Visualising the Conflict: Immersion in the Landscape of Victims and Commemoration in Northern Ireland

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Abstract

The University of Ulster received funding from the Arts and Humanities Research Council (AHRC) to undertake a two-year project entitled 'Remembering': Victims, Survivors and Commemoration in Northern Ireland. The project resulted in a digital archive related to the issues surrounding victims in the region. A team of researchers based at the Magee campus of the university documented the developments that have taken place in this subject area since 1997. Information that was collected during the project was made available through the existing CAIN Web site (cain.ulster.ac.uk). CAIN (Conflict Archive on the INternet) is a Web site which provides a wide range of information and source material on the Northern Ireland conflict and politics in the region from 1968 to the present. The CAIN Web site has been available on-line since 1997.

Following the completion of the original project the AHRC announced additional capital funding and called for proposals to the Digital Equipment and Database Enhancement for Impact (DEDEFI) Scheme. CAIN submitted a proposal for a second project which was designed to improve the access to, and the impact of, the databases which were compiled during the first project. Crucial to its success was the provision of a visual dimension enhancing the databases collected during the first project. These databases included a new database of information and photographs of physical memorials across Northern Ireland, and an updated version of Malcolm Sutton's Index of Deaths which included recently obtained latitude and longitude co-ordinates. A key element of the second project involved mapping location data related to victims and commemoration onto the Web. This was undertaken using both Google maps/earth and Geographic Information Systems (GIS) to locate and add the latitude and longitude values for each record in the databases. GIS software was also used to analyse the data and to produce high quality maps. These maps show the location of deaths and memorials related to the conflict, correlated with various socio economic factors. They are designed to provide a spatial dimension and context for the data which they exhibit. This paper discusses the techniques used to create these maps and highlights some of the key findings to arise from them. An additional element of the project was the development of a virtual educational space in Second Life. The project has produced innovative material, which will be made publicly available on the CAIN website during 2011, and insights for those studying or researching the conflict within and about Northern Ireland.

Introduction

In 1997 the then Secretary of State for Northern Ireland, Marjorie ('Mo') Mowlam, appointed Sir Kenneth Bloomfield to consider how the issues of victims and survivors of the Northern Ireland conflict might be addressed (McDowell 2007). Bloomfield's Report *We Will Remember Them* (Bloomfield 1998) represented the first major initiative on the issue by the British government. This process ran alongside the negotiations that led to the Good Friday Agreement. Since 1997 the issue of victims has been a dominant theme in the political discourse of Northern Ireland. Policy initiatives have included: the appointment of a Minister for Victims; the setting up of the Victims Liaison Unit; the Victims Unit; various consultations; the establishment of the Historical Enquiries Team (HET); reviews of the Criminal Injuries Compensation Scheme; funding of various groups, agencies and organisations who worked with victims and survivors; the establishment of the Victims' Commissioners; and the Consultative Group on the Past (Nagle 2009). In addition there have been many high profile public Inquiries.

As opposed to the policy initiatives that have been undertaken it is worth noting that there has been no 'truth and reconciliation commission' as has been the case in many countries around the world. Also the British government and the local Stormont administration still struggle with the question of how to deal with the past in such a way that will not place additional strains on the current political arrangements, but which would contribute to reducing the likelihood of the reoccurrence of political violence in the future.

At the grass roots level there have also been developments around the issue of victims and survivors. Since 1998 there was an increase in the number of victims' groups some of whom have led high profile campaigns around victims' issues. In addition there was a noticeable increase in the use of physical memorials (plaques, stones, memorial murals, memorial gardens, etc.) in public places to commemorate those who had been killed during the conflict. These memorials have been mainly erected by family and friends of civilians who were killed, and groups who commemorate Republican and Loyalist paramilitaries who have been killed. Only a smaller number of security force (RUC, UDR, and British Army) memorials are to be found in public spaces; sometimes at the site where the soldier or police officer was killed or located alongside existing war memorials. It would appear that the majority of security force memorials are located in police stations, army bases, Orange halls, Protestant churches, and other private buildings. The decision to locate these memorials indoors is due to concerns over potential politically-motivated damage to the memorials. While all memorials in public places are at risk of common vandalism, many are also the subject of politically motivated attacks. This is especially true of paramilitary memorials and other contentious or high profile memorials.

The CAIN (Conflict Archive on the INternet; cain.ulster.ac.uk) Web site provides information and source material on the conflict and politics in Northern Ireland. In recent years CAIN received two grants from the Arts and Humanities Research Council (AHRC) to develop resources related to the issue of victims. The first grant was for two years and was awarded in 2006 for work on a project entitled 'Remembering: Victims, Survivors and Commemoration'. The second follow-up grant was awarded in 2010 for a project entitled 'Visualising the Conflict: Immersion in the Landscape of Victims and Commemoration in Northern Ireland'. These two projects are briefly described below.

Victims, Survivors and Commemoration

This two year AHRC-funded project was undertaken to document the developments that have taken place in the area of victims since 1997 and to build an on-line archive of resources related to the topic. While most of the work related to the conflict within Northern Ireland, the research team also looked at how this issue has been approached in the Republic of Ireland and Britain.

Prior to the beginning of this project there had been some information on the topics of victims and commemoration on the CAIN Web site. However, this project greatly expanded the material with an extensive on-line digital archive of source materials and information (cain.ulster.ac.uk/victims). Part of the work involved seeking permission to gather and compile information and material that was held by a large number of organisations and individuals. Some of this information was only available in paper format and it was converted into a digital format. In addition the project also generated new material. For example, the team compiled a searchable database of information and photographs on the physical monuments to the victims of the conflict. As part of the data gathering, GPS co-ordinates were collected for over 450 physical memorials located in public spaces, mainly in Northern Ireland.

Information contained in the archive helps to document the process by which society in Northern Ireland has so far addressed the complex issues surrounding victims, survivors and commemoration. The information is now freely and readily available to a world-wide audience through the CAIN site. The lessons learnt in Northern Ireland are of interest not only to an academic audience but also to policy makers, non-governmental organisations, community leaders and others.

A further aim of the project was to secure the long-term preservation of the digital material. The University of Ulster is committed to ensuring that all the contents of the CAIN site remain available to users of the site into the long term. In addition the CAIN site was selected to participate in the UK Web Archive (webarchive.org.uk - formerly the UK Web Archiving Consortium Project) and as such the contents of the site are regularly archived.

Visualising the Conflict

Following the completion of the first AHRC-funded project, the AHRC announced additional capital funding and called for proposals to the Digital Equipment and Database Enhancement for Impact (DEDEFI) Scheme. CAIN submitted a proposal to carry out a one-year project and was given an award in 2010.

The second project was designed to improve the access to, and the impact of, the databases which were compiled during the first project. The first part of the new project involved mapping location data related to victims and commemoration onto the Web. Some of the work involved using proprietary software (Google Maps/Earth) to provide users with enhanced ways of manipulating, visualising and interpreting the data. In addition Geographic Information Systems (GIS) software was used to analyse the data and to produce high quality maps. The second part of the project involved an investigation of the potential use of virtual world technologies, in an educational setting, to allow users to interact with the information contained in the databases and to engage in dialogue with other users about issues related to victims and commemoration.

A new section of the CAIN site containing the outputs of this second AHRC-funded project will be made available later in 2011. When it is launched users will find an interactive Google map displaying information on physical memorials, with links to information on the victims commemorated by particular memorials. There will be a large number of high quality GIS maps, and graphs, displaying information on victims and commemoration correlated with variables such as population densities and deprivation indices. There will also be a description of the virtual educational space that has been created in Second Life (with a backup in OpenSim) and details of the SURL where people can visit the Second Life Island and view the facilities created.

Data Sources

The Visualising the Conflict project extended the potential uses that could be made of some existing databases on CAIN and incorporated data from other publicly available sources. The opportunity for doing this work arose firstly because grid co-ordinates had been collected using a GPS device when the database of physical memorials was compiled, and secondly because X/Y grid co-ordinates had been added to a database of deaths from the conflict. While the grid co-ordinates for the physical memorials had been made available alongside other information when the outputs from the Victims, Survivors and Commemoration project went on-line, this information was not mapped at the time.

Sutton's Index of Deaths

Staff at CAIN worked with Malcolm Sutton to convert and update the information contained in his 1994 book 'An Index of Deaths from the Conflict in Ireland 1969-1993'. The resulting database was the basis for a section on the CAIN Web site which was first made available in 1999 and then updated to 2001. As a result of extensive feedback on this dataset of deaths (1969-2001) regular corrections are made to the information. There is currently information on 3,528 deaths. While the database initially contained street address information on where the deaths occurred it did not include map co-ordinates. However, in 2008 a research team at Lancaster University provided CAIN with X/Y co-ordinates for the deaths that occurred within Northern Ireland. Location information was obtained from Sutton's Index of Deaths, and then checked against other sources such as 'Lost Lives', and the co-ordinates were estimated using mainly paper maps. Staff at CAIN decided not to release this co-ordinate data until additional checks could be carried out. As part of the Visualising the Conflict project the co-ordinates were converted to decimal latitude and longitude and plotted using GIS and Google maps and Google earth. It was decided that the co-ordinates could be used at ward level, but some of the co-ordinates could be improved upon using more recently available digital mapping sources.

Memorials Database

As part of the first AHRC project on Victims, Survivors and Commemoration an assessment was made of the then available information on physical memorials in Northern Ireland. There were a number of sources of information on murals (some of which are commemorative memorials) not least the Mural Directory on CAIN (McCormick 2006), a booklet on memorials related to the conflict had been published in 1997 (Leonard 1997), and Sara McDowell had compiled a database, as part of her Ph.D. Thesis, containing information on people killed during the conflict and any memorials commemorating those individuals (McDowell 2006).

However, there was no comprehensive on-line database with information and photographs of physical memorials in Northern Ireland. As the number of physical memorials in public spaces appeared to be on the increase and as the topic of commemoration was a highly contested one in the region, it was decided to try to combine existing information and to expand on that material with a survey of physical memorials. The data gathering exercise took place during the period 2007 to 2009. In addition to photographs of each site and each element of the memorial, it was also decided to use a hand-held GPS device to record the X/Y co-ordinates of the memorial. The memorials were also described and classified according to: physical type (memorial stone, enclosure, garden, plaque, mural, other); nature (civilian, British security, Loyalist, Republican, other); physical materials; setting; and access. The database also contained links to information on the persons commemorated utilising the existing information from Sutton's Index of Deaths, and also the photographs of those killed which had been collected during the project (currently 1,500 images). While not yet fully

completed, many of the inscriptions contained on the memorials have been transcribed and are contained in a searchable field in the database. Some of the memorial sites contain very lengthy inscriptions, often with scores of names and dates, and there are a number that still remain to be transcribed. The immediate aim is to try to expand the database of memorials as new ones appear in public spaces and also to finish adding inscriptions and photographs.

When the new archive of materials related to Victims, Survivors and Commemoration was made available on CAIN in June 2009, the information on X/Y co-ordinates was produced simply as plain text. At the time CAIN did not have the skills or resources to map the information. The second tranche of funding from the AHRC which funded the Visualising the Conflict project allowed CAIN staff to map the information about physical memorials. Some of the outputs from this work are briefly outlined below.

Additional Data Sources – NISRA/EDINA

In addition to the two databases mentioned previously, a number of other data sources were employed in the study. Socio-economic factors, population density and religious segregation are identified as having a significant influence on the distribution of incidents arising from the conflict (Shirlow 2006). Data relating to each of these factors was exploited in this study using GIS. For representation of deprivation, the Northern Ireland Multiple Deprivation Measure Score (NIMDMS) was used. The Northern Ireland Statistics and Research Agency (NISRA) compile the Northern Ireland Multiple Deprivation Measure (NIMDM) and it provides a detailed indication of deprivation in areas across Northern Ireland. The NIMDM is a combination of seven types or 'domains' of deprivation. To combine the domains, the domain ranks are firstly transformed to an exponential distribution (ranging from 0 to 100) and combined with the following weights: Income Deprivation 25 per cent; Employment Deprivation 25 per cent; Health Deprivation and Disability 15 per cent; Education, Skills and Training Deprivation 15 per cent; Proximity to Services 10 per cent; Living Environment 5 per cent; and Crime and Disorder 5 per cent. The resulting combined score is ranked to give the Multiple Deprivation Measure Rank. The area with the highest rate of deprivation (highest score) is ranked as number 1.

Census data for the year 2001 was accessed from the Northern Ireland Statistics and Research Agency (NISRA) and used for the purposes of calculating religious segregation and population density in this research programme.

One aim of the project was to provide researchers with comprehensive and detailed spatial tools related to exploration of the conflict. In order to achieve this aim, it was decided to map the data on a range of different geographic scales, depending upon the contents of the map. Therefore data was plotted at ward level, super output area level and at one kilometre grid square level. GIS Shapefiles of Northern Ireland for these three geographic scale maps were downloaded from two different sources: the Northern Ireland Statistics and Research Agency

(NISRA) (1 km grid square and SOA) and the EDINA borders (Wards) Web site. In total there are 582 wards in Northern Ireland. These wards vary in size from 800 residents to 9000 in the most densely populated wards. Super Output Areas (SOAs) were created to improve the reporting of small area statistics in Northern Ireland. Before the creation of SOAs the standard unit of presenting local statistical information was the 582 Electoral Ward (Wards). The target size for SOAs is approximately 2000. In total there are 890 SOAs in Northern Ireland.

Examples of GIS Maps of Deaths

The main objective of the Visualising the Conflict project was to enhance already existing databases available on the CAIN website. Key to achieving this aim was the utilisation of Geographic Information Systems (GIS) to provide high quality static maps, which would provide an important spatial dimension. GIS is a data management and analysis tool that can map the location and attributes of data and analyse spatial relationships among them. This development should prove invaluable for researchers seeking to identify patterns relating to locations of victims and, also, memorials. Such patterns are less amenable through utilisation of traditional databases.

A series of detailed maps were produced identifying the location of victims in relation to a range of relevant indicators. A provisional list of these maps is included in **Appendix 1**. Currently a total of 163 maps have been produced. A number of these maps and indicators are similar to those that had been created previously by other researchers (for example: Mesev, Shirlow, Downs 2010). However, these earlier studies of the spatial distribution of victim location used different datasets (as they did not have access to the Sutton Index of Deaths) and it was deemed necessary to develop these maps using this resource. In addition the intention was to make the maps available for download in a number of formats (PDF and JPEG).

It is not possible to provide details of all the results of all of the maps produced to date but the remainder of this paper describes a few of the maps to give an indication of the type of work that has been carried out.

One of the first set of maps to be created illustrates the death rates per 1000 population, for eight categories of victims, due to the conflict in Northern Ireland between 1969 and 2001. The data was mapped at electoral ward level. The death rate was calculated by dividing the total number of deaths during the conflict by the population within which the deaths occurred. Eight categories of victims have been mapped: all victims of the conflict; Civilians killed due to the conflict; Loyalists killed due to the conflict; Republicans killed due to the conflict; British Security Personnel killed due to the conflict; all those killed by Loyalists during the conflict; all those killed by Republicans during to the conflict; and all those killed by British Security Personnel during the conflict. Three geographical areas have been mapped for each of these

categories: Northern Ireland, Belfast and Derry. The death rate legend is split into five levels for each of the categories of victims mapped. The first level is those wards where no deaths occurred; the second level is the number of wards which fall in the lowest 50 per cent of death rates; the third level is the number of wards in the next highest 22.5 per cent of death rates; the fourth level is the number of wards in the next 22.5 per cent of death rates; the fifth level are the wards within the top 5 per cent of death rates. **Figure 1** contains one of the maps showing total death rates for Northern Ireland. The 24 maps in this particular series confirm in visual format what those familiar with the Northern Ireland conflict know in terms of the distribution of deaths. Namely that certain areas of Belfast and Derry, together with south Armagh and the border counties bore the heaviest burden in terms of loss of life, while a number of areas saw few if any deaths.
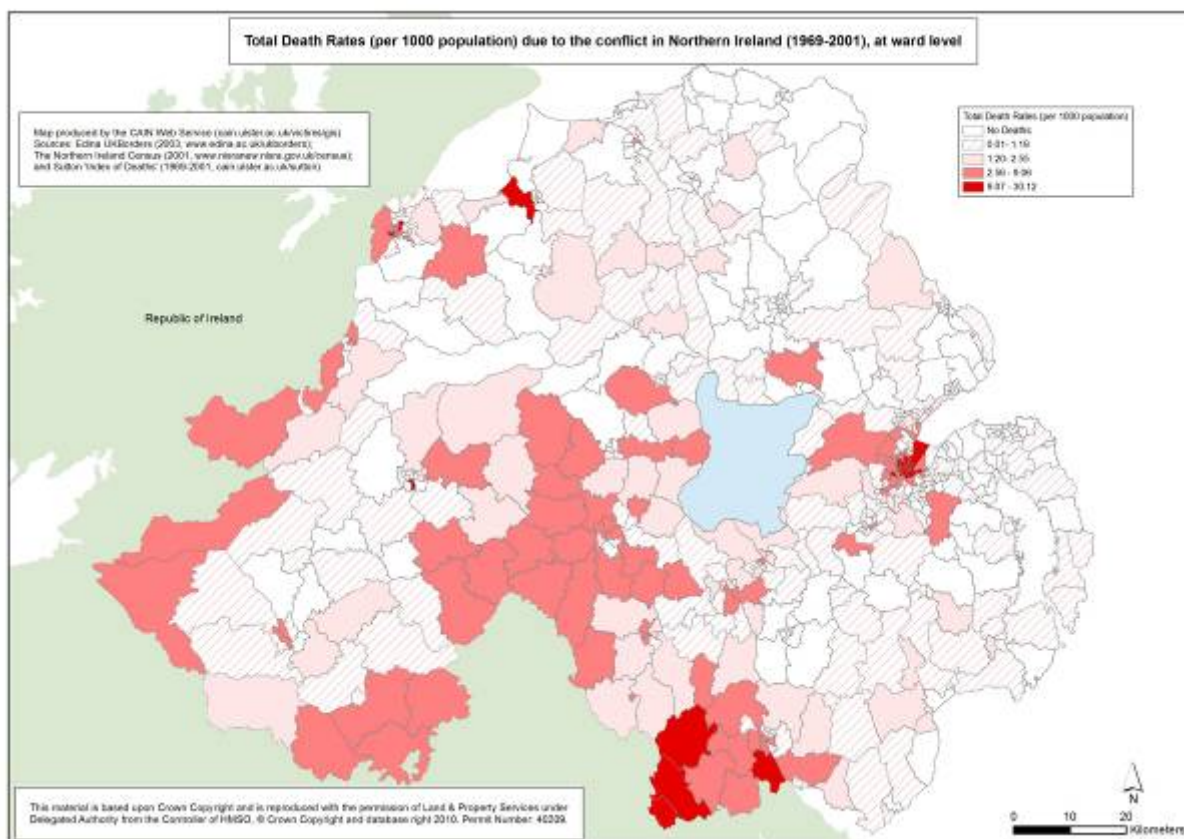

Figure 1 An example of a map displaying total death rates (per 1000 population)

Sutton's database covers a period of 33 years, during this time there have been significant movements of population at Ward and even SOA level. Moreover, due to the high density of certain locations it proved impossible to plot with any clarity the exact location of all individual deaths. It was decided therefore that a pragmatic and also efficient approach would be to plot deaths at a one kilometre grid square level. In addition to mapping the three geographical

areas – Northern Ireland, Belfast and Derry – the maps plot not only the total number of deaths between 1969 and 2001 but, in addition, map the number of deaths within eight different year groupings in each individual grid square. These groupings are: 1969-1973; 1974-1978; 1979-1983; 1984-1988; 1989-1993; 1994-1998; and 1999-2001. As an example **Figure 2** shows deaths in Belfast for the period 1969-2001.
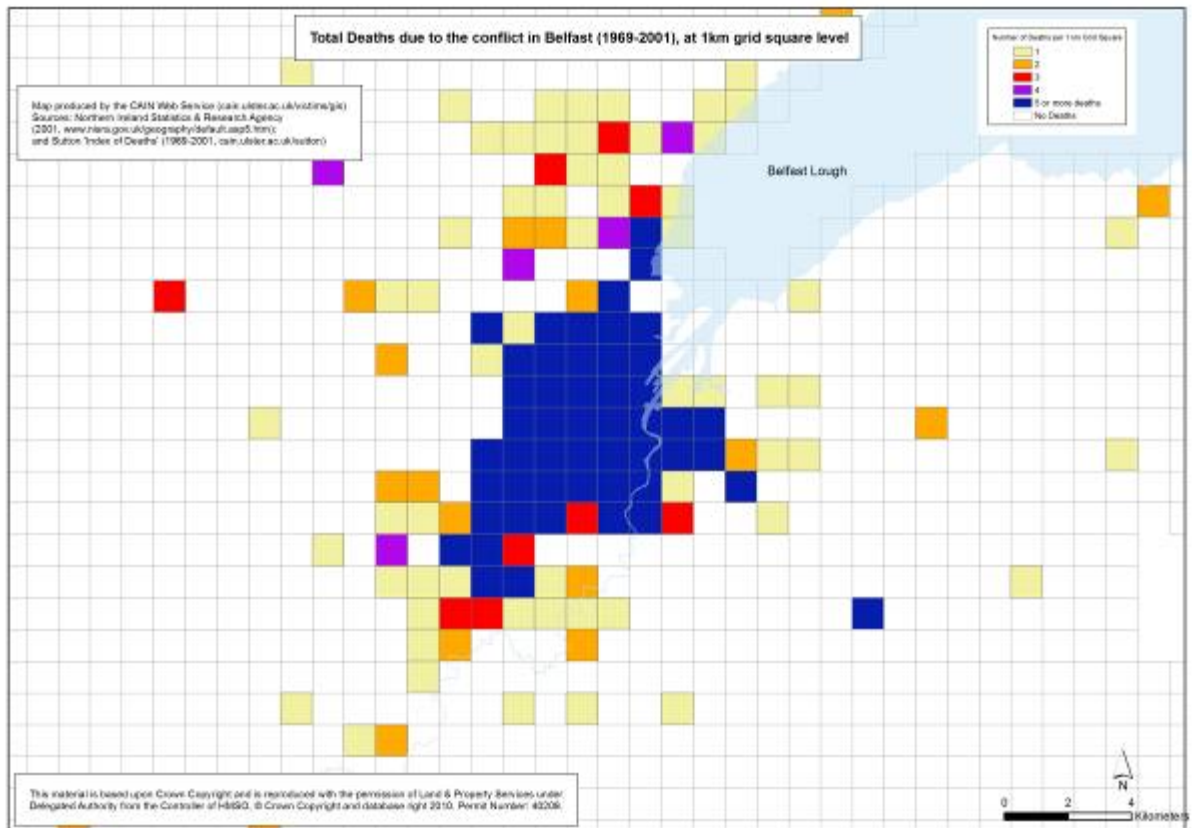

Figure 2 An example of a map showing total deaths at 1 km grid square level

The information used to name, locate and plot each victim was obtained from Sutton's database. The number of deaths per one kilometre grid square was divided into six separate layers, ranging from no deaths to five or more deaths. In addition to the static maps, a further dimension is provided by an animated version of the maps. The map in **Figure 2** confirms the intensity of deaths in north, west and central Belfast.

While the basic description field in Sutton's Index of Deaths is not as extensive as that in, say, 'Lost Lives', it does provide some additional information related to the motivation for particular killings. Extracting this information from the description field it was then possible to map particular categories such as: those persons killed as a result of Republican and Loyalist feuds; those people who were killed by Republicans because they were alleged to have been informers; and those victims who were classified as 'disappeared'.

GIS Maps of Deaths and Memorials

While some of the GIS maps related to the distribution of deaths will be similar to those produced by other researchers, one area which is completely new is the mapping of the location of physical memorials in public spaces. Although the database of memorials is still a work in progress and not a comprehensive survey, due in large part to the amorphous nature of commemoration, nevertheless it provides the most comprehensive on-line archive that is currently available. Utilising the Sutton Index of Deaths and the CAIN database of memorials, it was possible to develop a series of maps examining the relationship between the two. In particular an analysis was conducted of the distance between the location where a person was killed and the closest memorial that commemorates that individual.

Due to its long tradition and organised nature, those people who were members of a Republican organisation when they were killed are often commemorated at more than one memorial. The most obvious example being those who died on Hunger Strike, who are commemorated at dozens of memorials across Ireland. In examining the relationship between place of death and place of commemoration it was decided to use the closest memorial where more than one memorial was known to exist.

Memorials in the CAIN database are grouped into four main categories: Civilian; Republican; Loyalist; and British Security Force. It was known in advance of the research that most British Security force monuments are located within army bases, police stations, Protestant churches, Loyal Order halls, and other buildings. Due to issues related to gaining access to such buildings, a comprehensive survey of Security Force memorials could not be undertaken. Some have been included, mainly those few to be found in public spaces and several in Protestant churches. However, for the purpose of the analysis of distance information this group was omitted from the analysis. Maps were produced for Northern Ireland, Belfast and Derry for Civilian, Republican and Loyalist. The map for Loyalist deaths and associated memorials in Belfast is included in **Figure 3**.
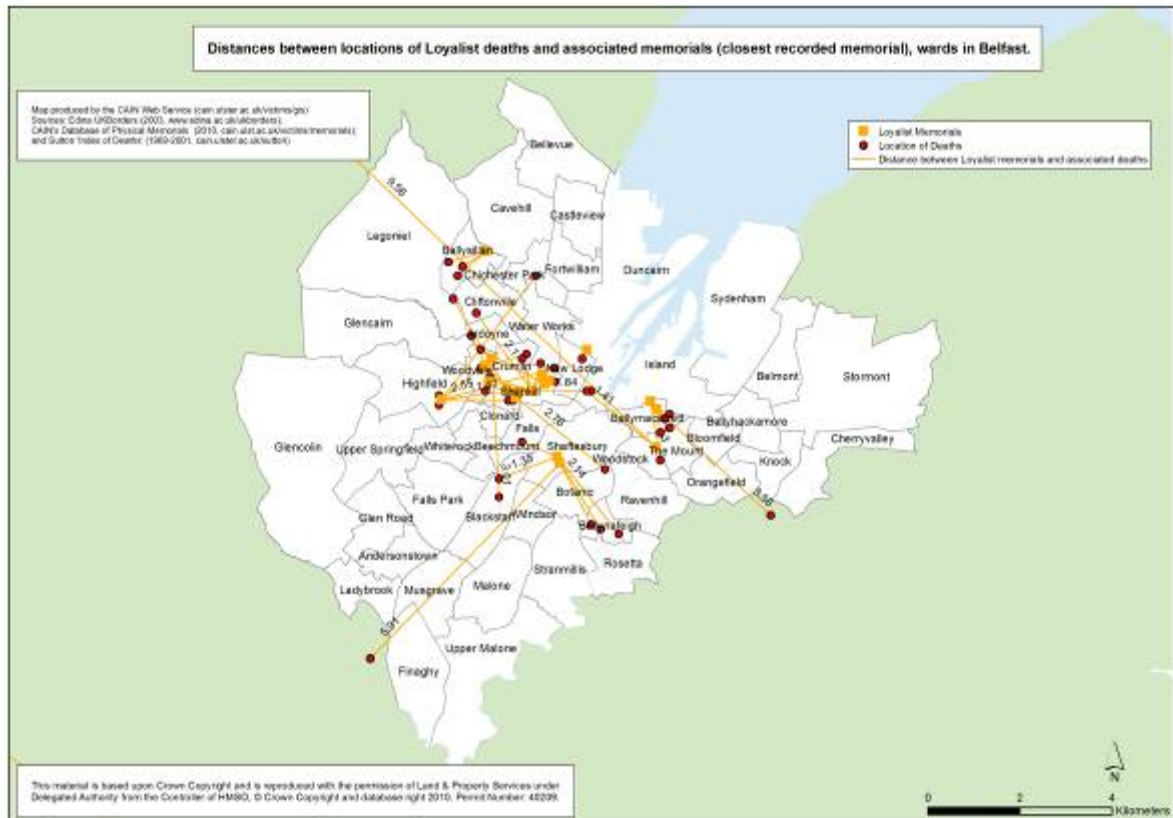
Figure 3 An example of a map showing distances between location of deaths and closest memorial

From an initial analysis of the maps, the general pattern to emerge established that, on average, Republican memorials were located the furthest distance from location of death, and Civilian memorials were located closest to the location of death. In order to validate the robustness of this finding, a statistical analysis was undertaken on the respective distances between memorial and site of death.

Box and whisker plots are a statistical technique which indicate the median distance between two points, in this case, location of death and closest associated memorial. They reflect the middle mass of the data obtained, the inter-quartile range, and how these cluster around the median for each sub group of victims. The distribution of points is represented by the shape and size of the vertical middle box and the attached 'whiskers'. The diagram illustrates clearly, through the relative size of the boxes, the Republican sub-groups as having on average greater distances between points. Due to the large number of outliers in each subgroup, indicated in the diagram by the asterisk (*) symbol, the box plots were recreated, this time employing a ten and twenty kilometre threshold limit. The results of these findings reinforced the earlier conclusions.
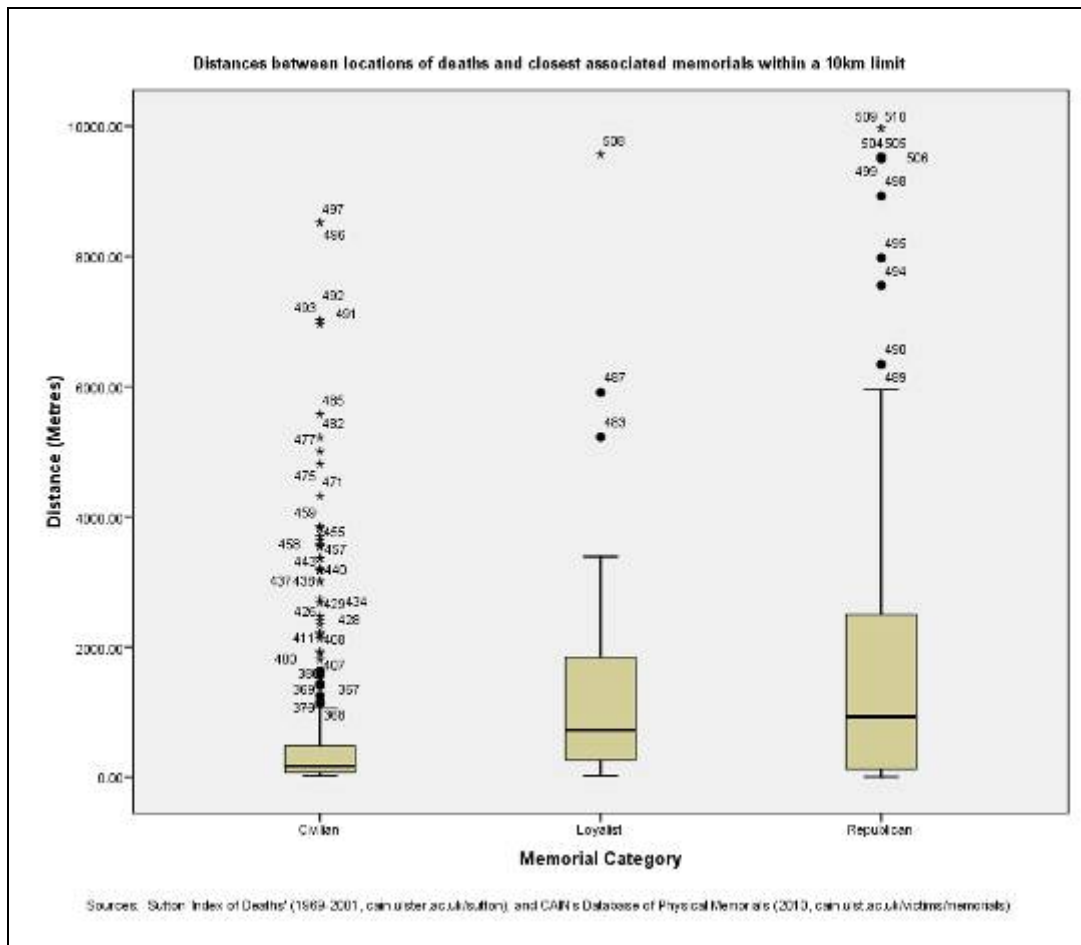
Figure 4 An example of a boxplot diagram illustrating distances between deaths and closest memorial

Although Northern Ireland as a whole, Derry and Belfast were all analysed, it was considered that, for the purpose of this paper, Belfast provided the optimal case study in order to illustrate the comparative spatial distribution of the three sub-groups and relevant memorial locations. The maps illustrated that the majority of Civilian memorials were located in the West and North of the city, the Loyalist memorials were situated predominantly in the north-west, east and south-east of the city, and memorials to Republicans are located in the West and inner-city areas of North Belfast. The maps highlight that a significant number of these Republican memorials commemorate victims who were killed at some distance from the city limits.

From knowledge of the history of the conflict it is clear that many Republicans were killed, in their terms, 'while on active service'. These incidents often took place away from Republican areas. While Republican commemorative organisations would like to place memorials close to the spot where members were killed, this is often not feasible hence the memorial is placed in a Republican area or at a Republican Plot in a cemetery. Fewer Loyalists were killed 'on active service' and a significant number who were killed, died as the result of feuding between rival Loyalist groups. Hence the memorials can be placed closer to the place of death. Many civilian memorials are located very close to the spot where the person was killed. These differences help explain the outcomes observed in the boxplots.

GIS Maps of Deaths and Peacelines

Sectarian conflict during the Troubles resulted in the erection of a series of separation barriers known as 'peacelines', 'peace walls', or 'interface barriers'. These barriers range significantly in size and were first constructed in 1969. The purpose of the peacelines was to separate the two communities and thus try to reduce the opportunities for violence to erupt. An obvious question to ask therefore is whether there is any evidence that the peacelines have been successful in preventing the most serious forms of violence namely killings. Given the database of deaths contained information on the location of deaths it should in theory be possible to plot the location of peacelines and examine deaths prior to and following their construction. Unfortunately one immediate problem arose with the information on the 22 peacelines constructed in Northern Ireland (16 of which were erected in Belfast); the Northern Ireland Office (NIO) had accurate records in terms of the year of construction for only seven of the peacelines. With further research, perhaps in a newspaper library, it should be possible to obtain dates for most of the peacelines but it was decided to conduct a tentative analysis of deaths close to these seven barriers.

Table 1 Deaths due to the conflict that occurred close to certain peacelines in Belfast

Number of Deaths

Peaceline	*500m Buffer*	*500m Buffer*	*250m Buffer*	*250m Buffer*
	Before	**After**	**Before**	**After**
	< 3 years	*> 3 years*	*< 3 years*	*> 3 years*
Roden Street (1985)	8	6	1	1
Alliance Avenue (1991)	6	2	3	1
Squires Hill (1993)	5	1	3	0
Townsend Street (1992)	6	2	1	1
Lanark Way (1988)	3	4	2	3
Workman Avenue (1990)	2	2	0	0
Alexandra Park (1994)	2	1	1	0

Sources:

Table based on Sutton's 'Index of Deaths' (1969-2001); Belfast Interface Project; Northern Ireland Statistics and Research Agency (NISRA)

Table 1 lists the seven peacelines analysed. Using the GIS software, a 500 metre 'buffer zone' was created around each peaceline. Two separate data files were plotted on the GIS. The first file contained the locations of deaths for the three years prior to the year of erection of the peaceline; the second file plotted the locations of deaths which occurred in the three years after the year of erection of the peaceline. Due to an absence of information on the precise month when the peaceline was completed, it was decided to omit deaths during the year of erection from the analysis.

Table 1 shows that five of the seven peacelines experienced a reduction in the number of deaths in the years following construction. However, there could be a number of factors other than the erection of the peaceline – most notably the general decline of total deaths from the high points in 1972 and 1974 – which constituted to this reduction. Of the two remaining peacelines, one had the same number of deaths after the construction whilst the other experienced a greater number of deaths. As indicated above this work was only intended as an initial tentative analysis of the information on deaths and peacelines. Further research will be required to obtain the dates of construction for the entire 22 peacelines recorded by the NIO and it would also be necessary to undertake a statistical analysis of the deaths to test if any observed reductions in deaths could be attributed to say the overall decline in the level of deaths. In order to do this it might be necessary to plot imagined peacelines and matching buffer zones in nearby interface areas and see if there corresponding reductions in the number of deaths. Of course it would be necessary to bear in mind while doing this that the current barriers have been placed in those areas which experience the highest violence or were perceived to be the areas of greatest threat. **Figure 5** shows one of the pairs of GIS maps with 250 metre and 500 metre buffer zones around the peace line in Alliance Avenue in north Belfast.
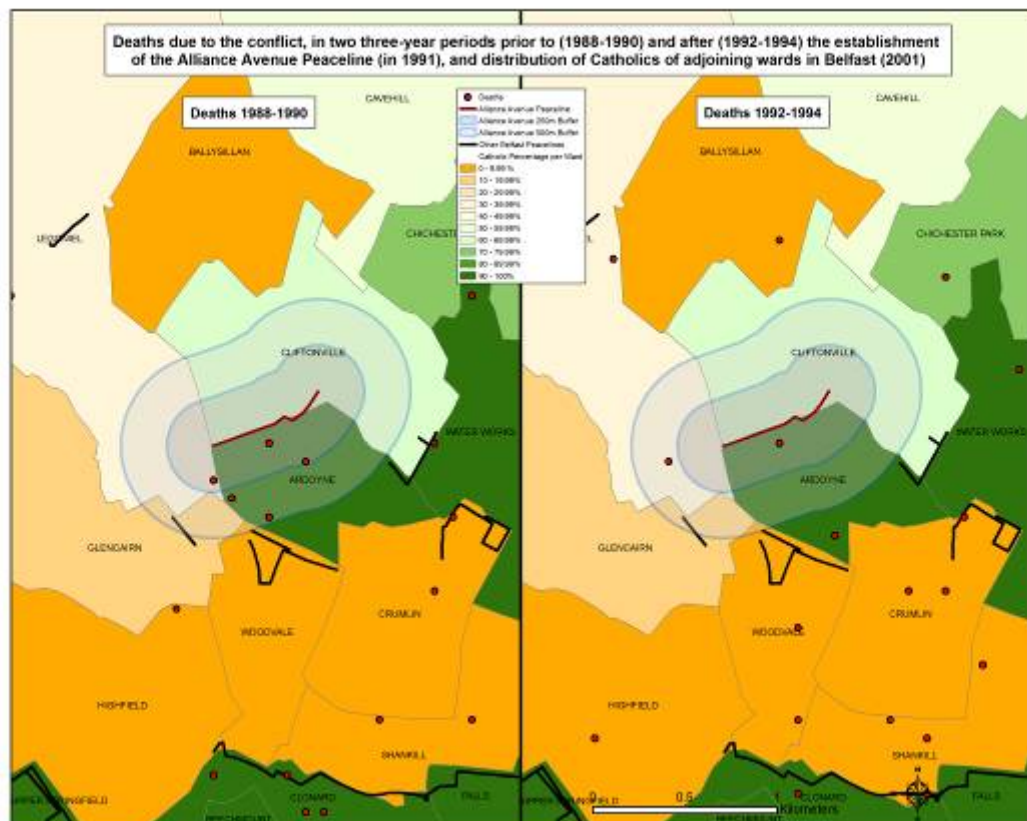

Figure 5 An example of two maps comparing deaths prior to and after erection of peaceline

Other GIS Maps

The Sutton Index of Deaths records 258 deaths that occurred outside of Northern Ireland. Of these 115 happened in the Republic of Ireland, 125 occurred in England and 18 were in mainland Europe. These locations had never previously been mapped. Using a combination of the Sutton database, Google Earth, Ordnance Survey Maps and Public Records, latitude and longitude co-ordinates were generated for the locations of these deaths. These co-ordinates were then inputted into the GIS system and the outcomes mapped. These maps should prove a valuable addition to the other GIS maps produced by the Visualising the Conflict project.

In order to further analyse the databases and explore the relationship between variables appropriate use has been made of relevant statistical procedures from the SPSS (originally, Statistical Package for the Social Sciences) package. The data mapped and summarised in this paper is supplemented by a range of techniques including tables, pie charts, bar charts, stacked bar charts, histograms, box and whisker plots, and scatter plots. When the outputs are made available the GIS maps will be complemented with various graphs and tables of data. Taken together this information should prove to be a valuable resource for researchers and students.

Google Map

In addition to the GIS maps, a further spatial element was the incorporation of a Google Maps interface to visualise the location of the physical memorials. Using the latitude and longitude co-ordinates recorded in the CAIN database of memorials, it was possible to plot the locations of the memorials upon a Google Map interface. Using Google Map PHP software, this map was linked to the CAIN server to create an interactive Google Map of physical memorials. The memorials were classified by both Nature (Civilian; British Security; Republican Paramilitary; Loyalist Paramilitary; and Other) and Physical Type (Plaques; Murals; Memorial Gardens; Memorial Stones; Memorial Enclosures; and Other Memorials). Once the map has been made publicly available an interactive key will enable the user to select which types of memorials they wish to display.

When a user rolls the cursor over the memorial icon they are interested in viewing, a new window appears, containing a photograph of the memorial, its title and where it is located. The user can then click on this window and a further window appears which contains information and more photographs of this memorial. **Figure 6** shows an example of the Google map and the windows that open on rolling over and clicking on the links.

Figure 6 Screengrab of Google map displaying information on physical memorials

In addition to the pop-up windows, street view has been included in the interface. Street view is a further extension of Google maps and enables the user to explore places around the memorials through 360-degree street-level imagery. Each time a user selects a memorial the street view zooms to the closest available area next to the selected memorial.

Immersion in a Virtual Educational Space

A final element of the Visualising the Conflict project was to develop a virtual educational space where the information related to physical memorials and those commemorated, could be displayed in such a way that groups of people could interact with the information and have an immersive experience. It was decided to develop a presence in Second Life and to back up the facilities in OpenSim.

The facilities currently include: a welcome area with a 3D model of the island space; a virtual tour of the facilities; a general information area; an area which displays an in-world interactive Google map with information on the location, status and nature of physical memorials; information panels which display information extracted from the databases of victims and

memorials on CAIN; 3D models of 200 physical memorials that are located across Northern Ireland; a meeting / teaching area; and a 'memorial street' which displays a sample of 3D memorials to be found in nationalist and unionist areas of Northern Ireland.
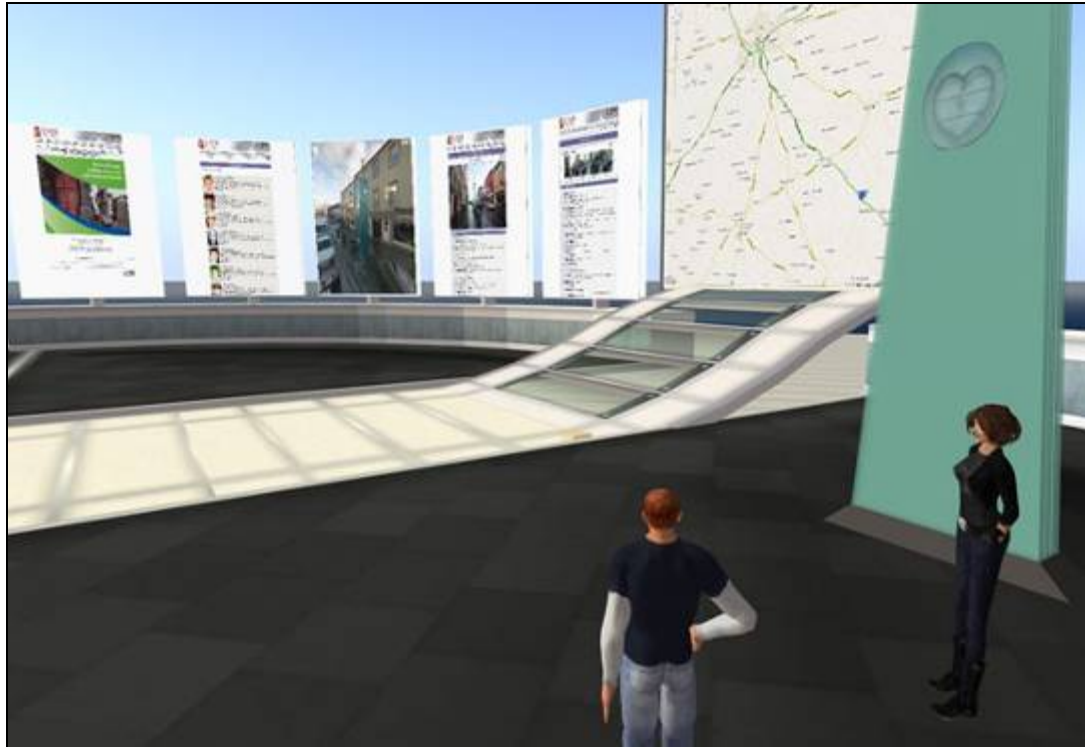

Figure 7 Screengrab of part of the virtual educational space in Second Life

The ultimate aim of this development is to establish if particular audiences, for example young people, would find it easier to engage with the information when presented in a virtual space.

Conclusions

In this short paper it has only been possible to indicate the range of outputs that will become available later in 2011 from the Visualising the Conflict project. The Google map of physical memorials to the conflict and the virtual educational space were only briefly described. These facilities will only be fully appreciated by those who use the interactive map or enter the immersive environment within Second Life.

The provisional list of GIS maps contained in **Appendix 1** gives a better overview of the mapping work that has been undertaken. While the general picture from the maps on the distribution of deaths across Northern Ireland will not surprise those intimately familiar with the history of the conflict in the region, the detail in smaller areas will be of value even to experienced researchers and the summary maps will be of use to a wide range of users.

The mapping of physical memorials in public spaces will be of considerable interest to those who study commemoration related to the Northern Ireland conflict or who wish to compare the experience in the region with other areas around the world. The combination, for the first time, of the information on the location of deaths and the location of associated memorials has allowed other questions to be considered.

Given the previous experience of CAIN staff, it is anticipated that there will be interest in, and feedback about, the outputs to be made available and this response may lead to other mapping work being undertaken in the future.

Appendix 1 Provisional list of GIS maps

The following is a provisional list of maps that will be available when the new section on Visualising the Conflict goes on-line later in 2011.

Background Maps:

- Outline Maps, by area, of Ward Boundaries (1995) – Series of 8 maps

- Distribution of Catholic population at ward level in Northern Ireland, Belfast and Derry, with peacelines – Series of 3 maps

'Text' Maps:

- Deaths indicated by names, by area (Northern Ireland, Belfast, Derry) – Series of 3 maps

- Animation of map Deaths indicated by names, by area (Northern Ireland, Belfast, Derry) – 1 animated map

Deaths:

- Deaths and Killings (1969-2001), by area (Northern Ireland, Belfast, Derry), by status and organisation, at ward level – Series of 24 maps

- Deaths and Killings (1969-2001), by area (Belfast, Derry), by status and organisation, with Multiple Deprivation Measure score, at ward level – Series of 16 maps

- Deaths, by area (Northern Ireland, Belfast, Derry), by 5 year groups, at 1 km grid square level – Series of 24 maps

- Animation of maps of Deaths, by area (Northern Ireland, Belfast, Derry), by 5 year groups, at 1 km grid square level – Series of 3 animated maps

- Female Death Rates (per 1000 population) due to the conflict (1969-2001), by area (Northern Ireland, Belfast, Derry), at ward level – Series of 3 maps

- Female Death Rates (per 1000 population) due to the conflict (1969-2001), by area (Belfast, Derry), and Multiple Deprivation Measure score, at ward level – Series of 2 maps

- Number of people killed due to the conflict in Belfast, by year (1969-2001), at SOA (Small Output Area) – Series of 34 maps

- Animation of maps of Number of people killed due to the conflict in Belfast, by year (1969-2001), at SOA (Small Output Area) – 1 animated map

- Bar Chart Maps - Deaths (1969-2001), by area (Belfast, Derry), by status, at ward level – Series of 2 maps

- Pie Chart Maps - Deaths (1969-2001), by area (Belfast, Derry), by status, at ward level – Series of 2 maps

- Stacked Bar Chart Maps - Deaths (1969-2001), by area (Belfast, Derry), by status, at ward level – Series of 2 maps

- 3D Bar Chart Maps - Number of people killed due to the conflict in Northern Ireland, Belfast and Derry, between 1969 and 2001, at SOA (Small Output Area) – Series of 3 maps

- Spatial Intensity Maps - Death locations (1969-2001), by area (Belfast, Derry) and Northern Ireland Multiple Deprivation Measure score (2005), at ward level – Series of 2 maps

- Deaths due to the conflict, in two three-year periods prior to and after the establishment of Peacelines, and distribution of Catholics in adjoining wards – Series of 6 maps

- Distribution of deaths within Belfast area, as a result of Republican and Loyalist feuds and disputes and Religious distribution of population, at ward level – Series of 2 maps

- Killings in Belfast by Republican Paramilitaries of people alleged to have been informers and Religious distribution of population, at ward level – Series of 3 maps

- Child Victims (up to 16 years) due to the conflict (1969-2001), at ward level – Series of 4 maps

- Deaths due to the conflict (1969-2001), which occurred outside Northern Ireland – Series of 4 maps

Memorials and Deaths:

- Location of Physical Memorials, in public spaces, to the Conflict – Series of 3 maps

- Distances between locations of deaths and associated memorials (closest recorded memorial), Belfast, Derry, and Northern Ireland – Series of 8 maps

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**Appendix 2** Large versions of GIS maps displayed in the above paper

Large version of **Figure 8** An example of a map displaying total death rates (per 1000 population)

Total Death Rates (per 1000 population) due to the conflict in Northern Ireland (1969-2001), at ward level
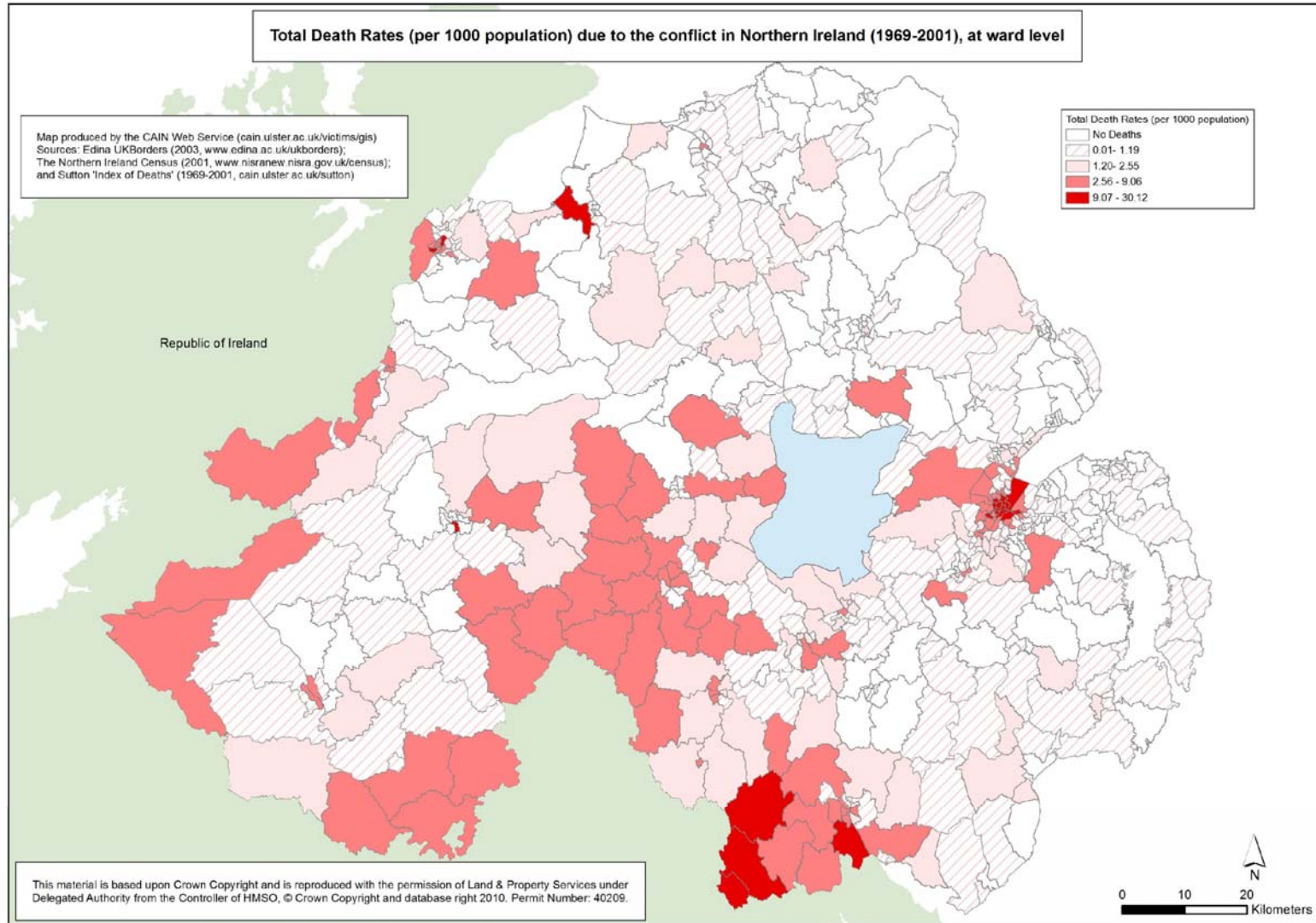
Large version of **Figure 9** An example of a map showing total deaths at 1 km grid square level

Total Deaths due to the conflict in Belfast (1969-2001), at 1km grid square level

Number of Deaths per 1 km Grid Square
1
2
3
4
5 or more deaths
No Deaths

Belfast Lough

Map produced by the CAIN Web Service (cain.ulster.ac.uk/victims/gis)
Sources: Northern Ireland Statistics & Research Agency
(2001, www.nisra.gov.uk/geography/default.asp5.htm);
and Sutton 'Index of Deaths' (1969-2001, cain.ulster.ac.uk/sutton)

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0   2   4
Kilometers

N

Large version of **Figure 10** An example of a map showing distances between location of deaths and closest memorial
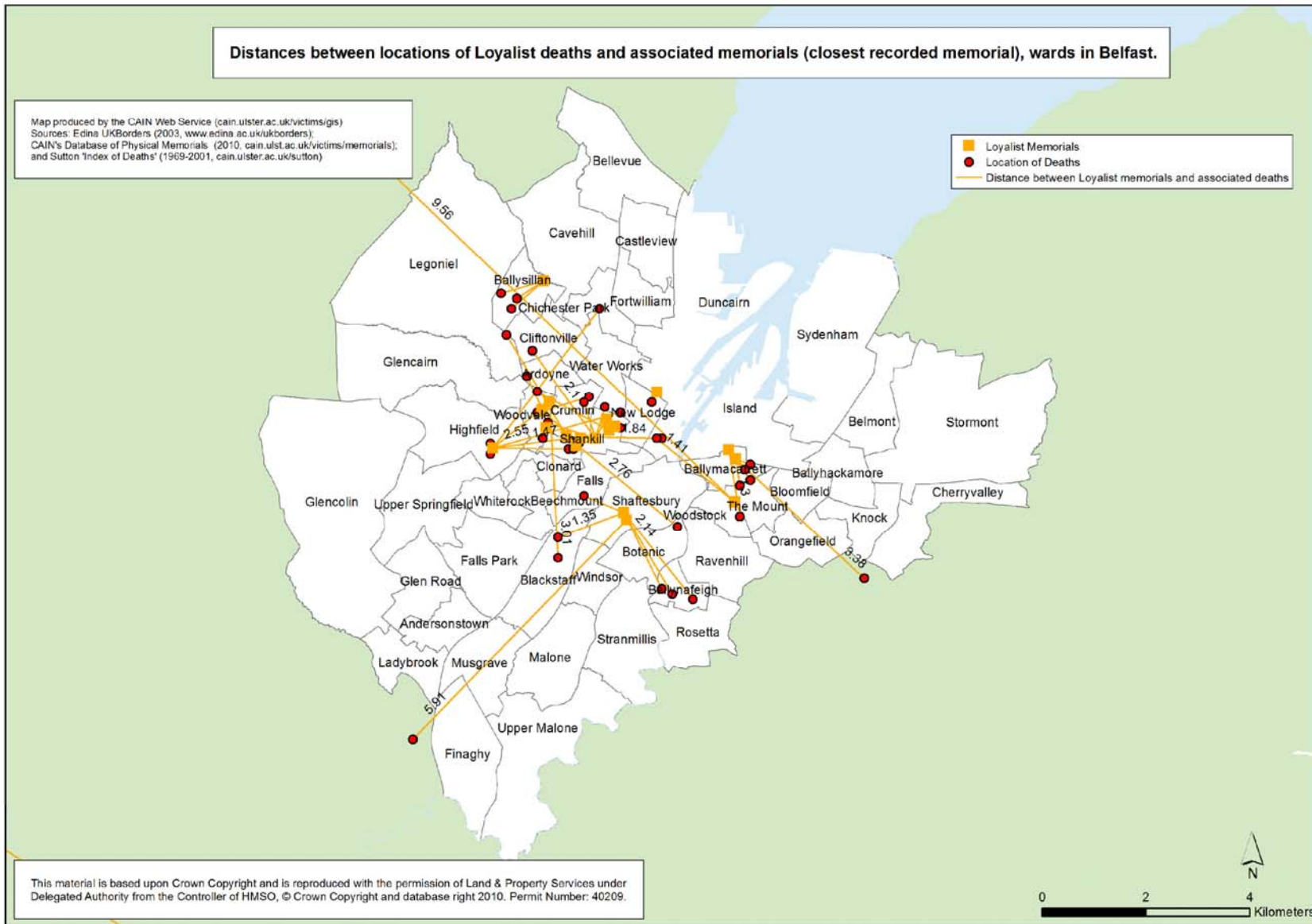
Large version of **Figure 11** An example of a boxplot diagram illustrating distances between deaths and closest memorial

Distances between locations of deaths and closest associated memorials within a 10km limit
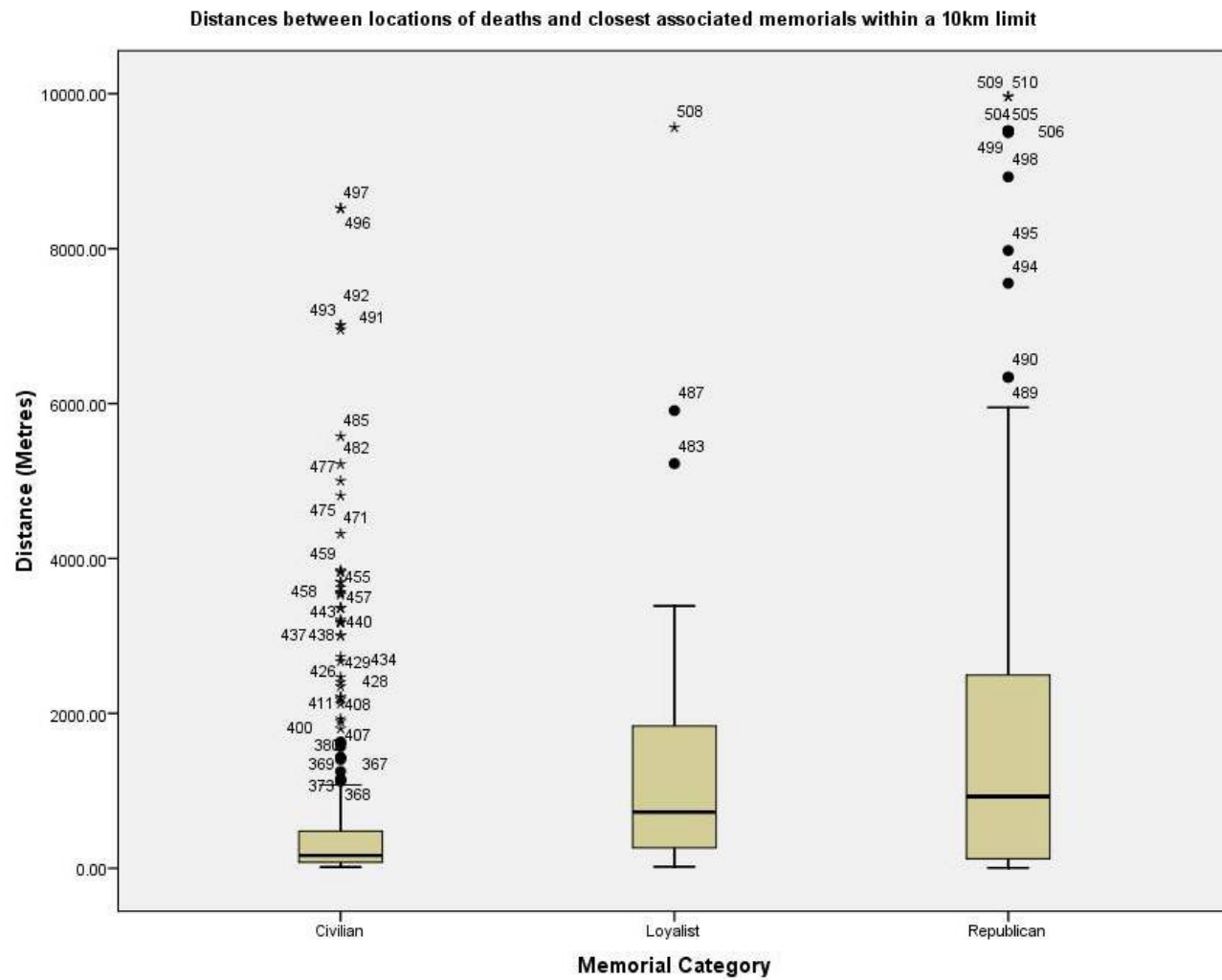
Sources: Sutton 'Index of Deaths' (1969-2001, cain.ulster.ac.uk/sutton); and CAIN's Database of Physical Memorials (2010, cain.ulst.ac.uk/victims/memorials)

Large version of **Figure 12** An example of two maps comparing deaths prior to and after erection of peaceline

Deaths due to the conflict, in two three-year periods prior to (1988-1990) and after (1992-1994) the establishment of the Alliance Avenue Peaceline (in 1991), and distribution of Catholics of adjoining wards in Belfast (2001)