Using Visualisation Techniques In Planning To Improve Collaborative Governance in Ireland

Paddy PRENDERGAST and Krysia RYBACZUK

(Mr Paddy Prendergast and Dr Krysia Rybaczuk, Department of Geography, Museum Building, Trinity College, Dublin 2, IRELAND
prenderw@tcd.ie & krybczuk@tcd.ie)

Abstract: *Public participation in planning is gradually being adopted as an established component of both local and national Irish governance strategies. However, facilitating public participation in planning is not based on a simple set of ingredients that can be mixed according to a set recipe. Rather, it is a complex process that requires consolidated co-operation between a variety of players, changes in existing organisational processes, the adoption of innovative technological tools, and the re-engineering of services and data to provide them to the public in a more user-friendly manner.*

Environmental Impact Statements (EISs) are just one example of environmental information that is important in a participatory context. Currently the mechanism for accessing these and the requirements for producing these are not conducive to participatory planning. EISs are rarely accompanied by any widely available metadata, they are rarely digital; in fact they only become catalogued and available in a central repository in Ireland after decisions have been taken. Furthermore, the statements themselves are not as effective as they might be in conveying the information they contain to planners and the general public. One particular issue for which EPA (Environmental Protection Agency) guidelines exist but which is rarely addressed comprehensively, is that of visual impact assessment (VIA) used to predict, visualise and evaluate the impact of proposed developments on the landscape.

This research paper examines the various visualisation techniques utilised within VIAs prepared by consultants as part of the environmental impact assessment (EIA) process in Ireland and assesses their potential use in participatory planning. It also assesses possible improvements and suggests recommendations for the future.

1 INTRODUCTION

This paper is based on the results of two surveys conducted to investigate how the planning and development system manages the visual amenity in Ireland. A quantitative survey examined the quality of visual impact assessments (VIA) carried out within environmental impact assessment (EIA) for the development control process. These results supply evidence on the nature, techniques used, and quality of visual impact assessment practice from a sample of 164 EISs submitted between 1997 and 1999 (Prendergast & Rybaczuk, 2004). A second qualitative survey examined planning policies used to protect and enhance the visual amenity. Four stakerholder groups were interviewed including planners, design professionals, environmental organisations and the environmental spokespersons for the political parties. These results supply information on the development pressures impacting most significantly on the visual amenity, policies protecting the visual amenity within County and City Development Plans, other development policies impacting on the visual amenity, and methods used to enhance the visual amenity.

The inclusion of sustainable development in 2000 as one of the criteria against which planning applications are assessed by planning authorities has emphasised the role of public participation within the planning and development system. However, public participation in planning in Ireland is not as well developed as it could be, and initiatives to improve participation have not always been successful. The utilisation of the visualisation techniques used for VIA as potential communication formats is investigated to assist public participation.

2 ENVIRONMENTAL IMPACT ASSESSMENT INFORMATION

Ireland's planning system is based on the Local Government (Planning and Development) Act, 1963 (Oireachtas, 1963), which introduced Ireland's first statutory development control system. Much legislation and regulations have been enacted since, including a statutory independent planning appeals system (Oireachtas, 1976), an environmental control system (DoE, 1989), expanded functions to meet the demands of increased economic growth and a growing European dimension from Ireland's membership of the European Union. The Planning and Development Act 2000 (Oireachtas, 2000) recently introduced radical changes in the areas of protection of architectural heritage, increasing residential densities in urban areas, and requiring developers to commit a percentage of residential development sites for social housing.

The planning departments of Ireland's 88 local authorities (29 county councils and 59 municipal authorities) operate Ireland's planning system. The system includes a forward planning process which publishes Development Plans and land-use maps every five to six years, a development control process to adjudicate applications for development rights which includes a facilitity to appeal decisions to An Bord Pleanála (the Planning Appeals Board), and an enforcement process to monitor land-use and conditions applied to development decisions.

Planning permission for certain categories of major developments cannot be assessed on the basis of the planning application and the County/City Development Plan (CDP) alone (DoE, 1989). These categories also require environmental impact assessment (EIA) to be carried out and an environmental impact ststement (EIS) to be prepared and submitted with the planning application. EIA examines the existing environment and potential impacts resulting from the proposed development on human beings, flora, fauna, soils, water, air, climate, the landscape, material assets, and cultural heritage. None of these environmental factors should be omitted at risk of invalidating the planning application, but their level of treatment may differ depending on the likelihood of impacts resulting from the specific project proposal (CAAS, 1995a). There has been a perception to date that environmental factors, which can be assessed by quantitative scientific analysis such as water, air, and noise, are more important than factors, such as landscape, which use more subjective evaluations (European Environment Agency, 1998).

EIA is a process for anticipating the potential effects on the environment caused by a proposed development, and where effects are identified that are unacceptable, these can be then be avoided or reduced during the design process (CAAS, 2002). Landscape Impact Assessment (LIA) examines two aspects of the landscape, impacts on landscape character and impacts on the visual amenity. Visual

Impact Assessment (VIA) is defined as an estimation of the likelihood of changes to the visual amenity of the landscape resulting from a proposed development (The Landscape Institute & The Institute of Environmental Management & Assessment, 2002). Visual impacts are therefore often viewed as a subset of landscape impacts. They relate solely to changes in the visual amenity of the landscape due to obstruction or intrusion of views, and to the effects that those changes may have on the viewer. Therefore, the primary function of VIA is to predict the visual impacts of a development on the visual amenity before construction, in order to modify designs of proposed structures to eliminate or minimise these impacts.

2.1 Methodology Chosen for the Survey of Visual Practice

EISs submitted to local authorities as part of the documentation for planning permission are available for inspection at local planning authorities. Individually visiting all of the planning authorities in Ireland would be a long and arduous task. Far more convenient for a study looking at projects across several planning authorities is the collection of EISs in the ENFO (Ireland's public information service on environmental matters) library in Dublin.

When the survey was conducted the central repository contained nearly one thousand EISs submitted between 1988 and 1999. The statutory requirement for EIS content (DoE, 1989), the EPA guidelines on EIS content (CAAS, 1995a) and the EPA advice notes on EIS preparation (CAAS, 1995b) would not have taken effect until 1996 at least. Furthermore, it was assumed that after the introduction of EIA professionals would have undergone a steep learning curve of the concepts, methodologies and techniques necessary. Therefore the selected sample was chosen from the later years of the total EIS population to ensure those examined post-dated the learning curve of professionals conducting EIA as well as post-dating the implementation of the guidelines.

A pro-forma initially developed to systematically collect LIA and VIA data was piloted to ensure that it was comprehensive, easy to conduct, and that the data collected were in a format suitable for subsequent analysis. On the basis of these results, the sample population was stratified into separate development categories for ease of comparison within each category. The only three development categories which had sample sizes sufficiently large enough to justify their selection were piggery developments quarry developments and urban developments, so these were duly chosen and the pro-forma was reformatted to concentrate exclusively on VIA. Development categories more likely to conduct VIA (wind-farms, afforestation) were purposely not selected, so that the overall survey results would be representative of the general quality of VIA practice in Ireland.

The survey examined 164 EISs in total, with the following breakdown by development category: piggery developments (35), quarry developments (42), urban developments (87). One EIS from the quarry development category was excluded from further analysis since it was an undersea development, which did not modify the existing visual amenity.

2.2 Visualisation Techniques used for Visual Impact Assessment

A range of visualisation techniques is available to present the nature and magnitude of predicted visual impacts which increase in complexity and realism from engineering elevations, to artist's impressions, to photomontages, to physical models and to virtual models. Piggery developments recorded the least use of visualisation techniques (3%), whilst quarry developments and urban developments recorded slightly higher usages, 25% and 26% respectively (Figure 1). However, only 51% of VIA used photography, which is the cheapest, simplest and most effective technique for providing information on the existing visual amenity.

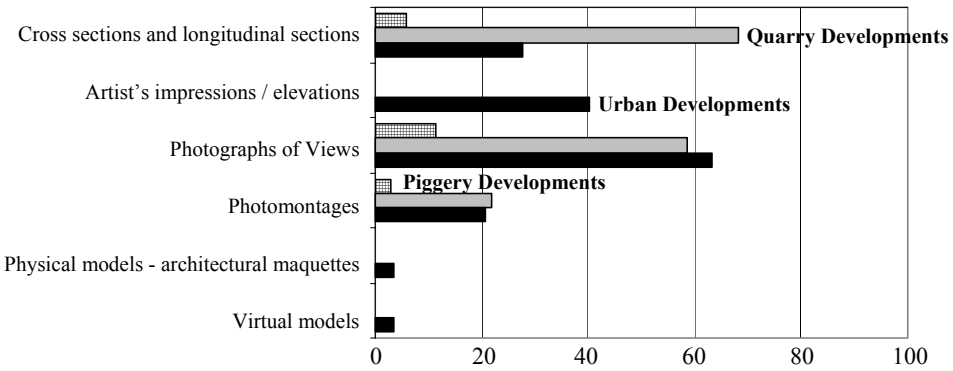

Figure 1 Incidence of use of different visualisation techniques within VIA in Ireland between 1997 and 1999.

VIA uses visualisation techniques to indicate to planners, developers and the general public what the predicted the changes to the existing visual amenity will be. Predictions need to be calculated using scientific methods to ensure they are valid and repeatable, and visualisation techniques should provide realistic predictions of the nature and magnitude of likely visual impacts. The overall use of visualisation techniques (Figure 2) was low (21%) and traditional techniques were more predominant than modern with photomontages being used less (17%) than the more conventional techniques of artist's impressions, perspective views and elevations (22%).

Physical and virtual modelling techniques can be expensive and might normally only be performed for projects involving major investments, but since EIA is only prepared for major developments, the use of modelling techniques was lower than anticipated (3%), and all of these models were only created for urban developments. However, these results refer to data produced between 1997 and 1999 which are now somewhat dated, so it would be interesting to conduct a follow-up survey to determine any improvement in use of the visualisation techniques outlined and in the adoption of modern techniques. The adoption of modern techniques is not just technologically based, and issues such as the cost and copyright of spatial data influence decisions. Many of these issues are currently being examined during the development of the Irish Spatial Data Infrastructure.

Proposed developments can be virtually modelled in three dimensions, and sophisticated tools are available to provide very advanced simulations for surface rendering, lighting and atmospheric conditions. One of the main advantages of this new technology is the high standard of realism achieved using virtual models. An orientation and latitude can be assigned to a proposed structure to permit a virtual sun to cast shadows, which are correct for the site location. The ability to model structures to this degree of realism before a sod is turned enables the designer and the developer to identify and correct design mistakes before construction begins.

Another important benefit of producing virtual models is their ability to simulate multiple scenarios of form, layout, and finishes at design stage. This examination of multiple scenarios for each development proposal facilitates the improvement of design quality. Another major advantage of virtual models is their ability to check the architectural and environmental suitability of a design to its' site and its' environs. This examination of the proposed development to ensure it strikes a balance with the receiving environment with respect to its' form, scale, colour, orientation and detailing is the essence of EIA. However, in order to accomplish this satisfactorily it is also necessary to model the receiving environment and not just the proposed development site. Ideally, a three-dimensional model of the urban environment is required in which virtual models can be placed for examination and analysis. This identifies a particular difficulty in that most mapping products currently available are two-dimensional. It would be very expensive and time consuming for project proponents to produce 3D models of the receiving environment, but many city authorities worldwide are creating 3D city models as tools to suit this planning need (http://www.casa.ucl.ac.uk/vc/cities.htm). The current absence of 3D models for urban areas in Ireland means that 3D virtual models of the proposed development if created can only be analysed against a 2D model of the surrounding environment. As a consequence, this type of analysis is not yet commonplace.

Figure 2 Examples of visualisation techniques extracted from EIS in Ireland. Anticlockwise from top left: Cross section of the National University of Ireland sports complex in Cork, Front elevation of proposed renovation of a golf club, Artist's impression of Dundrum Town Centre, Photograph of existing residence proposed for demolition, Photomontage of the Luas bridge in Ranelagh, Physical model of the National University of Ireland Sports complex at the Mardyke in Cork, and Virtual model of the Landsdown cement factory in Kinegad (EIS archive, ENFO Library, Dublin).

New visualisation techniques and methods for disseminating the information are also possible once the virtual model has been created. Visualisations techniques include perspective views, fly-throughs (using multiple perspective views), and interactive walk-throughs allowing the observer to chose their own route through the model to examine the development proposal in their own way and at their own pace. Since all of these different presentations of the virtual model are digital they are suitable for distribution and access over the Internet. This variability of presentation and increased access has the potential for making planning processes more inclusive by involving designers, developers, planners, decision makers, local communities and interested citizens (Shiffer, 2002). The visual images become the driving force and the interface to provide planning information to the end-user in a format they can understand more easily. User groups accepted the potential inherent in technological solutions, both as practical community development tools and as potential means to empower individuals, organisations and entire communities (Haughey, 2004).

The use of many intead of fewer visualisation techniques provides multiple representations of a development proposal that collectively contribute to communicate the proposed concept more effectively. Secondly, and of equal importance, is the ability to use these visualisation techniques to provide alternative development proposals to ensure inappropriate developments are minimised.

3 PUBLIC PARTICIPATION IN IRELAND'S PLANNING PROCESS

Public participation has been a feature within the forward planning and development control processes since the inception of Ireland's Planning and Development system. However public participation in the past was minimal in forward planning, because scant resources were traditionally allotted to policy formulation up to as recently as the mid to late 1990s, and County Development Plans cover relatively large areas which limits the detail possible for smaller community areas thereby mitigating against community involvement in the process.

3.1 Traditional approaches used for Public Participation

Public participation in County Development Plans is an important aspect of their preparation since local authorities must publish a notice to announce the preparation of draft Development Plans or variations to existing Plans. Once prepared, the draft goes on public display for 12 weeks to permit the public submit their observations and copies must also be sent to various statutory and voluntary organisations seeking their specialist advice. Submissions from the public and these bodies must be considered before local politicians can adopt a Development Plan.

In contrast to forward planning, public participation in the development control process is over-subscribed with multiple objections to individual development proposals being normal. Notice of submission of planning applications must be included on a site notice in a prominent position on the site boundary and published in a national newspaper to inform the public and stimulate participation. If the development proposal requires EIA then the planning authority must also publish a notice in a national newspaper that an EIS has been received with a particular development proposal. Details of applications are available for public inspection in the local authority offices for 8 weeks after submission during which time objections may be submitted. A draft decision is then published and a further 4 weeks is available where objections to the draft decision may be made to the Planning Appeals Board for adjudication.

However, public participation in the development control process is idiosyncratic and often driven by events. Knowledge of a proposed development may stem from the publicity it receives in the local media, a discussion between neighbours, or a chance observation of a planning notice while passing by. Some individuals act as local champions by taking on the role of community watchdogs and local community groups and local organisations can significantly improve participation by informing the community and stimulating opinions and observations. Government sponsored groups such as community development projects, or partnerships, can play important similar roles. However, they are not geographically uniform and tend to focus on socially excluded areas.

3.2 Sustainability highlighting the need for Public Participation

The new Planning and Development Act (Oireachtas, 2000) requires planning authorities to also consider sustainable development when evaluating planning applications for development consent. The concept of sustainable development usually cited is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland et al, 1987). A glaring anomaly between this concept of sustainable development and the traditional planning and development system in Ireland was that forward planning was too short by only considering a five to six year period, so there was an urgent need to provide a national and regional planning context for medium and long terms. Another focus of this concept of sustainability was to change the perception of landscape and environment from being a resource for life, to being a delicate resource with the ability to positively contribute to quality of life.

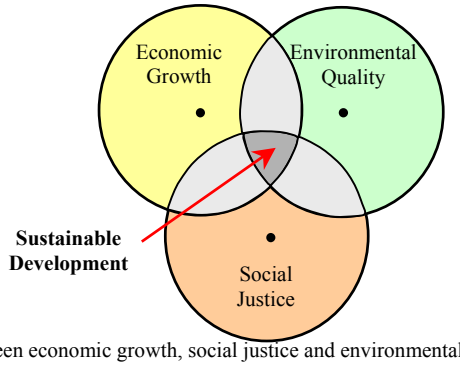

Figure 3 Relationship between economic growth, social justice and environmental quality to achieve sustainable development.

A national sustainable development partnership was established in 1999 with the aim of encouraging sustainable development across the Irish economy and society, and to advise government on policies to support and promote it. The partnership included a wide range of stakeholders from environmental, community, statutory, professional and economic sectors and they developed an agreed view on what sustainable development means in an Irish context (Comhar, 2002). Twelve principles for sustainable development were recommended as a benchmark to comprehensively test the sustainability of existing and proposed plans and programmes. A more simplified concept was also provided which is more suitable for use by developers and professionals within the design process and for planners within the development control process. It states that the three objectives of economic growth, social justice and environmental quality should be addressed equally in an integrated manner in order to achieve sustainable development (Figure 3).

The concept of sustainable development is nothing new to planners, but it has consistently been relegated by the pursuit of economic development (ENER-IURE, 2002). However, economic growth need not be at the expense of social development or maintaining a healthy physical environment, so these three objectives need not be mutually exclusive. Sustainable development requires compromise between the three competing interests, and citizen participation is identified as key to the attainment of sustainable development (Comhar, 2002).

County Development Boards were established with representation from the local government, state agencies, local development sectors and social partners to develop local strategies to implement sustainable development, and local authority's operations are now required to be consistent with these strategies (DoELG, 2001). Local authorities have also undertaken a range of initiatives to promote sustainable development both within the authorities and within local communities. Strategic Policy Committees have been established within local authorities to ensure that:

- The objectives of sustainable development are integrated into Development Plan policies.
- The performance of local authorities is evaluated and managed in a more environmentally friendly manner.
- Local agenda 21 initiatives are taken to formulate partnerships with local communities to promote awareness and educate about sustainable development issues in order to develop joint solutions.

All these initiatives have led to an increasing awareness that protecting the environment is an important national goal, and that the participation of local communities is a key requirement in this regard to ensure sustainable development is achieved.

4 SURVEY OF POLICIES USED TO MANAGE THE VISUAL AMENITY

4.1 Methodology chosen for the survey

A second qualitative survey examined policies within Ireland's County and City Development Plans (CDPs) used to protect and enhance the visual amenity. A sample was selected from the 29 County and 5 City administrations in Ireland that contain major planning departments and senior planners from the selected local authorities were contacted requesting their participation in the study. Although the initial intention was to include planners only, it was subsequently decided to include the other stakeholders of the visual environment; associations of design professionals creating the development proposals, community and environmental groups with environmental interests, and the environmental spokespersons of the political parties. The survey conducted 42 structured interviews during the summers of 2001 and 2002, which included design professional associations (6), environmental groups (12), planners (18) and political parties (6). Although the results of this survey primarily provides information on the development pressures impacting most significantly on the visual amenity, policies protecting the visual amenity within CDPs, other development policies impacting on the visual amenity, and methods used to enhance the visual amenity, it also provides much valuable information on local initiatives being taken to improve public participation.

4.2 Initiatives to improve Public Participation

The inclusion of sustainable development by the new planning and development Act (Oireachtas, 2000) as one of the criteria against which development proposals should be evaluated and the identification that public participation is key to the attainment of sustainability have highlighted the need to improve public participation in planning. However, facilitating participation in planning is not based on a simple set of ingredients that can be mixed according to a set recipe. The lack of formal structures to involve community groups in planning in the past has resulted in a shortage of existing groups and structures to take on this new role.

A statutory requirement within the new planning and development Act (Oireachtas, 2000) to prepare Local Area Plans (LAP) for local communities has rejuvenated local authority initiatives to facilitate public participation in planning. Many of the groups interviewed in the policy survey conducted felt that the preparation of LAPs would significantly help public participation by involving local communities in preparing draft LAPs for their localities. Different methodologies have been tested to develop participatory models suitable for the Irish situation with varying results. Some of the methodologies employed were:

- The Suburban Environmental Management Participatory Approach (SEMPA) project was a participatory approach designed to achieve more sustainable methods for planning and development. The local authorities and stakeholders shared responsibility for preparation of Development Plans using a SEMPA model. The model contained two aspects: an environmental forum for resolving conflicts, and local planning groups tasked with finding local solutions. A number of plans were produced including a Management Plan for the Howth Peninsula, a Recreation and Tourism Plan, a Public Transport Plan, an Environmental Plan for commercial enterprises, and a Management Plan for the use of public open space. The project proved successful in raising awareness of environmental issues, breaking down adversarial attitudes between local authorities and communities, and developing a local planning model based on partnership (Planning Authority A[#]).

[#] For reasons of confidentiality the planning authorities cannot be named.

- An experimental method was adopted by another local authority where the planners acted as facilitators and a steering group was established in a village by inviting locals to represent each sector of the community (farming, fishing, rural coastal area, tourism, commercial, residential, etc) and to prepare their own Local Area Plan. However, this methodology proved to be problematical because planners (historically under-staffed) have insufficient resources to commit to similar projects for the other villages (Planning Authority B[#]).
- An LAP for a rural town was prepared where public participation was limited. The advertisment of the Plan preparation was published before research or data collection began so the complete process to prepare the draft Plan was squeezed into statutory period of 6 to 8 weeks. Initially it was not intended to hold public meetings, however, one was held, but it did not address the hopes or aspirations of the local community so the Plan may not be representative of the views of the community (Planning Authoriy C[#]).

4.3 Difficulties encountered when encouraging Participation

There was a wide acceptance by all the groups interviewed during the policy survey of a historical lack of public participation in the forward planning process in Ireland. From the local authority's perspective, processes and attitudes need to be changed to stimulate and encourage participation. The words 'public participation' are not mentioned in any of the legislation or regulations dealing with the planning and development system. 'Public consultation' is used instead. The use of the word 'consultation' permits a less than enthusiastic support for participation if those driving the process wish to retain control, so consultation processes can be held to satisfy a statutory duty rather than engage with the public in a spirit of partnership. Arnstein viewed consultation as one of the degrees of tokenism (Figure 4), so would attitudes to participation improve if 'participation' was used instead of 'consultation'?

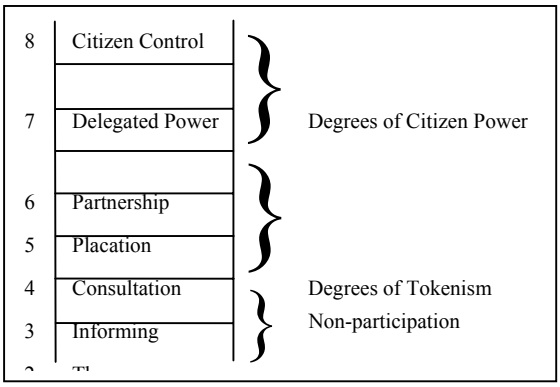

Figure 4 – Ladder of Participation (Arnstein, 1969).

Results from the policy survey indicate that some local authorities have difficulties engaging the public at times. Much money is spent putting adverts in newspapers, on local radio, and holding meetings in the local area, but local authorities do not get responses until draft Plans are published. The concept of public participation is to get people's views at the start to direct the planning process, rather than when concepts have been solidified in the minds of the gatekeepers.

Participation can be very resource-intensive for planners who need to educate, encourage, facilitate and manage participation projects. Due to the historical understaffing of planning authorities where inadequate resources were traditionally assigned to forward planning (ENER-IURE, 2002), the numbers of planners required for participation are still well below what is required even though the staffing situation has significantly improved during the last decade.

The access mechanisms currently in place to permit inspection of documents at the planning authority offices operate at only 18% of capacity from the time perspective (30 hours in a 24/7 week) due to staffing shortages within planning authorities, thereby severely constraining public participation. Although access to planning information is provided within these limited hours, the travel distance to the local planning authority and the availability of public transport for citizens can be an issue especially in larger rural counties.

Public participation in the forward planning and development control processes is somewhat compromised by procedural rules. All local authorities apply a charge (to cover the cost of production) to purchase paper copies of Development Plans and their associated land-use maps, although many local authorities now publish both of these documents on their websites. Local authorities also charge citizens to make objections to planning applications at the application stage and during appeals(currently €20), and appeals are only accepted if the same person previously submitted an objection at the application stage. All of these rules contrive to limit public participation and some expressly prohibit social inclusion by applying a charge to participate.

It is recognised that there is a major educational issue to inform the public how and why to participate in the forward planning and development control processes (Ryser, 2003). The implementation of ICTs would permit the adoption of a direct democracy model in which the opinions and preferences of the public could have a significant impact on decision making (McDonagh, 2001).

5 USE OF ICTs IN PLANNING

ICTs provide a range of new possibilities to compliment traditional ways of employment and of interacting with others and what is evolving via information society initiatives is a fundamental change in service provision. The Irish governments' first action plan on the information society (DoT, 1999) used a three-stranded e-government approach for online delivery of public services: (a)

[#] For reasons of confidentiality the planning authorities cannot be named.

information services - ensuring all public service information was available online via Department & Agency websites, as well as being delivered through traditional channels, (b) interactive services - enabling complete transactions to be conducted through electronic channels and (c) integrated services - re-engineering information and service delivery to suit user needs and developing a public services broker to supply government services through a single point of contact (www.reach.ie).

Although the implementation of the first plan was successful, rising standards elsewhere provide challenges to continually innovate, so the initial plan was superseded with a new action plan in 2002 (DoT, 2002). The new plan focuses on three key infrastructures: (a) developing the capacity necessary for delivery of advanced telecommunications services; (b) providing a secure legal framework for electronic transactions that businesses and consumers can use with confidence and (c) government playing a key leadership role in encouraging wider engagement with ICTs through its own business processes and service delivery arrangements. The new plan also containes a list of flagship projects, two of which directly relate to the planning and development system. The first project due for release early in 2005 includes an online facility providing access to the forward planning process to permit citizen interaction with the draft Development Plan, and development control process by supplying planning application forms on-line and to permit registering of unauthorised developments, commencement notices, and objections to planning applications by citizens on-line.

The second project named gPlan (GIS Planning) uses an integrated intranet/internet planning GIS (geographic information system) to provide documents and graphics relating to the planning register, Development Plans, and the forward planning and development control processes to remote users to view, analyse and make submissions via the system (www.proteus.ie). This project developed for the local authorities of Meath, Kildare and Donegal and the Local Government Computer Services Board is currently at proof of concept stage and key aspects are:

- To provide automatic display of appropriate Ordnance Survey Ireland mapping;
- To provide full access to the full text of the Development Plan for any policy objective or land-use zoning selected on the map;
- On-line submission of input by interested parties on any Development Plan policy objectives;
- To view full details of planning applications selected on the map, including a history of planning decisions in the area;
- To produce a notification report of overlaps of planning applications with Development Plan zonings, National Heritage Areas (NHAs), Special Areas of Conservation (SACs), Special Protection Areas (SPAs,) and Sites and Monuments.

5.1 Physical Access to Information for Public Participation in Planning

Physical access to information is the first key component necessary for public participation, which was identified as a right in the Freedom of Information Act (Oireachtas, 1997). The on-line ePlanning facility via the Public Service Broker portal should significantly improve the period of access by providing a 24/7 service, and should also permit access from remote locations over the internet. Many thousands of personal computers (PC) have been installed in public libraries during phase one of the Information Society Action Plan, trying to minimise the digital divide by providing access to the internet to those who do not have PCs at home.

Since the forward planning and development control processes both operate within statutory time periods, it is not only necessary to provide access, but access must be permitted within the statutory time period. If the process operates within an 8-week period and the information is not available until the start of week 2 (12.5% loss) or week 3 (25% loss), this loss of access hinders participation. This loss of access would be an ideal indicator of the success or otherwise of the new online access mechanisms and planning authorities should be required to maintain their loss below target values and publish information quarterly on whether targets are being achieved.

It is clear that improving public participation will not thrive unless the employment of ICTs in the interaction between government and citizens is at a sophisticated level. However, the existence of websites merely providing access to information about government services does little to change this manner of interaction between government and the citizen (McDonagh, 2001).

5.2 Intellectual Access to Information for Public Participation in Planning

The development control process requires a diverse range of planners, architects, engineers, project proponents, local politicians and the public to be able to conceptualise development proposals from documents supplied with planning applications. This necessitates reading maps, trying to visualise ideas in 3D from 2D schematic drawings and plans, and also understanding scientific evidence supplied in environmental impact statements (EISs) on impacts on water, fauna, traffic flows, and landscape. Therefore, intellectual access to information is the second key component necessary for participation, and how the information is presented can either impede or facilitate its understanding. Consequently, there is a need to examine the way information is currently presented in order to develop new paradigms to maximise communication, understanding and participation for all involved.

5.2.1 Capacity Building

The current process demands that individuals and community groups are aware of how the planning processes operate in order to allow them participate. This could be a dangerous assumption, which may divorce many citizens from the planning and development system and highlights a need to educate the public on how to participate and the need for participation by developing a sense of community ownership. Since public participation should be inclusive and not marginalize any social groups, this capacity building might best be provided during the mandatory schooling period before the age of 16. A planning and development module in the Civil Social and Political Education (CSPE) curriculum in second level could satisfy this need. The module would be specifically designed to educate how these processes operate and what role the public is expected to play in a democratic society. A second module should also be developed to educate existing adults how to participate and encourage them to become involved in their local communities.

5.2.2 Presentation of information

There is a need to examine the way information is currently presented in order to develop new paradigms to maximise communication, understanding and participation for all involved. Technical and scientific information can be difficult to grasp in text or in tabular form. Planning authorities are statutorily obliged to publish planning lists of applications received, decisions made, appeals received, and appeals decisions, and most do so via their websites. However, the lists are supplied in a format, which makes it difficult to find the information required, by having to read through page after page of textual data. This type of information needs to be re-engineered and supplied in a format, which assists rather than confuses knowledge.

Concepts can also be grasped much more quickly if presented graphically. Graphics not only disseminate the basic information but they can also indicate how elements are linked and how processes operate chronologically. One of the aims of the Information Society policy is to re-engineer existing processes to ensure government services are client focussed. This was successfully achieved in providing government information using a concept of lifecycles for citizens (www.oasis.gov.ie) and for businesses (www.basis.ie).

Changes in the landscape arising from new developments have a direct, immediate and visible effect upon people's surroundings, thereby arousing strong feelings. Immediate opinions are stimulated when people are visually confronted with a constructed development. Using visualisation techniques within the development control process is an important way of stimulating the public into vocalising opinions at a stage when the development is not yet built and their opinions can make a difference (Bell, 1999).

Many examples exist where geographic information system (GIS) technology has been successfully applied to improve existing planning processes, but radical changes are required to examine development proposals visually and optimise public participation in the process using visualisation techniques. Geo-visualisation is a relatively new area of geographic information research that integrates approaches from visualisation in scientific computing (ViSC), cartography, image analysis, information visualisation, exploratory data analysis (EDA) and GIS to provide the theory, methods and tools for visual exploration, analysis, synthesis and presentation of geographic information (MacEachren & Kraak, 2000). The strength of the combination of all these disciplines is the opportunity to look at data differently and stimulate so-called visual thinking by visual exploration and analysis. Two important functions of geo-visualisation in planning are exploration and collaboration. Professionals (planners, architects and engineers) can use geovisualisation for visual thinking to explore and preview different planning scenarios. Collaboration has to do with presenting development proposals visually between the various groups (planners, architects, engineers, project proponents, local politicians and the public) at different stages of the development control process. These geo-visualisation techniques can dramatically improve understanding of the planning issues, entice wider public participation by presenting the issues in a format which is more easily understood, and lead towards improved planning decisions and a better environment. Furthermore, the internet seems to be the logical delivery mechanism for collaboration to disseminate these geo-visualisations and as a resource to provide forums, chat rooms and email for discussing development alternatives (Jiang et al, 2002).

5.3 Implications of Public Participation to Collaborative Governance

There are many examples of significant improvements in public participation when investment is committed to local community groups (Clarke, 1999; Haughey, 2004) so funding should be provided for community groups across all social classes to assist participation at community level and ensure participation is widespread both thematically and geographically.

Supplying information in current formats from websites will not in itself improve participation. The information needs to be re-engineered to suit the public and its' provision in graphical formats using visualisation techniques should assist information understanding. The new ePlanning and gPlan facilities for the forward planning and development control processes are eagerly awaited and should provide the tools necessary to significantly improve citizen interaction in the planning and development system.

The development of eDemocracy can be viewed as underpinning a new approach to democratic theory where the basis of this theory is that representational democracy has failed. The perceived weaknesses of existing democratic arrangements are that members of the representative assemblies represent partisan interests, that they tend to follow only their own partial understanding of what is good for their constituencies, and that they are more responsive to the requirements of the political party they belong to, than to the citizens whose mandate they have received. The implementation of ICT, it is argued, will allow for the adoption of the more desirable model of direct democracy in which the opinions and preferences of all members of the public can have a significant impact on decision making (McDonagh, 2001).

6 CONCLUSIONS

- The results of the survey of visual impact assessment indicate a low use (21%) of visualisation techniques for VIA in Ireland in the late 1990s, and there is a need to investigvate why this is so. Obstacles limiting the use of visualisation techniques such as availability of skilled staff or availability, suitability or cost of spatial data should be examined and eliminated to encourage improved use of visualisation techniques.
- The gPlan facility currently being piloted and tested should permit maximum use of the full range of visualisation techniques available and should examine the concepts used in geo-visualisation to explore, analyse and present data in visual formats to assist understanding and encourage public participation.
- Consideration should be given to replacing the word 'consultation' with 'participation' in planning and development regulations to minimise the use of public consultation in a closed manner and to maximise participation of local communities in planning and development processes.

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