the TGD to the facilities recommended for audience and spectator facilities.
- The definition of disability should be altered so that it encompasses all disabilities that may impact a person approaching, accessing and using a building. However it must also be specific enough to capture certain impairments that restrict movement.

Such recommendations echo principles of recommendations set out by the Commission on the Status of People with Disabilities in 1996 and now the opportunity has finally arose for these expectations to be realised. The NDA (2009) also make some notable broader proposals on the overall scope of the Regulations. Accessibility should become part of the formal planning process whereby a prerequisite for planning permission would be compliance with Part M. The NDA (2009) also feel that local authorities should take more unified approach to their responsibilities for access by adopting a common written text relating to accessibility and in particular approaches to buildings.

They strongly feel that one greatly significant barrier to independent access it the current accessibility of approaches to buildings. Part M should be extended to deal with the accessibility of approaches to a building from the initial point of access such as street parking or car parks. This could also be achieved by altering the proposed DAC to include this requirement (NDA, 2009). The NDA also made extensive proposals to alterations of dimensions cited in each of the sections of the TGD to Part M. The most significant of these submissions relates to circulatory access of streetscapes approaching buildings from car parks and other access routes. Proposals suggested by the NDA required a more streamlined approach to accessibility taking into account other disability legislation.

The Equal Status Act, the Employment Equality Act, Health and Safety and Welfare at Work Act, Disability Act and Building Control Bill each have an impact on access to the built environment for people with disabilities and should be considered in any revision of Part M. The Irish Wheelchair Association (IWA) who represents 20,000 people with disabilities also made detailed submissions on the proposed revision of Part M. This submission was made following a major review of accessibility requirements of their members and the subsequent publication of their own "Practical Access Guidelines". The IWA feel that this revision of Part M offers a valuable opportunity to move from "minimum" to "optimum" design requirements (IWA, 2009). Although the draft document suggests designers consult higher design specifications the IWA also feel that in reality the majority of designers will consult the TGD to Part M as their main reference document because this is a regulatory standard it may be seen as a "catch all" document. Where reference is made to a higher design specification the IWA feel direct quoted information must be provided in order to engage the reader. Such technical information should also be provided in a manner that contains less jargon and can be easily understood by all concerned. The IWA also feels that provision must be made for existing buildings and guidance on measures that could be taken to upgrade their accessibility. They also agree that Part M must reference Equality legislation and the Disability Act throughout the document in order to provide a more cohesive consistent approach. Other more specific recommendations include;

- Increase the sizes for sanitary accommodation to allow space for a turning circle for a wheelchair and also require provision of changing bench and hoist facility.
- Increase the height of indoor car parking spaces taking into account the high top vehicles people in wheelchairs may use and improve space-marking system.
- Change the requirement for housing to be "lifetime adaptable" rather than visitable by people with disabilities.
- Require greater integration and scatter of people with disabilities in spectator facilities to ensure they can be accommodated next to their party.

(IWA, 2009)

The National Consumer Agency also made a detailed submission on the proposed revision of Part M. Although in their submission they concentrated on dwellings that is not the focus of this research, they did have some interesting observations.
Their submission moved away from the technical aspects of the provisions of Part M towards a broader perspective of building control in general. Some of there recommendations include;

- The system of building control enforcement must be substantially improved to provide an increased level of inspection including a transparent system of certification based on best international practice.
- A more formal approach to inspection and enforcement should be implemented and designed in a manner that allows public inspection and a complaints procedure.

- The BRAB should be made more accessible to the consumer so that they can make individual observations on the Regulations.
- Additional resources should be injected into Building Control departments to allow for the necessary changes to occur. (National Consumer Agency, 2008)

Another association interested in the housing element of Part M's revision was the Irish Council for Social Housing. They also submitted a detailed proposal, this time focusing on the provision of social housing by Housing Associations who currently provide up to 1600 new units per year. Since their formation housing associations have provided over 5000 units for those with disabilities. They believe the current revision is misdirected, rather that merely revising the current document a new concept should be devised to overhaul the concept of access for people with disabilities. They are advocates for "Lifetime Adaptable Housing" rather than just allowing for homes to be "visitable" by people with disabilities they have adopted a "design for all" approach. They identified some interesting issues in their submission;

- The success lies in the provision for adequate enforcement as experience to date shows compliance levels are poor. This is attributed to inadequate enforcement by building control officers and a knowledge deficit by designers.
- Building Control should be more linked to planning control to ensure planning control is used more effective to promote access.
- The wider social environment of streets, footpaths, kerbs and street furniture must be considered.
- Promote innovative design solutions and low cost accessibility options.

(Irish Council for Social Housing, 2006)

The Society of Chartered Surveyors who in their subscription to a clearly opposing model of disability felt proposed amendments are too prescriptive and need to be relaxed submitted an alternative approach to public consultation of Part M;

- Reintroduce the terms "reasonable" and "reasonably practicable" to allow for greater flexibility in interpretation of the requirements.
- Provide a range of dimensions in the TGD that allow for more choice.
- Provide transitional arrangements and extend the lead in time, especially for the DAC to allow industry and local authorities time to receive training for the requirements.
- Reverse the decision on applying new building regulations to old building stock (e.g. where there is a change of use) as this limits potential commercial viability of urban centres where some historical or conservation buildings may be impossible to alter.
- The environs of a building need to be addressed more by the new Regulations
- Rephrase "minimum level of provision" to "best international practice"

(Society of Chartered Surveyors, 2009)

Although the Society state these alterations would embrace the spirit of what the legislation is trying to achieve the reintroduction of "reasonable" and classifying the TGD as "best international practice" is sure to outrage many disability groups who have persevered for years to omit such references. By adopting the TGD as best international practice the limits will always be seen as optimum rather than minimum. Instead of a designer opting for the minimum demands of the legal requirement they must consider the possibility of designing for all thus including children, elderly, pregnant, so called "normal" individuals and people with disabilities.

APPENDIX IV

PRINCIPLES OF UNIVERSAL DESIGN
&
UNIVERSAL DESIGN DEVELOPMENT IN IRELAND

PRINCIPLES OF UNIVERSAL DESIGN

Universal design developed in the mid-nineties and the seven founding principles established by the North Carolina based Centre for Universal Design are as relevant today as in 1997 and are utilised today by the Centre for Excellence in Universal Design (CEUD) in Ireland in promoting universal design theory. The seven principles are;

1) Equitable Use:	the design is useful and marketable to people with diverse abilities;
2) Flexibility in Use:	the design accommodates a wide range of individual preferences and abilities;
3) Simple and Intuitive Use:	use of the design is easy to understand, regardless of the user's experience, knowledge, language skills or current concentration level;
4) Perceptible Information:	the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities;
5) Tolerance for Error:	the design minimises hazards and the adverse consequences of accidental or unintended actions;
6) Low Physical Effort:	the design can be used efficiently and comfortably and with a minimum of fatigue and;
7) Size and Space for Approach and Use:	appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

(Connell, Jones, Mace, Mueller, et al, 1997, p4/5)

The purpose of the Principles is to guide the design profession in areas of environments, products and communications. In describing their understanding of the underlying philosophy of universal design the Centre defined it as;

"The design of products and environments to be visitable by all people to the greatest extent possible without the need for adaptation or specialised design". (Connell et al, 1997 p.4/5)

The subscription to this definition combined with the seven principals is an appropriate foundation for designers who accept the accessible design brief to start their designs. The Center feel the Principles may be used to appraise existing designs, guide the design process and educate both designers and consumers about the requirements of an environment more accessible to all.

Features that must be considered when adopting the Universal Design approach

The CEUD (2010) describes many features that must be considered when adopting the universal design approach;

- The building as a whole.
- Each unit within the building for example halls, stairs, etc.
- Every design feature of the building or unit including walls, floors, ceilings.
- Every piece of furniture both fitted and loose.
- Location of each unit in relation to the rest of the units e.g. distance to toilets.
- The entrance to the building.
- The approach to the building, including the route to a road or car park.
- The car parking facilities.
- Temporary buildings and facilities.
- Public transport vehicles including taxis.
- Outdoor or open air facilities including concert/spectator facilities.
- Lighting, heating, ventilation and air conditioning.
- Water supply, including drinking water.
- Fire safety and evacuation procedures.
- Management of the building including maintenance, servicing and storage.

UNIVERSAL DESIGN DEVELOPMENT IN IRELAND

The Irish Pension Board projects that by 2036 more than 1.1 million people will be aged over 65 years of age this compares to the most recent 2006 census figures of 464,000 people in Ireland were over 65 years of age. This aging population prediction again reinforces the need for adopting universal design now in order to plan for the future. The CEUD was created within the NDA in 2007 and aims to approach design and construction of both the built environment and services in a manner that makes them accessible to all including people with disabilities. The CEUD promotes best practice in the design of buildings and products, including computers and other electronic systems. The theory of universal design will also form part of training and professional examination of architects, engineers and other design professionals through the promotion of best practice using up to date standards, education and awareness (NDA, 2007). The CEUD will develop standards, promote research, provide expert advice and encourage compliance with national and international universal design standards. The CEUD also hopes to raise awareness of universal design through the core values of independence, working together, human rights, equality and striving for excellence. Through interagency working with stakeholders such as disability organisations, professionals and government departments the CEUD aims to take account of human difference to enable all people to participate in society (NDA, 2007).

The CEUD also promotes campaigns targeted at particular stakeholders, for example tradesmen, interior designer, landscape gardeners, etc. in an attempt to form design partnerships. The Centre in future hopes look at other major groundbreaking concepts, such as sustainable development and those outlined in the previous section. The CEUD (2010) views universal design on macro and micro levels. At micro level a designer is not expected to develop a design for a product that fits all but a design that is more inclusive because it is impossible to develop a "one size fits all" scenario. On a macro level universal design is improving accessibility to features such as a service or even a society by going beyond individual tangible features to incorporating all features, policies and perceptions on accessibility to create a more streamlined approach beyond physical access alone. Successful application of these principles makes the prospect of meeting the design challenge posed by our future selves a distinct possibility.

The European Institute for Design and Disability is a European network, founded in Dublin, Ireland in 1993 that also promotes the principles of universal design in Ireland. The original aim of the network was "to use design to achieve the inclusion of disabled people in society in European countries". This aim has recently expanded with the inclusion of a more mainstream approach, of "enhancing the quality of life through design for all". The name change to Design for All Europe in 2006 reflects this development. Design for All Europe is now a federation of National and Corporate Member Organisations in 22 European countries. With a strong inter-disciplinary approach, the majority of members are professionals in design-related fields (EIDD, 2004). The aim of EIDD is to encourage active interaction and communication between design professionals interested in the theory and practice of "Design for All" at both national and community level. This is a design-led organisation focusing on the opportunities offered by design to "overcome at source obstacles that mankind has illogically created, in both mental attitudes and the resulting artificial environment, to enable all people to lead a full, pro-active part in an inclusive society" (EIDD, 2004).

Another recommendation from the Commission on the Status for People with Disabilities original submission was the suggestion that a national committee be established to develop universal design policy and practice and to monitor progress in relation to built environment access. This recommendation finally came into effect almost a decade later with the introduction of the Disability Act 2005 that enabled the creation of The previously mentioned Centre for Excellence in Universal Design (CEUD). The Disability Act envisaged that by promoting universal rather than accessible design that both products and buildings could be made more accessible to all not just those with disabilities. The Disability Act 2005 defines universal design as;

"the design and composition of an environment so that it may be accessed, understood and used;

- to the greatest possible extent,
- in the most independent and natural manner possible,
- in the widest possible range of situations, and
- without the need for adaptation, modification, assistive devices or specialised solutions, by any persons of any age or size or having any particular physical, sensory, mental health or intellectual ability or disability".

(Disability Act, 2005)

This means designers must allow for independent access in a natural manner to the widest possible range of situations. This is an important development as not only does this government led initiative strive to improve access of government buildings but also the wider built environment.

Teaching Universal Design in Ireland

Little emphasis is currently placed on universal design in universities educating architects and designers in Ireland. Designers are the one of the primary focus groups in promoting universal design and they have a strong influence over the finished design and plan. Educating them in the principles of universal design from the outset could alter their mindset to see that universal design is an integral process of design rather than an "add on" feature. Universal Design aims to improve design by making it more inclusive and accessible to all, it should never imply compromise to the extent it damages a design, it should in fact increase its' desirability. It is a process, not an outcome and therefore designers must adopt a user/person-centred approach to designing (CEUD, 2010). This requires an awareness and appreciation of the diverse abilities of people. Universal Design should be integrated throughout the design process as it is not an add-on at the end. Attitudes are slowly changing and accessible design is being introduced into the curriculum of architects and designers. In tandem with this there is a slow yet steady increase in the quality and amount of available universal anthropometric data that could greatly assist the design brief for accessibility. The NDA in conjunction with academic, accrediting and professional bodies is currently reviewing the manner in which accessible design is being incorporated into third level curriculums.

Presently in Ireland, accessible or universal design does not form the central part of the design syllabus at university level providing perhaps the primary reason as to why designers in Ireland have not welcomed the process.

There are however some British courses that do promote more accessible design principals, for example in the Universities of Wolverhampton, Salford, Coventry and Reading degree courses in Inclusive Design are available. These courses examine how design affects the way we live and encourages development of design skills to improve the status for people with disabilities. They integrate the understanding of ergonomics and sociology in the design of architecture, interiors and products. The University of Ulster runs a Universal Accessibility Auditing Programme in Jordanstown. This course was attended in the investigation of this research and is discussed in greater detail in Chapter 5. This course provided the skills necessary will to evaluate and apply the concepts and principles of Universal Accessibility, understand the implications legislative requirements, have an awareness of the medical and/or physical conditions which impact on, accessibility, identify obstacles to accessibility and recognise appropriate solutions, and produce written Accessibility Audit reports. In Ireland University College Dublin (UCD), has incorporated a module called "Draware" onto the curriculum of their architect's degree course. The principal aim of this project is to develop within the architectural profession, the awareness and design skills necessary to understand requirements and applications of principals to achieve universal access in the built environment. The project co-coordinators have developed an educational programme that is incorporated into the mainstream of design teaching within the School of Architecture at UCD. Some of the course material will also go towards the Continuing Professional Development of practicing architects. In developing this programme careful consultation took place between the coordinators and disability groups to identify a broad range of barriers to access and inclusion in the built environment including physical, psychological and physiological barriers (Draware, 1998). This exciting initiative is somewhat constrained by the current minimum legislative requirements that do not have foundations in the universal design concept. It has been found that design professionals rarely receive continuing professional development training in the area of accessibility (Draware, 1998). Very few designers have a disability. Very few people with disabilities are designers, this leads to a breach as to the insight and influence required to change practices. Designers need to be encouraged to interact with people with disabilities and other user groups. There is also a need to import inclusive design education into third level education and continuing professional development courses for designers and architects (Imrie, 1998). In contributing to the development of a new concept of design and teaching this course placed particular emphasis on a multi-sensual approach as a route to achieve greater accessibility to the built environment for all. Taking varying impairments into the design brief creates an extremely demanding process should a designer be willing to accept the challenge.

The CEUD (2010) hopes to further promote education in the area of universal design by working in partnership with education and training providers, certifying bodies, as well as students and professional bodies, to ensure that specialist training course in universal design are developed and delivered and becomes a key part of the curriculum of mainstream education, including architecture, engineering and design courses. They also aim to encourage design professionals to take part in Continued Professional Development courses on universal design. To this effect an excellence in design award has been launched as a "quality mark" for accessibility, ABLE Business Award. This replaces the Validated Accessibility Scheme, (VAS) as a now nationally recognised award that acknowledges businesses that have made provision for universal access and circulation throughout a premises. This means that all users including those with disabilities can circulate in safety and with ease (Horgan, 2009). This award is presented through a partnership between Rehab and Fàilte Ireland finally acknowledging private industry's recognition of the importance of people with disabilities as consumers and the value associated to meeting their needs.

APPENDIX V

DESIGN CONSIDERATIONS FOR ACCESS AUDITS

DESIGN CONSIDERATIONS FORACCESS AUDITS

The NDA (2002) have identified three techniques for acquiring access information. The first of these is the "Walk and Talk Audit/Route Appraisal". This is a very simplistic audit whereby a brief walk through of an area is carried out by an auditor to provide a client with a concise overview of accessibility and inaccessibility features of a building. No detailed report or long-term proposal for improvements is provided and it is typically used when a client plans short-term use of a facility for example hiring a room in a hotel for a function. Such an approach does little for the lifetime of the building. The second type of audit identified by the NDA (2002) is the "Design Appraisal" process that examines plans of a proposed building for accessibility. A report is provided that highlights improvements required to enhance access for people with disabilities. As this is a desktop study it is difficult to provide accurate predictions as to how the building will be used or managed. The third variation to the access audit is the "Acquisition Audit" that provides a potential purchaser of a building with the information required to identify any physical adjustments required to allow full accessibility (NDA, 2002). This audit is often used as a negotiation rather than improvement tool and is centred around cost rather than inclusive design. Although useful in each of their own rights none of them encompass the comprehensive approach of a full access audit. An access audit not only highlights priorities for action, recommendations and a plan for action it also highlights the presence of good accessible features so that the audit findings can be used as an information tool to assist people with disabilities in their decision making process. All-inclusive audits can examine printed material and publicity, staff attitudes and the physical and management issues within the built environment (Holmes-Siedle, 1996). The following is an example of a checklist of factors may be considered in audit design;

Feature to be Assessed	**Example**
Duties under law	Part M of the Building Regulations 2000
Building Use	Areas of use, periods of use and potential uses
Management	Health and Safety policies, evacuation policies
Maintenance	Daily programmes and any future plans
Proposed Changes	Changes in use, staffing or alterations/extensions
Access Criteria	Recognised measurement of accessible features
Consultation	Liase with staff and local access groups
Other Audits	Fire, safety or staff attitudes
Budget/Other resources	Space and time
Who Audit Addresses	Managers, technical staff or LA Officials
Time Scale for Work	In phases or continuous review

(Derived from Access Committee for England, 1997)

Holmes-Siedle (1996) described in detail some of the primary features that an audit should address. The main items he identified that should be taken into consideration as still relevant and include, physical access to both transport and the built environment, decoration and how levels of colour and contrast affect access for people with cognitive or visual impairments and evacuation provisions. Toilet facilities and their layout, including shower facilities as well as way finding and communication devices may also be taken into consideration. Other audits may include recreation facilities or health and safety aspects like first aid or signage. In designing an audit the people who are going to use it and be affected by it must also be considered. Finding out detailed information on the users of public buildings is an expensive and time consuming task often only carried out during large-scale audits by local authorities or architectural associations. These groups obtain this information from, existing data, surveys, and/or focus groups (Holmes-Siedle, 1996).

Fearns (1993), who was one of the pioneers of access auditing and developed one of the first access audits, listed four factors contributing to accessibility that need to be considered in the design of access audits;

(a) Building Shell

The main aspect that will determine access is how the building itself is constructed. Any conscious or unconscious decision made by the designer and owner/manager can fundamentally affect the accessibility of the building over a long period of time. From the number of steps to the entrance, to the type of floor surface, building owners and managers and designers have great influence when it comes to the provision of access for people with disabilities. There are still a large number of important public buildings in which importance seems to be determined by the number of steps up to the front door.

(b) Fixtures and Fittings

No building can function as an empty shell. The fixtures and fittings also play a vital role in accessibility. These fixtures and fittings will not survive as long as the building itself, so they will need to be replaced. An access audit can identify deficiencies in these fixtures and fittings. A conscious decision can then be made whether to make changes irrespective of cost or to make improvements based on economic limitations at a time when changes or replacement are due.

(c) Furniture and Equipment

After the installation of fixtures and fittings, furniture and equipment are then added to the building. Problems can also occur at this stage in relation to access. The lifetime of furniture and equipment is even shorter than the lifetime of the fixtures and fittings. It therefore follows that opportunities for improvement of access by using better furniture and equipment are much greater.

(d) How the Building is Utilised

When individuals occupy the building the human element, which includes use and management, becomes very important. Awareness and attitudes of both employees and employers need to be developed if the safety and convenience of people visiting the building are to be maintained. Accessibility is affected when working practices obstruct circulation or cause hazards for example, too much polishing can lead to slippery floors.

Understanding these four factors that contribute to accessibility will greatly improve the auditing process that in turn will improve future accessibility. Since the nineties these criteria have remained critical to the auditing process and in 2010 when the CEUD describes features that must be considered when adopting the universal design approach to access auditing little variation is evident;

- The building as a whole.
- Each unit within the building for example halls, stairs, etc.
- Every design feature of the building or unit including walls, floors, ceilings.
- Every piece of furniture both fitted and loose.
- Location of each unit in relation to the rest of the units e.g. distance to toilets.
- The entrance to the building.
- The approach to the building, including the route to a road or car park.
- The car parking facilities.
- Temporary buildings and facilities.
- Public transport vehicles including taxis.
- Outdoor or open air facilities including concert/spectator facilities.
- Lighting, heating, ventilation and air conditioning.
- Water supply, including drinking water.
- Fire safety and evacuation procedures.
- Management of the building including maintenance, servicing and storage.

Whatever criteria selected for auditing accessible designs that promote access for people with disabilities should not hinder access for others. Careful selection of design criteria and examination of factors contributing to accessibility will alleviate this.

Purpose of an Access Audit

The intention of an access audit will greatly influence both the terms of reference in which the audit is conducted and the outcome and use of results. Holmes-Siedle (1996) identified three other reasons for conducting an access audit;

(a) Comparative Survey

This is an audit that gathers data on the accessibility of a building or facility to build a comparative table of the accessibility of buildings. This type of access audit enables a statistical comparison of service provision across a region. Many attributes relating to the accessibility of a built environment based on technical attribute data will be collected and then each building will be compared in detail in relation to each attribute data.

(b) Analytical Survey

This is an audit that gathers data that indicate the accessibility of a building that may be used for publication in references, reports, directories and guides. This can assist people with disabilities in availing of accessible services that suit their individual needs. This is the type of audit that has been adopted for this research. It is envisioned that if people with disabilities are provided with accurate up to date information in relation to the built environment that they intend to access that this will empower them to the extent that they can make independent choices and thus live independently in the community.

(c) Adaptive Survey

This type of audit is formulated to gather information to bring about improvements in accessibility. It measures degrees of inaccessibility and generates recommendations for improvement. A comprehensive audit of this kind will also prioritise the improvements and make detailed recommendations. The cost implications of these recommendations may also be incorporated into an expected time-scale for the completion of works. Once the reason for conducting the access audit has been identified, the auditing process can begin.

Preparation for Auditing

In 1997 the Access Committee for England stood at the forefront of auditing the built environment for accessibility, the requirements they outlined at this time which need to be considered before commencing an access audit still bear relevance today and must be considered carefully prior to the design and implementation of any access audit:

- Legal Obligations: e.g. disability, fire, health and safety legislation, building codes.
- Building Use: periods of use, areas of use, use by members of the public, staff use, variety of usage and potential use incorporating future usage or adjusted usage to facilitate better access;
- Management: departmental responsibilities, health and safety policies, service delivery/customer service policy, employment policies and means of escape;
- Maintenance: routine programmes, periodic maintenance, plans for future maintenance and funding of maintenance;
- Proposed Changes: changes in use, changes in staffing, proposed alterations and extensions, moves, management/corporate changes;
- Other Audits: health and safety, fire, disability awareness, some of these audits are carried out as a matter of course, it may therefore be advantageous to combine the information of other audits for mutual benefit;
- Access Criteria: what recognised measurement criteria will the audit be formed around, in an Irish context this might be Part M of the Building Regulations 1997;

- Consultation: has any consultation been undertaken with staff, other users or access/disability groups. What are their concerns and priorities?
- Available Budget: known or projected budget. It is important to identify if the money will be available over time to allow for continuous improvements;
- Other Resources: space, time and willingness to facilitate consultation exercises and to conduct the study;
- Who will the access audit address: is it for managers or technical staff, and;
- A Time Scale for the work: recommendations of an audit will have a limited shelf life as the building will naturally develop in terms of structure and use, and good progress in accessible design will progress.

(Access Committee for England, 1997, page 6)

As mentioned an access audit not only takes into account the physical structure of the building but how the building operates on a daily basis. Therefore to obtain a true reflection of how a building works the NDA (2002) recommend that the audit take place when the building is fully operational over a number of visits in order to obtain a true reflection of how it functions. The auditor should approach the building in a logical sequence taking into account the building's users, the design of the building and the management of the building. Ideally people with disabilities should assist in the auditing process and this must not be confined to wheelchair users (NDA, 2002). The audit should appraise the features significant to accessibility including building approach, internal circulation, facilities, interior design, and escape in the event of an emergency (NDA, 2002). With a clear understanding of such factors the design and implementation of the access audit can commence, the aspects taken into account in the design of the "LADDER" concept for this study can be examined in Appendix IV.

Auditor

With an understanding of the background knowledge required the next aspect to decide upon is who will carry out the audit. The auditor appointed will be determined by the needs of the client/person commissioning the audit. The auditor should be chosen based on their experience and expertise in terms of their understanding of legislation and standards, their experience of people with disabilities, their training and their previous work in the area (NDA, 2002). Each of these aspects was considered in the decision to use this process in the design of the "LADDER" concept and each prerequisite was achieved as part of the methodology. Fearns (1996) emphasised the need for care in choosing a consultant to carry out an access audit. An access audit encompasses two elements: the built environment and people with disabilities. It could be presumed that architects, designers, surveyors, engineers and planners are the experts in the area of the built environment, however it is this group of professionals who have shaped much of the inaccessible environments of today. Therefore the most successful audits and surveys are carried out by a varied group of able-bodied people and people with disabilities, using questions designed mainly by people with disabilities (Holmes-Siedle, 1996). Fearns also agrees that the second element of the equation must be people with disabilities. It is unwise and unfair to assume that an independent wheelchair user will understand barriers faced by a wheelchair user who relies on being pushed. What an auditor can do is to point out how a building measures up in comparison with the measurements decided upon for the audit. They can then suggest practical ways in which improvements might be made to make the building more accessible to people. Many people find audits of great use including, architects, interior designers, building managers, disability organisations, access officers, equal opportunities officers, purchasers of equipment and furniture, health and safety officers, and of course people with disabilities (Fearns, 1993). One of the main reasons for carrying out an audit is to devise and introduce a package for improving overall accessibility.

No matter who carries out the audit, its true benefits will only be seen if there is co-operation and consultation between the auditor and building owners/managers, architects, planners, engineers and building users. The ACE (1997) also describes some of the skills that are necessary to implement an access audit. These skills include, technical report writing, (jargon should be avoided or where necessary explained) presentation skills, cost estimation, project management, understanding of accessible (universal/inclusive) design. Knowledge of recent good practice, construction materials and an awareness of conservation issues may also be beneficial.

Equipment for Auditing

With background knowledge of the building, the auditor and relevant training in place the next element required in the auditing process is appropriate equipment. The equipment required for implementation of the access audit depends on the type of audit being undertaken. This section aims to identify each of the typical elements of equipment required: measurements/criteria against which access is to be measured against; measuring equipment; plans or diagrams of the building; (Fearns, 1993).

a) Criteria which Access is to be Measured Against

One of the primary aims of this research was to design a "LADDER" concept to collect and communicate accessibility information to assist people with disabilities empower themselves to live independently. Once a set of accessible design data has been decided upon to determine access in the audit a list of measurement criteria can be developed. The measurement criteria in this research are adapted from the TGD to Part M. Most audits use either a checklist or table format.

b) Measuring Equipment

All measurements in the Irish Building Regulations, the NDA guidelines and available audit packs such as the Centre for Accessible Environments "Guide to Appraising the Accessibility of Buildings", are in metric terms. Nearly all measurements are in millimetres (mm). Therefore in practical terms a two-metre tape (2000 mm) is a useful tool as very few measurements that have to be taken will be greater than this. This basic tool proves vital in the measurement of actual levels of accessibility. Equipment used in this research included inclinometers (for measuring the gradient of ramps and slopes), a digital camera, a hand held computer (for collecting results), an electronic measuring device for measuring the width of footpaths and, the location of objects in the route of traffic (Sonin 60 PRO), and spring scales (for measuring the strength of door closers). Other equipment such as photometers (to measure light levels) can also be used where available. However, such equipment is often expensive and not readily available and if it is not available, personal opinion can be relied upon but only if carried out in conjunction with potential users. This is particularly useful if the opinion is obtained from a person who will be most affected by the feature; e.g. a wheelchair user's opinion of a deep pile carpet or a partially sighted person's opinion of the lighting conditions. In this research equipment was independently developed to specifically suit the selected audit criteria and measurements this included a door pressure gauge and a gradient meter.

c) Plans

Where they are available, plans of a building can be a beneficial tool in carrying out an audit. A plan firstly allows the person carrying out the audit to see what was planned in relation to access in the building and secondly, to see what actually was provided, and thereby assess if this matched expectations. Plans can also help in listing the areas that need to be improved. The one disadvantage however, is that plans may not be readily available or an accurate reflection of an older building.

In most Local Authorities an appointment must be made to view plans. If the official plans of a building cannot be acquired then a simple sketch of the building, drawn roughly or to scale can suffice. It is important that the plans or drawings themselves are not used on their own to get accurate measurements of accessibility. Plans can be inaccurate or significant changes may have been made to the building since they were made. Plans are often not detailed enough to show the location of furniture or the nature of finishes.

External and Self Audits

There are two options for implementing the access audit an external audit and a self-audit Fearns (1996). In both of these approaches the scope (will the audit act as a record of accessibility or will it suggests means of improvement) and the purpose (who the audit addresses) of the audit must be decided upon before its implementation. For an external audit a consultant is normally commissioned to carry out the audit. . This type of audit can be implemented when the organisation wants an independent view on the situation at hand. This approach may also be adopted when there is a lack of trained staff in the organisation to carry out the audit. A company may feel that they do not have the time or resources to train a member of staff to carry out an audit. This approach may also be used when a company needs to implement immediate changes to accessibility. Awareness training must also back up an audit carried out by an external source. Failure to do so will result in misunderstanding of the consultant's report and ineffective implementation of recommendations made. This in turn may lead to greater inconvenience or even danger, as external auditors will not witness future changes in a building's accessibility and subsequent needs for improvement.

A self-audit is where the organisation itself carries out the audit. This generally has the advantage of costing less than an external consultant and also acts as a way of training staff in issues of access on a very practical level. Consequently, staff members are unlikely to repeat mistakes or make new ones. Although this approach is cost effective a self-audit may be time consuming with focus often lost therefore requiring determination and stamina (Fearns, 1996). A self-audit will require a reliable set of measurement criteria (such as Part M of the Building Regulations 2000), a set of accessibility questions (such as Appendix IV) and measurement equipment (see Chapter 5). Any audit is only considered to be a success if the results are reliable, accurate and detailed and represent the difficulties that a person with a disability has (Fearns, 1996).
The NDA (2002) identify a number of other key issues that should be considered in conducting an all inclusive access audit these include;

- The presence of an access team to manage ongoing accessibility issues.
- Access policies and procedures designed by management.
- Access procedures in event of emergency (personal emergency egress plans).
- Training Records (for example staff who have sign language).
- Health and Safety Statements.
- Staff and management interviews.
- Communication strategies (both design and the information purveyed).

The NDA have developed an "Access Handbook Template" as a tool to help building owners manage accessibility in their built environment. This provides an outline as to how to catalogue and explain the features, fixtures and fittings of a building that must be monitored or improved in order to ensure access for all (O'Herlihy, 2005). Such documents can assist management in meeting legal requirements and ensure high levels of access on an ongoing basis based purely on the findings of the access audit.

APPENDIX VI

GIS: HISTORY OF MAPPING, GEOGRAPHY OF DISABILITY & UNDERSTANDING GIS PROCESS

&

CURRENT WORK IN THE AREA OF MAPPING DISABILITY

GIS; History of Mapping and GIS, Geography of Disability, Understanding the GIS Process

History of Maps & GIS

Peuquet & Marble (1990) provided the most interesting original insight into the origins of mapping and identified how the first maps were drafted before the first alphabets. Maps were initially used to describe far-off places, as an aid to navigation and for military strategists and to assist decision-making processes. In Roman times the agrimensores or land surveyors carried out extensive map making, but when the Roman Empire declined so too did map making. During the eighteenth century governments began to realise the importance of systematic mapping of their lands, and since that time many individual styles of mapping have evolved (Burroughs, 1991). A physical map can be relatively easy to plot in order to store large amounts of spatial data in a compact and accessible form. It does however have some limitations and those outlined by Aronoff (1989) are still evident today, for example data for a physical map needs to be firstly generalised in order to appeal to a greater population, this data must then be refined to develop to a level that is easily presentable, if not done correctly valuable data may be lost in the process. Another limitation is where a large area is to be represented; data has to be divided up into smaller scales to make it more legible although difficulties may be encountered matching edges where the data overlaps. Retrieving and managing large amounts of spatial information and combining such information from several maps sources can be expensive and labour intensive (Aronoff 1989). This research examines one such element of geographic information management technology, GIS and this section aims to introduce concepts underlying mapping, the power of maps, an overview of GIS and current uses of mapping in the area of disability.

The concept of GIS has its first origins in the 1960's where Ian Mc Harg a landscape architect while searching for a viable route for a highway introduced the concept of overlay. He aimed to design a highway that had the minimal disruption to other "layers" of the landscape such as pastures. Using layers of tracing paper he examined the intersection of each feature with the next highlighting the only logical route and inadvertently inventing the methodology for the first ever GIS (Schuurman, 2004). Although this was carried out using paper over a light box technology quickly caught up to the concept and a computerised version emerged in Canada in 1964. Roger Tomlinson used aerial photography to plan forest plantations when he by chance met Lee Pratt who was compiling land use maps for the Ministry for Agriculture. A meeting of minds occurred that pioneered the first computerised system that overlaid digitally enhanced data to plan land use. The Canadian Parliament named the system Canada Geographical Information Systems (CGIS) (Schuurman, 2004). GIS was slow to be accepted as cartographers found it difficult to leave behind the aesthetics of the hand drawn map however gradually computerised cartography grew into automated GIS.

MacEachren (1998) expanded on traditional definitions of GIS in relation to functions that it can perform into a system how data is "handled" rather than functions performed "on" data. He believes that Geographic Visualisation Information Systems (GVIS) brings GIS to a new level that will appeal to many genres and enhance the investigation of multi-disciplinary matters giving maps greater function and purpose. Visualisation can be logically applied to a GIS application. Visualisation is emerging as a subset of GIS whereby users interpret visual imagery and algorithms for data manipulation and patterns of user/computer interaction. Kraak and Ormeling (1996) explained how this theory could be applied in three different situations. Firstly visualisation can be used to explore the raw data, how can it be applied to the "problem" to hand.

Secondly visualisation allows analysis, combination and overlay of different data sets to provide new meaning. Finally visualisation can be applied to display and communicate the information manipulated and analysed. These three visualisation applications of exploration, analysis and presentation in a GIS can only be combined successfully by the user and although assisted by software the success of the product is limited by the foresight of the user. Kraak and Ormeling (1996) describe this concept as "private visual thinking". Visualisation in mapping allows the spatial relationship between objects to be made visible. But does the data actually require the underlying map. Is not sufficient to query the non-spatial data in its own right, as by definition the data is "non-spatial". Kraak and Ormeling (1996) successfully argue this point in describing that without the map the user would be unable to conceive the relevant spatial problems that would be solved through using a GIS. A GIS allows for the integration of varying data sets as long as they have some form of spatial relationship. Kraak and Ormeling (1996) give a clear insight as to why this system is unique.

Geography of Disability

The examination of the geography of disability may help reinvent the authoritarian or controlling nature of the map and as described by Harley (1989), a process that matches the map to the users requirements and specifications allows the empowerment of the ultimate end user to control its output. People create their own cognitive maps of the environment and each individual's cognitive map will differ (Vujakovic & Matthews, 1994). Cognitive maps become their creator's authoritarian maps; we all individually create our own "controlled" maps of the spaces we inhabit. Much has been written on the relationship with an individual's (able-bodied) perception of space and experience of an environment and the procedure the human mind goes through to come to its conclusions. The process is still not entirely understood. MacEachren (1995) describes visual cognition as the means by which cognitive processes interact with vision to enable us to interpret the world and our apparent ability to mentally manipulate visual information in the form of images. The detailed examination of a person's cognitive experiences can assist the development of maps and mapping methodologies. Their unique "authoritarian" images can be examined and expanded to increase their and others understanding of location, distance and direction through interaction with maps. This understanding assists the empowerment of the user. Viewing the environment in which a persons interacts in two or even three-dimensional scales immediately gives a greater understanding and visualisation of that space. Gleeson (1999) further expands on the geography of space by introducing the concept of "enabling geography"; he describes disablement as a "profoundly spatial experience". This spatial experience is not only sensed at the point where one physically interacts with the built environment but at all stages from the policy makers, to the legislature to the architect to the planner and on to the developer. Spatial experience extends beyond use of the existing physical environment to the attitudes and endeavours (consciously or not) of those who envisage it. Geographic visualisation links an image to what a person sees or perceives they see. This is becoming ever enhanced by the evolving computer sciences that surround us. It is now possible to link a visual map with real time, transient data. As the data evolves over time so too can the map to the point where if consciously made, enables its user.

Maps build from initial data identification and analysis through to the final representation of results. Combining these two factors allows the end user to truly visualise the data. Success of any map lies with the accuracy of the data and the competency of the user in presenting the information. MacEachren (1995) describes cartography as being about data representation. This is a good foundation for beginning to consider the expansion of the use of the map into science, art, sociology and many other fields including disability. Maps allow for a communication of valuable information to the user.

MacEachren (1995) describes the basic structure of cartography as being the combination of an information source with the cartographer's interpretation of the data with a map and an end user. One of the functions of the cartographer is to decide what information to portray and how it is represented. This is ultimately pre-determined by the needs of the end user, but can an able-bodied person truly predict the needs of one disabled end user let alone end users with disabilities? Before such a map is ever plotted it has a pre-defined purpose and hence a pre-defined end user. MacEachren (1995) correctly considers that maps should not be evaluated by how much information they communicate and how quickly, but how well they suit the task assigned to them or more importantly the user assigned to them. For cartographic representations of the built environment to be effective their designers must take into account the personal geographies of people with disabilities.

Where there is a map there must be a map-user. All users will be different, as all users will employ the map for varying reasons or to receive various messages or communications. Vujakovic & Matthews (1994) described how the way in which the environment is interpreted forms the basis of an individual's personal geography and it is only by addressing this personal geography can maps be truly "accessible" for people with disabilities. Many disciplines have sought to advance the difficulties faced by people with disabilities. These include the medical, social, engineering and architectural sciences. Each discipline has achieved much advancement in their individual fields of expertise. However Vujakovic & Matthews (1994), feel that geographers and cartographers are very well placed to progress the area further. These disciplines can in their unique perspective significantly contribute to breaking down barriers of understanding of the needs of people with disabilities, thus leading to greater awareness of urban space and its usability. MacEachren (1998) debates that if visualisation includes both visual thinking and visual communication then what does it exclude? Does linking these two factors merely provide the user with a form of cartography? Visualisation goes one step further it provides increased potential for human-map interaction that is only limited by the imagination of creators and end users. Human map interaction has a set of components related to the processing levels required. Maps themselves long existed before the concept of visualisation was ever pontificated. The objective of visualisation is to analyse information about geographic relationships (Kraak and Ormeling 1996). MacEachren (1998) explains that visualisation, like communication is not just about drawing maps but about using maps as a three-dimensional space within to interact. This evolves the limited user from gaining limited information to enabling many users interact with maps spatially, linking their internal imagery to the map. The user will always have human-map interaction. What underlines the potential for the depth of this interaction is the application of computer science to the map, which MacEachren (1998) feels facilitates visual thinking in qualitative as well as quantitative ways.

The study of geography and disability had traditionally been separate with many of the social sciences still unwilling to recognise the obvious link. Customarily the only tenable link between the two areas was related to improving access for people with visual impairments through the provision of tactile warning strips and tactile maps. The bond between geography and disability has had a slow but natural evolution that has provided a valuable intervention that can only serve to progress the improvement of disability access. The key to the success of this bond appears to be geographer's enthusiasm to see beyond the physical access issues to encompass the social access issues, something the social sciences could learn meaningful lessons from. As highlighted by Imrie and Edwards (2007), there is limited literature examining the combination of disability and geography in a manner that looks deep into the diversity and difference that underpin their interconnection.

Maps are used extensively within the planning process and physical planning maps inventorise the current situation and propose options for future development (Kraak and Ormeling 1996). If these maps have been dictated by able-bodied cognitive mapping they cannot and will not speak for the requirements of people with disabilities. Before the planners of an urban area can decide on a future development plan of its area numerous physical planning maps must be drafted forecasting trends and predictions, the manner in which these maps are drafted become a direct reflection of the opinions of its makers. This must account for why so much of the current built environment is inaccessible to many in society. If current and future representations are mapped or communicated from able-bodied authoritarian point of view this image shall be replicated for some time to come.

Understanding the GIS Process

There have been many descriptions of GIS and although current definitions such as the previously stated Nyerges and Jankowski (2010) definition are significant one, although somewhat dated description still stands the test of time in providing a useful starting point to understanding the concept. Burroughs (1991) describes how GIS aims to develop a powerful set of tools for collecting, storing, retrieving at will, transforming and displaying spatial data from a real world in terms of their position in respect of a known co-ordinate system, their attributes that are unrelated to their position and their spatial interrelations with each other that describe how they are linked together or how can travel between them. This description begins to introduce the concepts important in building a GIS. This includes coordinate systems, attributes and spatial interrelations. Understanding GIS involves the breakdown of the associated terminology and developing an appreciation of its application in various situations (Steinberg and Steinberg, 2006). The first element that must always be considered in a GIS is the data and how it is to be handled. GIS is suited to two types of data; spatial and attribute. Spatial (also known as geographical or coordinate) data represents features that have known coordinates on earth. Spatial data is raw data that has a geographic link through reference coordinates. Such data like roads or rivers can be presented on digital maps as points, lines or areas (also known as vector images) or as pixels or grids (also known as raster images) (Tomlinson, 2007). Data representation in GIS is either in raster or vector format. Information is stored using a feature called a cell or pixel. Cells are most often represented as squares of a fixed dimension and resulting data sometimes looks “blocky” and features that may be linear or polygon are represented as a group of cells in the raster model. Attributes are not stored in table format but coded to an individual cell. A single attribute is coded to each cell and if additional information is required more data sets or linked table are necessary.

What raster losses in detail it gains in speed so is therefore beneficial where less geographically detailed maps are required (Steinberg and Steinberg, 2006). Raster format can also be referred to as grid format and was the original format used in early GIS where data is represented in grid or pixel format that links to a coordinate system. Raster data is easy to handle however it requires much storage space to allow good spatial resolution. Images obtained from satellites are an example of raster data. Vector format data manages geographic elements in a series of coordinates and allows depiction of a true shape of an object and it has the advantage of using less storage space (Phadke, 2006). Linked to this data is the attribute data that bears no link to geographical location (such as the temperature of the air). It is the combining of the depth of such data to spatial data to allow for analysis that makes GIS a powerful tool (Tomlinson, 2007). Map regions or symbols can be depicted on the digital map and once selected can reveal a multiple amount of attribute data.

The geographic component of a GIS can be perceived as both confusing and difficult to get a handle on. We have long since known the value of locating a place or feature on a map and providing links to connections to these features. The scientific basis for mapping is less understood and we rely on geographers understanding of coordinates and algorithms. Fortunately GIS software provides many solutions to these difficulties for the average user and although the full complexities may not be understood the necessary components must be (Steinberg and Steinberg, 2006). Many researchers connect people and society and link attribute data to their geographical location making GIS an appropriate tool for analysing and communicating data. Sometimes there are difficulties in obtaining exact geographical information about an object however as geography is at the heart of the GIS these difficulties must be overcome by spatial degradation of detaching information from its true location (especially where privacy is an issue) (Steinberg and Steinberg, 2006). To allow more in depth analysis the data (both geographic and attribute) must facilitate overlaying in layers in an attempt to derive new relationships or meaning. Phadke (2006) describes a data layer as a set of logically related geographic features and the relationships between them. This is a unique feature of GIS that allows for information to be split into different thematic maps on one geographical plane in an acutely accurate manner (Phadke, 2006).

The overlay function in GIS distinguishes it from other computer mapping processes as it allows for the overlapping of datasets to create a new map with greater analytical meaning. A GIS can plot non-spatial data to that known location. Once plotted then endless queries can be performed on that data. A GIS can with little effort combine spatial (graphic) and non-spatial (graphic) data. This data may come from very different sources however its combination allows for the analysis of both sets in numerous scenarios. GIS data comes from a variety of sources in meeting a variety of needs to provide a holistic view of a complex issue and the success of GIS comes from the manner in which the data is managed through powerful software with attractive mapping capabilities (Nyerges and Jankowski, 2010). This success also however lies in the quality and accuracy of the graphic/spatial (mapping feature) and non-graphic (information relating to the characteristics of map features) data. If either of these datasets are inexact then the end user will ultimately be mislead. Kraak and Ormeling (1996) identify some problems in relation to acquiring accurate data. Data can be collected at different times by varying methods from desk top study to field work. The durability of the data may be limited to factors changing over time rendering some data sets having a limited shelf life and usability. Systems are also limited by the map data model that consists of points lines and polygons and that data can be clearly linked to discreet locations unfortunately much data is often not so clearly defined (Steinberg and Steinberg, 2006). As access to the built environment is continually changing the proposed “LADDER” concept of this research must have the capability to facilitate updating so that data presented is as “live” and as accurate as possible.

Attainment of graphic data can be from numerous sources such as terrestrial surveys, photogrammetrical surveys, satellite data, GPS data, map digitising etc (Kraak and Ormeling 1996). Problems may occur with these sources, as each source is stored in a different manner or may be subject to licensing or copyright laws. Once these issues have been resolved they can then be entered as part of the GIS. Using graphic data in a GIS will present the query of what visual tools can be applied to compare data. Kraak and Ormeling (1996) describe three methods of data comparison. Firstly spatial comparison allows for the examination of data on the same scale, this allows for the identification of trend or pattern. Next, thematic comparison allows a map to display different themes in a certain area. Finally temporal comparisons provide a view of a defined area over an expanding time period. GIS integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information (ESRI, 2008).

Harvey (2008) however warns to ensure the accuracy of the map the user must take care in abstraction of data to be used reducing data complexity too far may result in unreliable data. A decision must be made in every map production as to what level data should be reduced to as it is impossible to map everything however in doing so care must be taken not to loose the meaning of the map. Once the data has been chosen Phadke, (2006) describes the next support components vital to the foundation of a GIS, computer hardware, software application modules and the organisational component. The hardware component consists of the central processing unit, the storage unit, visual display unit, digitisers, plotters scanners and other peripherals. Such devices allow for the transformation of hardcopy paper maps into digital maps. With current advancement in technology such devices are often found in portable or micro-computer versions that allow inter computer communication through networks via modems (Phadke, 2006). With the required hardware elements in place a software package must be chosen, the selection of which should examine its strength in five fundamental elements;

- Data Input and Verification
- Data Storage and database Management
- Data Output and presentation
- Data Transformation
- Interaction with Users (Phadke, 2006)

Data input requires the user to convert data from existing maps and data sources into a usable digital format. Data storage and database management requires the user to organise attribute and geographical data in a manner that will allow ease of handling. Data transformation focuses on the maintenance of the data, linking it to other data sets and implementing quality control. In preparing to carry out data analysis it is essential to consider a variety of basic mapping and data format concepts (Phadke, 2006). Data analysis should take into account three aspects, firstly the overall concept for the use of the entire study, what are the aims and objectives and how do they link to the GIS. Secondly the location of the proposed area of study, what are the main characteristics and demographics of this geographical area? The final aspect to consider in deciding analysis is what questions are to be posed of the data including the overall research questions, the themes as they emerge from the data and how incorporating GIS could enhance outcomes of the study. The success of the use of a GIS is being in a position to identify variables that as best suited to its capabilities (Steinberg and Steinberg, 2006). GIS software typically includes tools for conversion of data format so care must be taken to monitor the accuracies of such conversions so that data is not lost. It is important to monitor data format and quality and make the necessary adjustments so data remains accurate and reflective of the situation. However Steinberg and Steinberg, (2006) identifies that good map design is based on a host of principles that many GIS software packages do not adequately cater for. For example software often assigns colours automatically which sometimes are so similar it makes it difficult to distinguish features. The final phase of the GIS process is output and for most users that is the map. Data output and presentation influences how the results of examining the data will be displayed. Maps produced in GIS can be attractive and is an excellent tool for communicating results. However one disadvantage may be placing too much information on a single map as this may cause the map to loose its relevance. Keeping maps simple strengthens their message, a maximum of five varying attributes is the maximum recommended and therefore this is the maximum number of attributes presented in maps presented in this research. Consideration must also be given to layout, size, orientation and presentation of legends (Steinberg and Steinberg, 2006).

Current Work in the Area of Mapping Disability

(a) Navigation Systems for Visually Impaired Pedestrians

The Graz University of Technology, Austria researched projects in their Institute of Navigation and Satellite Geodesy for assisting blind people access the built environment. They developed a model for navigating and positioning visually impaired users as they access their urban environment. The research was carried out in close collaboration with people with visual impairments. The aim of this research was to both make a difference on a social level and provide an outdoor navigation concept that includes both positioning and guidance (Wieser, Hoffmann-Wellenhof, Mayerhofer and Pressl, 2007). The model developed hardware and software components and along with a study into the background requirements to access for users linked this technology with common aids such as the white cane. The software incorporated a GIS function that provided a navigable map presenting information on footpath networks that can be used to decide an optimal path from a starting point to a pre-determined destination (Wieser et al 2007). Route planning in this sense will also be investigated in this research as a potential innovation of the proposed "LADDER" concept. The Austrian system allowed for individual positioning to a location relative to a near by object/obstruction. Route guidance was found to be a significant advantage to route planning as well as map matching as users could make informed decisions. For this model the white cane made a clearly audible sound and information exchange by voice between the user and navigation advice at the opportune moment. Although Wieser et al (2007) did find difficulties with cost and accessing good up to data accessibility data of urban landscapes this system has the potential to provide users with an audible digital navigable map that does not rely on the traditional tactile map and could revolutionalise the integration of people with visual impairments in society.

A similar short-term design project was launched in Dublin in 2007 as part of the NDA's annual design challenge. Five teams worked with an expert user (visually impaired person) to come up with a product or service that addressed a challenge commonly faced by them in making their way around the streets of Dublin. The teams were made up of architects, landscape architects, engineers, product designers, interaction designers and students. On observing their given route through Dublin, it became obvious that some parts of streetscape and routes were more accessible than others. This identified the need for a map-based system of alternative routes for specific needs (NDA, 2007). "My Way" allowed users to navigate the built environment by the chosen route appropriate to their needs. It incorporated GPS in a portable device that is accessible to multiple users, ranging from the disabled to the able-bodied, the young to the old, the pedestrian to the cyclist, the local to the tourist and many more. It incorporated an online web service where users could input their parameters and special needs. Although this was a "concept day" the potential advantages of such a device are clear in improving the accessibility and integration of not just people with disabilities in Dublin.

(b) NCBI & TACIS "Dublin by Touch"

The NCBI together with ESBI, Frank Audio-data and Index Braille Printers developed a GIS to help people with visual impairments orientate themselves in Dublin city. This project was funded by a European TIDE grant. It used a TACIS (Tactile Acoustic Computer Interaction System) and was entitled "Dublin By Touch". The system was developed to create an integrated system for importing interpreting and creating graphics for people with visual impairments. "Dublin By Touch" provides interactive access to digital maps of Dublin. It is a system whereby the user requests information on a particular area of Dublin city. Criteria to be mapped are selected, for example roads, buildings and bus routes. A map of this area is then printed in braille and placed into the Tacis pad.

Specific queries can then be inputted into the GIS. The user can access results in the form of tactile printouts, tone-scapes (each map feature has a different tone) and braille annotations within graphics. This tool is multifunctional and allows the user to access pictures, graphical user interfaces, maps and text. The software used was MapInfo version 3.0. MapInfo is flexible therefore users can operate it to become familiar with their hometown streetscapes. If digital maps are not available, simple ones can be created. The design of menus and commands allows users to perform queries and select routes.

(c) "Disabled Go"

The only service currently available in Ireland for communicating up to date accessibility information for people with disabilities in Ireland is a web-based service entitled "Disabled Go". This UK based project produces online access guides in an attempt to break down barriers that people with disabilities face when trying to access services in their community. This service is unique as it was the only service identified that sends a qualified surveyor to every site to conduct an access guide so that users can rely on the information provided (Disabled Go, 2010). An access audit is not conducted as the surveyors prefer to "say it as we see it" rather than adhering to an auditing process and formal measurement criteria such as the TGD to Part M are not used. The overall aim is to provide information so that a user can make an informed decision on their planned activities (Disabled Go, 2010). People with disabilities designed the access guide and regular consultations are held to assist the development of the process. Disabled Go does not judge or rate the accessibility of a venue but provides intricate detail on each feature contained in a venue allowing a user to make a choice based on their particular circumstance. They believe it is sometimes more important to understand the inaccessibility features in order to make a final decision. The guide is presented in one of two formats, the first is "Key Access Review" that provides the venue's address and symbol representation of accessibility features. This guide is aimed at venues the user would spend minimal time in for example a bank. The second is a "Detailed Access Guide" that provides detailed information in sections relating to the accessibility of each feature in tabular format with some associated photographs. There may be up to 800 pieces of information in each venue's guide that can make it laborious for a user to extract concise information quickly in a user-friendly manner. Although it is not a text heavy report it is presented in a manner that is time consuming and uninviting to access. However, one distinct advantage of this system is that that data is continually updated keeping the system relatively "live" with annual reviews implemented.

In Ireland two local authorities have subscribed to the Disabled Go service, Cavan County Council and Dublin City Council. Cavan County Council now has 500 venues and services registered on this online access resource as a facility to empower people with disabilities to function as independent individuals in society and make informed decisions through gaining a level of understanding of access provisions. In Dublin City Council almost 1000 venues have registered with Disabled Go in an attempt to fulfil the targets and aspirations of the Barcelona Declaration in making Dublin one of the most accessible cities in the world.

Disabled Go or as it is known in Dublin; Dublin Access Matters Network requires the completion of an access audit that looks positively on features/aspects of the business that are accessible in an attempt to portray a positive image for the business registered. Unfortunately negative or inaccessible features are not listed making the system a "lottery" for the potential user. However the audit is conducted by a trained professional who does provide a access action plan for state buildings to assist in the improvement of access. There is also a link to Dublin City Council's Access Officer who will assist in longer-term access issues. Although this service bears some similarities to the aim of this research the failure to use design standards such as the TGD presents a missed opportunity to provide suggestions for assessing regulatory standards.

The presentation of results in reviews containing up to 800 attributes is also dissatisfying as it does not provide a system of clear concise and quick user friendly outputs that the proposed GIS systems offers. The mapping element is also disappointing as a "drawing pin in a map" system is used that does not allow comparison with other services in the area and does not provide any indication of accessibility from a quick glance. The "LADDER" concept proposed in this study will provide an overall accessibility rating for a premises based on individual ability while also providing a comparison of other similar services in close proximity and details of inaccessible features.

(d) Access in the City

Access in the city is a new online tool for obtaining information on accessibility in Dublin City. This service differs from Disabled Go as it acts more as a forum and social network site where people with disabilities can share accessibility information. The site does however contain some detailed information on a map relating to accessibility of local authority services such as parks and some streetscapes and allows for users to input feedback on proposals that may affect access. The site keeps users updated on plans and timetables for works being carried out in the city that will impact upon access. Access audit results of local authority properties are also posted alongside remedial plans as part of the Framework Implementation Plan of Dublin City Council in their attempt to make its' services universally accessible by 2015 (Access in the City, 2010). This information service does not however provide information on private businesses or precise accessibility and inaccessibility features of local authority services.

(e) Accessible Ireland

Accessible Ireland is an information source produced for the sole use of wheelchair users to obtain professional information on the Irish hospitality industry. This service provides basic information on accommodation that has amenities such as roll in showers or accessible toilets. They collate this information by contacting members of the hospitality industry such as hotels and restaurants and ask them to provide information on their accessibility provisions. This service handles the user's booking by contacting the hotel/restaurant and ensuring the user's need will be accommodated. Although the service does provide a limited mapping function highlighting geographic location on site very little information on access features is provided.

(f) National Access Register

The concept of National Access Register also known as Direct Enquires emerged as a direct response to frustration felt by the founder's father who is disabled, in visiting shops, restaurants and services. Decisions for him and his family in accessing services were considered to be a "lottery" as they were unsure as to the levels of accessibility present. Consequently the National Access Register was created as a form of "Directory Enquires" service for people with disabilities. This UK web based company was developed in partnership with disability organisations to provide people with disabilities with information in relation to accessible features in their area. The company registers organisations that then voluntarily provide their individual access criteria to the National Access Register by completing a self assessment form. Users then can search for accessible buildings in their area and results are shown using symbol system, for example a wheelchair symbol designates the presence of a wheelchair accessible toilet. No information is provided in relation to inaccessible features. There is however an option to view the location of the premises on "Google Maps", but they are presented as a guide only and are not considered accurate by the site manager. No further information can be extracted from the map. The service is expanding to implementing access audits themselves of hotels thus providing more comprehensive information that links summary access information and photographs.

Although this system has similar ideals to this research by communicating access information to people with disabilities, there are some shortcomings. Firstly only buildings (other than hotels) that have voluntarily registered with the service will have accessibility information displayed on the site and secondly buildings with good accessibility are more likely to register than those with poor access (that generally are of greater concern to people with disabilities). The system operates in isolation and does not have any input from building control officers in relation to compliance with the law or disability organisations in relation to promoting compliance. The mapping system used does not allow extraction of more detailed information, as a GIS would provide. However such a service does provide more choice and information and assists businesses in meeting some of their legal requirements in relation to equality legislation.

(g) Blue Badge Map

The Blue badge map is a UK government web based information site that provides an interactive map for people with disabilities to access information in relation to blue badge parking spaces, car parks, public toilets, taxi ranks and other public services. This service provides accessibility information on a map with symbols indicating the location of an accessible feature, no further information can be drawn from the map. Based in 100 UK towns this site successfully communicates accessibility information on communal services, however the accessibility of individual businesses is not depicted.

(h) CRID (Consorci de Recursos I Documentacio per a l'Autonomia Personal)

In 1992 the Paralympic games were held in Barcelona. All new and altered structures or developments were constructed with accessibility in mind. This resulted in a great improvement in the city and even greater acceptance by its citizens. The Barcelona City Council decided to invest in a long-term project of accessibility improvement. The project is geared towards the entire population, but will ultimately benefit people with disabilities most. By March 1995 access was high on the list of priorities of Barcelona's Municipal Council, leading to it being invited to host the European Congress "The City and the Disabled". As a result of these improvements the CRID developed an overall strategy for improving the quality of life for people with disabilities through good environmental design based on the concept of design-for-all. As part of this plan current accessibility features were mapped to a GIS in order to identify the changes necessary in the city to remove architectural, urban and transport barriers.

From current data files the CRID know of no one else using GIS to map accessibility in this manner. The CRID have developed 25 municipal accessibility plans in 25 cities, with the support of GIS they have improved their tools to make them more efficient. The CRID use the current regulations in Catalonian, Law 20/1991 25th November and the government decree 24th March of the Government of Catalonia. They carry out inspections to investigate if the built environment matches these legislative accessibility criteria. In their work they have developed maps that examine the accessibility of the thoroughfare, the transport (public transport lines, parking for people with disabilities static elements such as bus stops, taxi ranks) and the location of public places (bars, chemists, hotels, restaurants, cinemas, supermarkets and public buildings). They programme works using the city digital cartography of the city, provided by municipal services as a base map. GIS is used as an information source and for design work for the thoroughfare. The urban elements that need to be modified are identified and a budget is developed. The main objective is to increase the efficiency of various operators across the city on various projects. On request, the CRID will assess the accessibility of individual buildings, but at present are not converting this data to a GIS. They develop accessibility maps and accessibility plans and they describe their accessibility maps as informative and reflect current provisions.

(i) Coventry Mapping Project

In 1993 the Coventry Mapping Project was a study that focused on the barriers and constraints to access and mobility for people in wheelchairs as they use the city centre. Vujakovic and Mathews (1994) in conducting this research felt it was vital that personal geographies of people with disabilities must be accepted if successful, user-friendly maps are to be provided. The research centred on mapping streetscapes rather than the accessibility of individual buildings. The project was interested in potential wheelchair users rather than professionals, who may have little direct experience of disability. While the results were not incorporated into a GIS, they provide a good case study of accessibility mapping (Vujakovic and Mathews, 1994). The project included a weekend workshop for people with disabilities and University Geography undergraduates. The premise to this project was similar to the ethos underlying this research that it is only through implementing research taking into account the varying individual needs of people with disabilities that real progress can be made.

One of the exercises in the Coventry Mapping Project involved each person drawing a map of the route to the main city library, such an exercise gave an insight into the personal geography of the participants. The second exercise involved pairs working together on a simple base map of Coventry city centre, where the wheelchair users were asked to identify the inaccessible features. The third exercise involved participants making a list of the features that they thought may be barriers to access and mobility in a typical city centre location. Some of the participants were people with disabilities, while some we able-bodied. The Coventry Access and Mobility Mapping Project illustrated that both the able-bodied participants and the wheelchair users felt that they needed to revise their perceptions of barriers to access and mobility. For the able-bodied participants this meant developing a greater understanding of the requirements for access for different individuals and not just what they perceived were the requirements. Wheelchair users became more conscious of design and planning issues. Vujakovic and Matthews (1994) found that this exploration of personal geographies of people with disabilities could be beneficial to all involved. Geographers and cartographers can achieve a better understanding of the needs of potential map users, while the users themselves can broaden their individual awareness of environmental design and planning. It was found that people with disabilities that affect mobility are able to take substantial control of the cartographic process (Vujakovic and Matthews, 1994).

The creation and control of knowledge systems provides a step towards greater empowerment. The personal geographies of people with disabilities reveal conceptions of place that stand in great contrast to those of other users in the built environment (Vujakovic and Matthews, 1994). Further work does however need to be carried out in an effort to join cognitive maps to practical maps that would help make towns and cities more truly accessible to all. (Vujakovic & Matthews, 1994).

(j) City Planning for the Disabled in Muenster

Since 1993, the Centre for Applied Social Geography has been working in close co-operation with the City of Muenster, Germany, on the project “City Planning for the Disabled in Muenster” (KOMM). This project is concerned with developing both means of orientation and planning guidelines for a barrier-free environment in Muenster. Simultaneously, information about people with disabilities as a social group is being gathered and is taught to students of the city’s university.

They devised a map that presented local information for people with disabilities in Muenster. In 1997, Muenster was the first city in Germany to provide the public with an interactive street map for people with disabilities. By providing people with disabilities with local information about Muenster, KOMM can help to overcome everyday problems of planning, organisation and orientation. Muenster's already existing city-information system can be located on the internet. The KOMM internet site offers the possibility of designing your own individual city guide. Currently, information is available about access to Muenster's pubs and restaurants, the location of public toilets etc. They are now working on including medical services, hotels, and points of interest. In the future, it will also hold information about recreational and cultural facilities in Muenster. At present only those institutions in KOMM that provide wheel-chair access or special services for people with disabilities are included. The information about the location in the city of Muenster is always supplemented by information about its accessibility. KOMM does not only offer information for the mobility-impaired (such as wheel-chair users) only, but it should be of interest to elderly people, to parents with prams, to people with the occasional plastered leg or heavy goods, too. KOMM is a structure that could easily be filled with the specific data of any other geographical location. It can thus be adapted to other cities or regions or be implemented into already existing internet services.

APPENDIX VII

COVER LETTER AND QUESTIONNAIRES ISSUED TO BUILDING CONTROL AUTHORITIES AND DISABILITY ORGANISATIONS IN 1999 & 2010

(Questions in red were inputted in the second administration of the questionnaire in 2010)

COVER LETTER

"Whitehaven",
Robinstown,
Palace East,
Enniscorthy,
Co. Wexford.

Dear

I am a post-graduate student at Dublin Institute of Technology researching a Masters degree in relation to the use of Access Auditing and GIS as a tool for Communicating Accessibility information for People with Disabilities as both a decision-making and access promotion tool. Part M of the Building Regulations 2000 was adopted as the auditing criteria and is also being examined in this study. This research is jointly funded by the DIT and an NDA scholarship and has spanned a time period where building control regulation for access is undergoing significant change.

I have compiled the enclosed questionnaire in order to assess the effectiveness of current/proposed access legislation and to determine the level of use of Access Auditing and Information Technology systems on a nation-wide basis. This project will hopefully go towards improving access to the built environment on a local as well as national level.

I would be very grateful if you could complete the following questionnaire, and return it to me using the enclosed self-addressed envelope before the 31st March 2010. If a braille version of this question is required, please contact me at the above phone number.

Thank you for your time and co-operation,

Yours Sincerely,

_____

Susan Codd. B.Sc. Environmental Health

Questionnaire 1 on Access Auditing and Geographic Information Systems as a tool for communicating Accessibility information and promoting compliance with Part M of the Building Regulations 2000

(Please tick where appropriate, & continue answers on separate sheet if necessary)

Authority: _____

Contact Name: _____

Address: _____

Population of area under Local Authority _____

Jurisdiction: _____

Telephone: _____

SECTION A General

Q.1 Do you have a working definition of "Disability"?

- ☐ Yes
- ☐ No

Q.1(a) If yes, please state this definition.

_____

Q.2 What percentage of the population in your local authority area have either physical or sensory disabilities?

- ☐ 0-5%
- ☐ 6-10%
- ☐ >10%
- ☐ Don't Know
- ☐ Other, please specify exact % if known

_____

Q.3 Do you actively liase with local access/disability groups in relation to developments that would be of concern to people with disabilities?

- ☐ Yes
- ☐ No

Q.3(a) If yes please state which groups. If no please state why not.

_____

Q.4 Do you have any polices or schemes (e.g. competitions/grants) in place that encourage accessible design and/or compliance with Part M of the Building Regulations 2000?

- ☐ Yes
- ☐ No

Q.4(a) If yes, please briefly describe these schemes.

_____

Q.5 Is access for people with disabilities incorporated into the Development Plan for your area?

- ☐ Yes
- ☐ No

Q5(a) If yes, please briefly state in what context

_____

Q5(b) If no, do you have any intention to include it into future development plans?

- ☐ Yes
- ☐ No

SECTION B: Access Auditing & Access Officers

Q.6 Has an access audit or access survey ever been carried out in your Local Authority area?

For the purposes of this questionnaire;
"Audit" means Checklist & Physical Measurement,
"Survey" means Visual Inspection

- ☐ Access Audit
- ☐ Access survey
- ☐ Neither

Q.7 Have members of your Building Control Authority received training in relation to monitoring for access for people with disabilities?

- ☐ Yes
- ☐ No

Q.7(a) If yes, please give brief details of this training.

_____

Q.7(b) If no do you have any future plans of providing training?

._____

Q.8 Is there an access guide to your area created on the basis of an Access Audit or Access Survey?

- ☐ Yes
- ☐ No

Q.8(a) If yes, please give brief details of this guide.

_____

Q.9 Do you have a designated access officer or an individual whose duties involve the role of access officer?

- ☐ Access Officer (full time)
- ☐ Access Officer (part-time)
- ☐ No Access Officer
- ☐ Other, please state. _____

Q.10 If you have an Access Officer what are their main duties?

_____

_____

Q.11 If you do not have an Access Officer, why do you feel that there is not an Access Officer within your local authority?
(Please rank in order of importance; 1= Most important, 5= Least important)

- ☐ Lack of Finance
- ☐ No Perceived need
- ☐ Other Official taking on these duties is sufficient
- ☐ Work is undertaken by Access/Disability Group
- ☐ Don't Know

SECTION C: Part M of the Building Regulations 2000

Q.12 Do you feel that there should be mandatory monitoring and inspection of Part M by Building Control Authorities?

- ☐ Yes
- ☐ No

Q.13 How do you make developers/applicants aware of their legal obligations under Part M of the Building Regulations 2000?
(Please rank in order of importance; 1= Most important, 7= Least important)

- ☐ Circulars
- ☐ Letters
- ☐ Disability Symbol on Application Forms
- ☐ Printed literature
- ☐ Oral Guidance by Official
- ☐ No information given
- ☐ Other means (Please specify) _____

Q.14 What is your current inspection rate for compliance with Part M?

- ☐ <10%
- ☐ 10%-15%
- ☐ 15%-20%
- ☐ >20%

Q.15 Since its introduction have you granted a Disability Access Certificate or DAC?

- ☐ Yes how many?_____
- ☐ No

Q16. Do you foresee the DAC as an effective measure of improving accessibility of the built environment?

_____
_____
_____

Q.17 Have you received any complaints in relation to Part M from the public or otherwise?

- ☐ Yes how many?_____
- ☐ No

If yes what is the nature of such complaints?_____
_____
_____
_____
_____

Q.18 Which of the following do you use to promote compliance with Part M?

- ☐ Conditions attached to Planning Permission
- ☐ Recommendations with Planning Permissions
- ☐ None
- ☐ Other, please specify_____

Q.19 Do you feel that Part M is sufficient in providing for access for people with disabilities?

- ☐ Yes
- ☐ No

Q.19 (a) If no, please state how you feel Part M is insufficient

_____

Q.20 How do you monitor buildings for compliance with Part M of the Building Regulations 2000?
(Please tick all relevant procedures)

- ☐ Access Audit
- ☐ Site visit during construction
- ☐ Site visit on completion
- ☐ Reading of plans submitted
- ☐ Response to third party complaints
- ☐ Liaison with developer/applicant?
- ☐ Don't actively monitor
- ☐ Other (please state) _____

Q.21 Do you have a working interpretation of the term "adequate provision"?

- ☐ Yes
- ☐ No

Q.21 (a) If yes, please state this interpretation

_____
_____
_____

Q.22 Do you feel that the minimum criteria set out by the Technical Guidance Document to Part M is sufficient for providing access for people with disabilities

- ☐ Yes
- ☐ No

Q.22(a) If no, please state how you feel the criteria are insufficient.

_____

Q.23 Do you use other information sources in relation to monitoring and enforcement of Part M, (E.g. NDA guides, Goldsmith publications)

- ☐ Yes
- ☐ No

Q.23(a) If yes, please specify the sources.

_____

Q.24 What percentage of planning applications have planning conditions attached to them in relation to Part M?

- ☐ 0-10%
- ☐ 11-30%
- ☐ 31-50%
- ☐ 51-80%
- ☐ 81-99%
- ☐ All Applications
- ☐ Too Difficult to estimate

Q.25 Has a planning application ever been refused as a result of non compliance with Part M?

- ☐ Yes
- ☐ No

Q.25(a) If yes, please give brief details of this situation.

_____

_____

Q.26 Have you ever carried out a legal prosecution/issued an enforcement notice in relation to non compliance with Part M?

- ☐ Yes
- ☐ No

Q.26(a) If yes, please give details of these proceedings.

_____

_____

Q.27 Do you feel the current proposed draft amendments to Part M are sufficient in improving access for people with disabilities?

- ☐ Yes
- ☐ No

Please expand:

_____

Q.28 Did you make a submission on the consultation document issued relating to the proposed changes to Part M, if yes please expand?

- ☐ Yes
- ☐ No

Please expand:

_____

Please mention any other comments/issues you have in relation to Part M its enforcement and its current review for providing access for people with disabilities?

_____

_____

_____

_____

_____

_____

_____

_____

_____

SECTION D: Information Technology

Q29 Do any departments within your Local Authority incorporate the use of Geographical Information Systems for data analysis or display?

- ☐ Yes
- ☐ No

Q.29(a) If yes, please give brief details of software packages used.(eg MapInfo)

_____

Q.30 How do you record data in relation to monitoring carried out for Part M?

- ☐ Hardcopy Files
- ☐ Databases
- ☐ Spreadsheets
- ☐ Mapping
- ☐ Other (please State)_____

_____

Q.31 Do you feel that combining access auditing and GIS would be a beneficial tool for displaying, analysing, storing and communicating accessibility data?

- ☐ Yes
- ☐ No

Please feel free to include any further comments you think may be of interest to this study.

_____

_____

_____

Thank you for your time and co-operation in completing this questionnaire. Please return the completed questionnaire in the envelope supplied.

Questionnaire 2 on Access Auditing and Geographic Information Systems as a tool for communicating Accessibility information and promoting compliance with Part M of the Building Regulations 2000

(Please tick where appropriate, and continue answers on a separate sheet if necessary)

Name of Group/Organisation:_____

Number of Members:_____

Contact Name:_____

Address: _____

_____

Telephone:_____

SECTION A: General

Q.1 Which of the following terms applies best to your organisation?
(Please tick only one)

- ☐ Access Group
- ☐ Voluntary Organisation
- ☐ Government Organisation
- ☐ Action Group
- ☐ Other (please state) _____

Q.2 What year did your organisation establish itself at its current premises?

_____

Q.3 Does this premises comply with the requirements for Access under Part M of the Building Regulations 2000?

- ☐ Yes
- ☐ No
- ☐ Don't Know

Comment:_____

Q.4 How many individuals are working at these premises?

_____

Q.5 Of these individuals working within your group, how many have a disability?

_____

Q.5(b) Of these individuals working within your organisation, how many work voluntarily?

_____

Q.6 How many working within your organisation have the following functions?
(Please enter the number of each into each box)

- ☐ Access officer
- ☐ Planner
- ☐ Building Control Officer
- ☐ Engineer
- ☐ Commercial Representative
- ☐ Social Worker
- ☐ Occupational Therapist
- ☐ Architect
- ☐ Other (please state)_____

Q.7 Which of the following is the main group represented group represented by you?

- ☐ Physically Disabled
- ☐ Visually Impaired
- ☐ Hearing Impaired
- ☐ Equal Representation of All
- ☐ Other (please state)_____

Q.8 What are the main activities of your organisation?

- □ Education in disability issues
- □ Communication of disability issues to the public, media or government bodies
- □ Advising Local Authority on access issues
- □ Advising builders/contractors on access for people with disabilities
- □ Determining access to existing buildings
- □ Access Training
- □ Planning application inspections
- □ Other (please state)_____

Q.9 Have you had any significant successes in relation to access provisions in your area?

- □ Yes
- □ No

Q.9(a) If yes, please briefly describe these successes. _____

_____

SECTION B: Information Technology and the Local Authority Relationships

Q.10 At present, which of the following methods do you use to store data in relation to the provision of access in your urban environment?

- □ Hardcopy
- □ Word Processor
- □ Spreadsheet
- □ Database
- □ Other (please State)_____

Q.11 Have you ever used Geographical information Systems (GIS) in relation to access and accessibility data analysis?

- □ Yes
- □ No

Q.11(a) If yes, please indicate the type of software package used.(Eg MapInfo) _____

Q.12 Is there an access guide for your area based on access audit or access survey?

- □ Yes
- □ No
- □ Don't Know

Q.12(a) If yes, please supply details of the guide. _____

Q.13 Do you have a good working relationship with your Building Control Authority?

- □ Yes
- □ No

Q.13(a) If no, what changes do you feel are necessary to improve this relationship. _____

Q.14 Do you actively liaise with your Building Control Authority in relation to planning applications or developments which would be of concern to people with disabilities?

- □ Yes
- □ No

Q.14(a) If yes, please briefly supply details of these liaisons.

_____

_____

Q.15 Do you carry out any planning application inspections?

- □ Yes
- □ No

Q.15(a) If yes, please briefly supply details of the procedures of inspections. _____

Q.16 What attitude do you feel your Building Control Authority has in relation to access issues and enforcement of Part M?

- ☐ Positive
- ☐ Indifferent
- ☐ Negative

Please comment; _____

_____

Q.17 Is your Local Authority building accessible to people with disabilities?

- ☐ Yes
- ☐ No

Q.17(a) If no, please state in what way it's inaccessible.

_____

_____

Q.18 Do you advise local building owners on access matters?

- ☐ Yes
- ☐ No

Q.18(a) If yes, please state in what way you advise them

._____

Q.19 Do you maintain regular contact with other similar disability groups?

- ☐ Yes
- ☐ No

Q.19(a) If yes, please state what groups, if no why do you not have contact.

_____

SECTION C: Part M of the Building Regulations 2000

Q.20 Are you aware of the current proposed revision to Part M?

- ☐ Yes
- ☐ No

Q.21 Were you asked to make a formal submission on the draft document?

- ☐ Yes
- ☐ No

Q.22 Did you make a submission on the draft 2009 Part M?

- ☐ Yes
- ☐ No

If yes briefly state the broad scope of such comments: _____

_____

Q.23 Are you aware of the Disability Access Certificate (DAC)?

- ☐ Yes
- ☐ No

If yes briefly state your understanding of it: _____

Q.24 Have you been approached to advise in relation to the DAC?

- ☐ Yes
- ☐ No

If yes briefly state nature of advice sought: _____

_____

_____

Q.25 What do you understand by the term "Adequate Provision"?

_____

Q.26 Do you feel that the current requirements of Part M are sufficient for providing access for people with disabilities?

- ☐ Yes
- ☐ No

Q.27 Do you feel that Part M needs to be revised?

- ☐ Yes
- ☐ No

Q.27(a) If yes, please state in what respects. _____

_____

_____

Q.28 Do you feel that the minimum criteria set out by the current Technical Guidance Document to Part M is sufficient for providing access for people with disabilities?

- ☐ Yes
- ☐ No

Q.28(a) If no, please state in what respects it is insufficient. _____

Q.29 Do you try to actively encourage accessible built environments?

- ☐ Yes
- ☐ No

Q.29(a) If yes, please state in what way.

_____

SECTION D: Access Auditing

Q.30 What do you feel are the present barriers to access?

(Please rank the following in order of importance, 1 = Biggest Barrier 5 = Smallest Barrier)

- ☐ Attitudes
- ☐ Finance
- ☐ Legislation
- ☐ Ignorance
- ☐ Other, please specify _____

Q.31 Have you ever carried out an Access Audit or Access Survey?

For the purposes of this questionnaire;

Audit"; Checklist & Physical Measurement,

Survey"; Visual Inspection

- ☐ Yes
- ☐ No

Q.31(a) If yes, please give details. _____

Q.32 Do you consider Access Auditing to be a beneficial tool in the improvement of access for people with disabilities?

- ☐ Yes
- ☐ No

Q.32 (a) If yes, please give details _____

_____

_____

Q.33 Have members of your group received training in relation to monitoring for access or access auditing for people with disabilities?

- ☐ Yes
- ☐ No

Q.33(a) If yes, please give details of training received. _____

_____

_____

Q.34 Do you consider the combination of access auditing and GIS beneficial in the display and analysis of access data?

- ☐ Yes
- ☐ No

Please comment:_____

_____

Please mention any other comments/issues you have in relation to the aforementioned issues for providing improved access for people with disabilities?

Thank you for your time and co-operation in completing this questionnaire.
Please return questionnaire in the envelope supplied

APPENDIX VIII

QUESTIONNAIRE FOR BUILDING OWNERS/MANAGERS IN THE RESEARCH AREA

QUESTIONNAIRE FOR BUILDING OWNERS/MANAGERS IN THE RESEARCH AREA

Building:

Address:

Date: **Ref. No:**

Q.1 **How long have you been at your current Premises?_____**

Q.2 **When was this premises built?_____**

Q.3 **Has this premises been significantly extended or altered? Please give details of year and extent of alterations.**

_____

Q.4 **Has the Local Authority (Building Control Authority) ever inspected your premises for compliance with Part M of the Building Regulations 1997?**

YES □ **NO** □

Q.5 **How often do you have customers with disabilities visit your premises?**

Daily	□
Weekly	□
Fortnightly	□
Monthly	□
Rarely	□
Never	□

Q.6 **Who would you most receive visits from?**

People with Physical Disabilities	□
People with Visual Impairments	□
People with Hearing Impairments	□
People with learning/cognitive disabilities	□
Other	□
None of the above	□

Q.7 **Are any of your staff trained in first aid/care for people with disabilities (if yes please give details)?**

_____

Q.8 **Do you have a policy for evacuating people with disabilities in the event of an emergency?**

_____

Q.9 **Do you feel that a map indicating accessibility would be of benefit to people with disabilities?**

_____

APPENDIX IX

CONSENT LETTER AND ACCESS AUDIT CHECKLIST BASED ON PART M

CONSENT LETTER

E-mail scodd@dit.ie
(01) 402 3519

Dublin Institute of Technology,
143/146 Rathmines Road,
Rathmines Road,
Dublin 6.

To whom it may concern,

I am a post graduate research student at Dublin Institute of Technology, Rathmines House. I am currently developing a mapping system (using Geographical Information Systems) to display, store and analyse information on the accessibility of the built environment for people with disabilities. This project is jointly funded by the National Rehabilitation Board (NRB) and Dublin Institute of Technology (DIT).

In order to further develop this technique I need to carry out a pilot study. I have chosen your area for this purpose. The study will involve taking some brief measurements of all buildings and footpaths in the area. These measurements are taken solely for research purposes and the testing of the package that is being developed. The results will not be available for public viewing.

I am therefore requesting permission to take some measurements of various attributes of your premises, for example door width, counter height, toilet size (if present) etc... These results will be combined together to portray the overall accessibility of your premises for various people with disabilities. This study will hopefully go towards improving the access options for people with disabilities on a national scale. Thank you for your time and co-operation.

Yours sincerely,

_____

Susan Codd B.Sc (Environmental Health).

Signature of Owner/Manager Consenting to Audit:_____

Position Held: _____

Access Audit Checklist based on Part M of the Building Regulations 1997

Building:

Location:

Contact Name:

Date:

List of Contents

Questions in red were made applicable to people with sensory impairments to increase the scope of the audit.

Section A Approach

		YES	NO
(A.1)	Does the building present hazards on circulation routes immediately adjacent to it (e.g. window opening out) ? (It should not)	☐	☐
(A.2)	Is there at least one entrance, preferably the main entrance accessible to wheelchair users ?	☐	☐
(A.3)	Is the approach to this entrance from the adjacent road or car park or other area accessible to motor vehicles level?	☐	☐
(A.4)	If there is a gradient for drainage purposes, is it as gentle as possible, (i.e. less than 1:50)?	☐	☐
(A.5)	Does the approach have a clear unobstructed width of at least 1m?	☐	☐
(A.6)	Is the surface of the approach non slip and suitable for wheelchair users?	☐	☐
(A.7)	Where a level approach is not possible are there steps and a ramp, or ramps provided?	☐	☐
(A.8)	If there are steps and a ramp are they as close as possible to each other with easy going steps and gentle ramps?	☐	☐

Section B External Steps

		YES	NO
(B.1)	If there are external steps, do the top and bottom landings have a textured surface (tactile warning for level change)?	☐	☐
(B.2)	Do the first and last steps in each flight provide a permanent visual contrast with the rest of the steps?	☐	☐
(B.3)	Do all flights and landings have a clear unobstructed width of at least 1m?	☐	☐
(B.4)	Is the rise of a flight between landings less than 1.5m?	☐	☐
(B.5)	Is the length of a landing, at least as great as the smallest width of the flight?	☐	☐
(B.6)	Is the rise of each step uniform and not more than 150mm ?	☐	☐

		YES	NO
(B.7)	Is the going of each step uniform and not less than 280mm ?	☐	☐
(B.8)	Are there tapered treads or open risers used? (there shouldn't be)	☐	☐
(B.9)	Are there nosings to the steps? (there shouldn't be)	☐	☐
(B.10)	Is there a suitable continuous handrail on each side of flights and landings?	☐	☐
(B.11)	Is the top of the handrail at a height of between 840mm and 900mm above the pitch line of the flight of steps and above the surface of the landing?	☐	☐
(B.12)	Does the handrail extend at least 300mm beyond the top and bottom risers and terminate in a closed end which does not project into a route of travel?	☐	☐
(B.13)	Is the profile of the handrail and its projection from the wall suitable?	☐	☐

Section C Ramps

		YES	NO
(C.1)	If there is a ramp provided, is there top and bottom landings with a textured surface provided to give advance warning of the change in gradient?	☐	☐
(C.2)	Is the surface of the ramp suitable for wheelchair traffic and reduces the risk of slipping?	☐	☐
(C.3)	Do the flights and landings have a clear unobstructed width of at least 1m?	☐	☐
(C.4)	Is the gradient of the ramp not steeper than 1 in 20 for individual flights of not longer than 9m, or 1 in 12 for individual flights of not longer than 4.5m?	☐	☐
(C.5)	Is the length of the landing at least as great as the smallest width of the ramp?	☐	☐
(C.6)	If there is a door opening onto a landing, is the length of the landing at least 1.3m clear of the door swing?	☐	☐

		YES	NO
(C.7)	Is there a raised kerb at least 75mm high provided on any open side of the ramp?	☐	☐
(C.8)	Is there a suitable continuous handrail on each side of flights and landings?	☐	☐
(C.9)	Is the top of the handrail at a height of between 840mm and 900mm above the pitch line of the flight of steps and above the surface of the landing?	☐	☐
(C.10)	Does the handrail extend at least 300mm beyond the top and bottom risers and terminate in a closed end which does not project into a route of travel?	☐	☐
(C.11)	Is the profile of the handrail and its projection from the wall suitable?	☐	☐

Section D Access into a Building

		YES	NO
(D.1)	Does the entrance doorway provide a clear opening width of not less than 775mm?	☐	☐
(D.2)	Do double doors provide at least one leaf which provides a minimum clear opening width of not less than 775mm?	☐	☐
(D.3)	Is there an unobstructed space of at least 300mm on the side next to the leading edge of a single leaf door?	☐	☐
(D.4)	Does each leaf of the door incorporate, where feasible and practical, a glazed vision panel extending from 900mm to 1.5m above the finished floor level?	☐	☐
(D.5)	Do any single pane fully glazed door leaf or fixed panel have a permanent means of identifying the glass?	☐	☐
(D.6)	Is the door ironmongery suitable for operation for people with disabilities?	☐	☐
(D.7)	Are doors that are fitted with a self-closing device suitable for operation by people with disabilities?	☐	☐
(D.8)	Are revolving doors present (shouldn't be)?	☐	☐
(D.9)	Is the entrance lobby designed and constructed in a manner that there is sufficient space to enable a wheelchair user, and a person assisting a wheelchair user, to move clear of one door before using the next one, while allowing space for a person to pass in the opposite direction?	☐	☐

Section E Internal Circulation

		YES	NO
(E.1)	Do internal doorways provide a clear opening width of not less than 775mm?	☐	☐
(E.2)	Do double doors provide at least one leaf which provides a minimum clear opening width of not less than 775mm?	☐	☐
(E.3)	Is there an unobstructed space of at least 300mm on the side next to the leading edge of a single leaf door?	☐	☐
(E.4)	Does each leaf of the door incorporate, where feasible and practical, a glazed vision panel extending from 900mm to 1.5m above the finished floor level?	☐	☐
(E.5)	Do any single pane fully glazed door leaf or fixed panel have a permanent means of identifying the glass?	☐	☐
(E.6)	Is the door ironmongery suitable for operation for people with disabilities?	☐	☐
(E.7)	Are doors that are fitted with a self-closing device suitable for operation by people with disabilities?	☐	☐
(E.8)	Do all corridors or passageways have a clear unobstructed width of at least 1.2m?	☐	☐
(E.9)	If a stairway crosses over a circulation route, are there suitable precautions taken to ensure that any part of the circulation route under the stairway with a height lower than 2.2m cannot be used for circulation purposes?	☐	☐
(E.10)	Are internal lobbies designed and constructed in a manner that there is sufficient space to enable a wheelchair user and a person assisting a wheelchair user, to move clear of one door before using the next one?	☐	☐

Section F Lifts

		YES	NO
(F.1)	Is there a suitable passenger lift provided to any storey above or below the entrance storey which; (a) in a two storey building has a net floor area per floor of more than 280m^2; or (b) in a building of more than two storeys has a net floor area per floor of more than 200m^2	☐	☐
(F.2)	Is there a clear landing of at least 1.5m wide and 1.5m long in front of every entrance to a lift?	☐	☐

		YES	NO
(F.3)	**Does the lift door have a clear opening width of at least 800mm?**	☐	☐
(F.4)	**Does the passenger lift have a clear landing of at least 1.5m wide and at least 1.5m long in front of every entrance to the lift?**	☐	☐
(F.5)	**Is the width of the lift car at least 1.1m and the length at least 1.4m?**	☐	☐
(F.6)	**Are the controls of the lift car and the controls at each landing at a height of not less than 900mm and not more than 1.2m above the car floor and the landing respectively?**	☐	☐
(F.7)	**Are the controls located away from corners and be located at least 500mm from any wall or projecting surface?**	☐	☐
(F.8)	**Are suitable tactile indicators that indicate each floor number provided on or adjacent to the lift buttons within the car and on the landing?**	☐	☐
(F.9)	**Does the lift car provide both visual and voice indication of the floor reached if there is more than three floors?**	☐	☐
(F.10)	**Does the lift door stay open for at least 8 seconds?**	☐	☐

Section G Internal Stairs

		YES	NO
(G.1)	**Do the first and last step of each flight provide a permanent visual contrast with the rest of the steps?**	☐	☐
(G.2)	**Do flights and landings have a clear unobstructed width of at least 1.0m?**	☐	☐
(G.3)	**Is the rise of a flight between landings less than 1.8m?**	☐	☐
(G.4)	**Is the landing as long as the smallest width of the flight and clear of door swings?**	☐	☐
(G.5)	**Are the treads and risers uniform, with risers not exceeding 175mm and the sum of twice the riser plus the tread (2R+T) not exceeding 630mm?**	☐	☐

		YES	NO
(G.6)	Are tapered treads and open risers used? (shouldn't be)	☐	☐
(G.7)	Is there a suitable continuous handrail provided on each side of flights and landings?	☐	☐
(G.8)	Is the top of the handrail at a height of between 840mm and 900mm above the pitch line of the flight of steps and above the surface of the landing?	☐	☐
(G.9)	Does the handrail extend at least 300mm beyond the nosing of the top and bottom steps and terminate in a closed end which does not project into a route of travel?	☐	☐
(G.10)	Is the profile of the handrail and its projection from the wall suitable?	☐	☐
(G.11)	Do top and bottom landings have a textured surface that gives advance tactile warning of the change in level?	☐	☐

Section H Use of Facilities

		YES	NO
(H.1)	Is each storey designed and constructed as to allow independent circulation by people with disabilities?	☐	☐
(H.2)	Is each storey designed and constructed as to allow independent access to the range of services and facilities provided on that storey?	☐	☐
(H.3)	If a change of level is required due to site constraints or design considerations, is there; (a) a suitable means of access between levels by grading where minor changes of level occur, or by means of a passenger lift, platform lift, or steps and ramps where substantial changes of level occur, <u>or</u> (c) the same range of services and facilities available to all on the accessible level	☐	☐
(H.4)	Was careful attention paid to the selection and location of light switches, ironmongery, taps, power points etc..so that they can be operated by light pressure and without undue stretching or stooping by wheelchair users or the ambulant disabled?	☐	☐

		YES	NO
Section J	**Hotel and Other Guest Rooms**		
(J.1)	**Is one guest room out of every 20, or part thereof, of the guest bedrooms suitable in terms of size, layout and facilities for independent use by a wheelchair user?**	☐	☐
(J.2)	**Does the entrance doorway to a guest bedroom provide a clear opening width of not less than 775mm?**	☐	☐
(J.3)	**Do double doors provide at least one leaf which provides a minimum clear opening width of not less than 775mm?**	☐	☐
(J.4)	**Does each leaf of the door incorporate, where feasible and practical, a glazed vision panel extending from 900mm to 1.5m above the finished floor level?**	☐	☐
(J.5)	**Do any single pane fully glazed door leaf or fixed panel have a permanent means of identifying the glass?**	☐	☐
(J.6)	**Is the door ironmongery suitable for operation for people with disabilities?**	☐	☐
(J.7)	**Are doors that are fitted with a self-closing device suitable for operation by people with disabilities?**	☐	☐
(J.8)	**Do all other bedroom doors have a minimum opening width of 750mm?**	☐	☐
(J.9)	**Do bedrooms which are designed for use by people with disabilities have "en suite" sanitary accommodation suitable for use by people with disabilities if that is the general arrangement for the rest of the bedrooms. Otherwise, is there unisex sanitary accommodation which is accessible to people with disabilities provided?**	☐	☐
Section K	**Sanitary Conveniences**		
(K.1)	**Is sanitary accommodation provided on the same basis as for other users of the building?**	☐	☐
(K.2)	**Is there a minimum of one unisex WC suitable for use by wheelchair users of either sex ?**	☐	☐
(K.3)	**Is this WC approached separately from other sanitary accommodation provided in a convenient and accessible part of a building to which wheelchair users have independent access to?**	☐	☐

		YES	NO
(K.4)	**Is there an accessible toilet on every other level?**	☐	☐
(K.5)	**When there is access to other storeys by stairway only is there a unisex WC suitable for use by wheelchair users at the entrance story level (if there is only the entrance and vertical circulation on the entrance level then the provision for an accessible WC is not mandatory, but in every such building there must be a provision made for ambulant disabled people)?**	☐	☐
(K.6)	**Does the WC cubicle have adequate space to allow for necessary wheelchair manoeuvre?**	☐	☐
(K.7)	**Does the WC cubicle have adequate space to allow for transfer onto the WC and to allow a helper to assist in the transfer?**	☐	☐
(K.8)	**Are facilities for hand washing within reach of the WC?**	☐	☐
(K.9)	**Is there is more than one unisex WC suitable for use by a wheelchair user, is there a choice of RHLT and LHLT?**	☐	☐
(K.10)	**Is there at least one WC accessible for use by the ambulant disabled provided in each room containing sanitary conveniences?**	☐	☐
(K.11)	**Are suitable grab rails provided in the cubicle intended for use by the ambulant disabled?**	☐	☐
(K.12)	**<u>WC cubicle dimensions.</u>**		
	(a) WC Pan Height 450/460mm?	☐	☐
	(b) Basin Height 800mm?	☐	☐
	(c) Horizontal Grab rail Height 700mm?	☐	☐
	(d) Horizontal Grab rail Length 600mm?	☐	☐
	(e) Distance of HG from wall 200mm?	☐	☐
	(f) Is the cubicle 1.5 X 2m?	☐	☐
	(g) Is the door 750mm clear opening width?	☐	☐
	(h) Height of folding grab rail 700m?	☐	☐

			YES	NO
(K.13)		**WC cubicle for ambulant disabled**	☐	☐
	(a)	**WC Pan Height 450/460mm?**	☐	☐
	(b)	**Horizontal Grab rail Height 700mm?**	☐	☐
	(c)	**Is the HG 200-400mm from wall?**	☐	☐
	(d)	**Is the HG 600mm long?**	☐	☐
	(e)	**Does the door open outwards?**	☐	☐
	(f)	**Cubicle size 1.5 X 900mm?**	☐	☐

Section L Audience and Spectator Facilities

		YES	NO
(L.1)	**Do people with ambulant disabilities have access to all levels?**	☐	☐
(L.2)	**Do wheelchair users have independent access to sufficient wheelchair spaces in selected areas which afford good viewing conditions?**	☐	☐
(L.3)	**Are there accessible facilities (e.g. bars and WC's) available similar to those available to other users of the premises?**	☐	☐
(L.4)	**Are wheelchair spaces integrated with areas provided for the general public?**	☐	☐
(L.5)	**Are wheelchair users able to sit with their companions wherever possible?**	☐	☐
(L.6)	**Is the clear space for the wheelchair at least 900mm wide and 1.4m deep?**	☐	☐
(L.7)	**Is there at least 6 or 1/50th (whichever is greater) of the seating capacity where the seating capacity is not more than 1,000 and 20 or 1/100th (whichever is greater) of the seating capacity where the capacity is more than 1,000 (if the are multi auditoria the rule applies to each auditorium)?**	☐	☐
(L.8)	**Is there a loop or Infra red system in place**	☐	☐

APPENDIX X

FOLLOW UP COVER LETTER AND QUESTIONNAIRE INCLUDING MAP GENERATED FROM THE "LADDER" CONCEPT

Follow up Questionnaire Cover Letter

E-mail scodd@dit.ie
(01) 402 3519

Dublin Institute of Technology,
143/146 Rathmines Road,
Rathmines Road,
Dublin 6.

«Title» «FirstName» «LastName»
«JobTitle»
«Company»
«Address1»
«Address2»
«City»

Dear «Title» «LastName»

You may recall in February 1999 I issued you with a questionnaire relating to Access for People with Disabilities, Part M of the Building Regulations1997 and, Computer Storage of Accessibility data. I thank you for your co-operation in taking the time to complete the questionnaire. I am now approaching the end of this research and as a follow up to the original questionnaire I am enclosing a working example of the system developed.

In the original questionnaire I asked if you thought accessibility data for people with disabilities should be stored and analysed using computer software, more notably Geographical Information Systems. I have as part of my research developed such a system using MapInfo version 5.0, and I would be very grateful of your opinion on it.

The map attached is a hardcopy example of this system. This map is a representation of any main street in a typical Irish town. The database that I have set up, (from results of access audits of each of the buildings) allows the user to perform on the individual buildings on the street. These queries relate to the accessibility for various types of disability. The example I have enclosed pertains to the accessibility of the buildings to wheelchair users. "Yes" indicates that the entrance is accessible to wheelchair users, and "No" indicates that the entrance is inaccessible to wheelchair users. Non-participants are buildings that did not agree to participate in the audit.

I am very interested to hear your opinion on this system. I have enclosed just one example of the database, there are an exponential amount of queries that could be carried out once the data is in place. I would appreciate it if you could complete the slip attached to this page an return it to me at your earliest convenience.

Once again thank you for your time and co-operation.
Yours sincerely,

_____

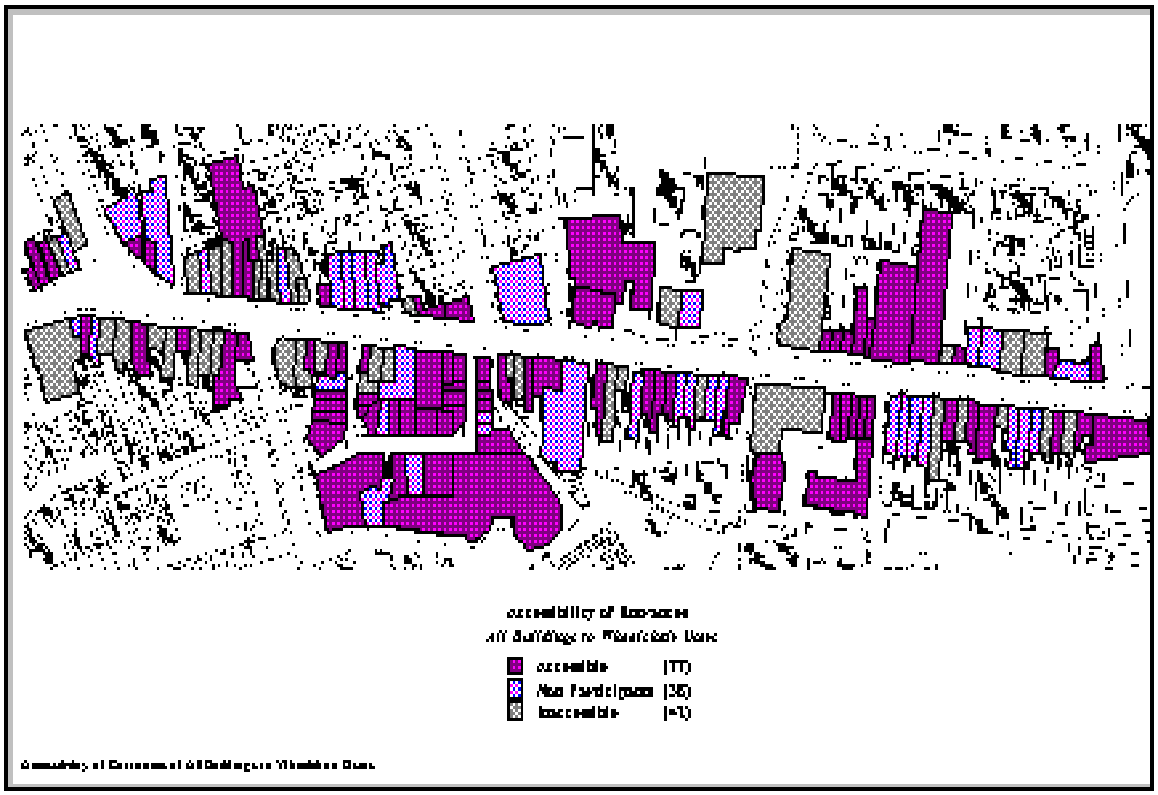
Susan Codd.

Name: _____ Organisation: _____

Please tick your relevant choice

Yes, I think that this system is a beneficial tool for the display storage and analysis of accessibility data for people with disabilities in the built environment. ☐

No, I do not think that this system is a beneficial tool for the display storage and analysis of accessibility data for people with disabilities in the built environment. ☐



(A full A3 size version of this map was included in the original letter)