case: the culture and sport evidence programme

The Art of the Possible

Using secondary data to detect social and economic impacts from investments in culture and sport: a feasibility study

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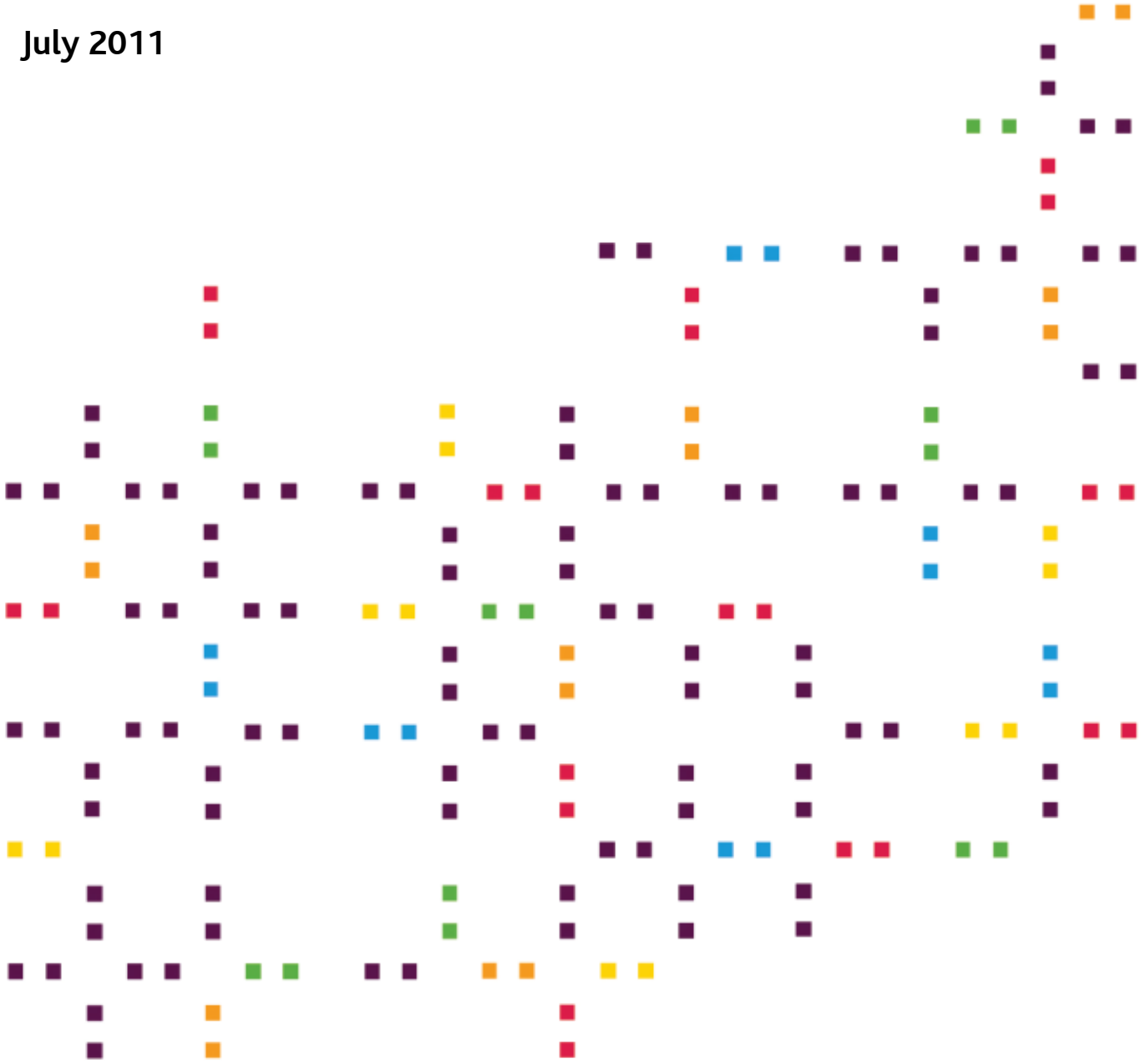

dcms department for culture, media and sport

ARTS COUNCIL ENGLAND

ENGLISH HERITAGE

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SPORT ENGLAND

The Culture and Sport Evidence (CASE) programme is a joint programme of research led by the Department for Culture, Media and Sport (DCMS) in collaboration with Arts Council England (ACE), English Heritage (EH), the Museums, Libraries and Archives Council (MLA) and Sport England (SE).

TBR[1] and the Cities Institute[2] were commissioned to produce this report.

[1] TBR is the trading name of Trends Business Research Ltd
[2] Cities Institute, London Metropolitan University

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1. Executive Summary

Background and Aims

This report is a feasibility study into obtaining robust quantitative estimates of the effects of cultural and sporting (C&S) investment using existing (i.e. secondary) data sources. The project aims to determine this by examining the techniques that have been used internationally, and the data in the UK that is currently available. Effects that are of particular interest are those on business activity in the local area, the local property market and wider measures of social, educational and health outcomes.

The issues this study examines are potentially very important to policy makers. By exploring new techniques to evaluate the impact of cultural and sporting investments it opens up the possibility of fresh insights into how such investments benefit local areas, and new approaches to quantify and value their impact. It indicates what is currently feasible and suggests areas for future research. This research agenda should ultimately help provide policy makers with evidence on how to make, and design, investments that have the greatest benefit for our society and economy.

Objectives and Methodology

The C&S investment projects considered for the purposes of this study are sporting venues, arts venues, historic buildings (i.e. renovations) and, museums, libraries and archives. [3]

There were two main elements to the study. Firstly, the existing international research on evaluating the impact of C&S investments with secondary data was assessed. Secondly, the available outcome and project data for the UK was examined to in order to consider what is possible.

To meet the study's aims, the following activities were undertaken:

- Relevant impact hypotheses and evaluation techniques from previous research were identified.
- Factors that should be considered when assessing the impacts of C&S investments on local businesses, property, health and other social factors were identified.
- An analysis of the outcomes that could be assessed specifically examining:
    - the use of longitudinal business data to understand impact on the local business base and, by extension, the economy local to an investment project.
    - data on property transactions, social outcomes, health, education and possibly wider quality of life measures.
    - Data sources across a range of potential indicators were also reviewed to evaluate their robustness and usefulness as well as associated costs and limitations.

Findings

The literature identifies that approaches to the measurement and identification of impact from C&S investments usually involve the collection of primary data, which is then analysed to produce results. However, this approach is constraining because the collection of primary data is time consuming and resource intensive, and because such research often involves the use of standardised assumptions to assess impact.

[3] The evaluation of previous Olympic events was outside the scope of this study.

A review of the literature has identified a small number of studies which have used secondary data to assess the impact of C&S investments. A selection of these were examined to understand the analytical approaches and techniques used, the indicators of impact examined and the data sources which were analysed to assess impact. One study was primarily focused on descriptive statistics while the remaining six used some form of regression analysis.

The availability of relevant data and the nature of that data is the key determining factor in whether an approach could be adopted in the UK. The study has therefore examined the availability and relevance of existing data sources within the UK, as well as the feasibility of gathering specific data about investment projects that are deemed important in the exercise of assessing feasibility and taking into account the range of evaluation issues that arise.

Moving forward

The international studies using secondary data have primarily focussed on the impact of sporting facilities on property prices. It is considered that the factors in the UK which it is most likely to be able to establish the impact of cultural and sporting facilities with secondary data are house prices, and potentially business start ups and closures.

Key determining factors for an investment project to be included in future study of impact are that it;

1. Has a potential impact that is supported by available data. This is likely to be the case for investments that are either quite large (e.g. The Olympic facilities, and Tate Modern), or clusters of smaller investments (e.g. the Sheffield creative quarter, and Hull Old Town).[4]
2. Is likely to have a geographic impact that is at least as great as the lowest geographic level at which the relevant data is available – in this report the study has focused on data which is available at a neighbourhood level. More data are available at Local Authority District level so that a greater range of analysis may be possible for projects with a wider impact area.
3. Was started between 3 and 8 years ago, since a greater range of data is available for the last 10 years. Although it may be possible to examine the impact of older facilities spatially.

The study concludes that there are a number of feasible options that can be taken forward:

- The impact on property prices and business start-ups of the cultural and/or sporting facilities could be examined. Existing research on this has been done for sport stadia. However, this could be done for cultural, artistic and heritage assets (see Annex 1 for an example of the impact on business start-ups of the Sage music centre in Gateshead). The analysis could assess[5]:

    - whether a recent cultural and sporting investment has increased house prices and economic activity.

    - The spatial impact of a facility i.e. do house prices increase as you get closer to a cultural/sporting facility.

  A study that examined both of these for the new Wembley and Arsenal stadiums on house prices has recently been completed.[6]

- It should be possible to assess whether areas with more cultural and sporting facilities are likely to have higher house prices or business start-ups controlling for other factors (using cross-sectional regression analysis). However, it would be difficult to establish causality with this approach as it may be that economic activity affects the number of cultural and sporting

[4] It should be noted that research involving the Olympics was outside of the scope of this study.
[5] This would probably involve using statistical techniques like difference in differences and spatial-lag regression.
[6] Ahlfeldt G, Kavetsos G (2010), 'Form or Function? The Impact of New Football Stadia on Property Prices in London', University Library of Munich, Germany; working paper series

facilities, rather than the other way round. An implication is that it is important to analyse impact data over time.

- Impact on visitor numbers, overnight stays and employment could be assessed where a project plays a significant role in a 'destination', such as a large visitor attraction in a city centre or, if sufficiently scaled, standing alone. Examples would include Tate St Ives, the Eden Project and Arnolfini in Bristol. Time series analysis could be used to assess this.

An issue, which does not appear to have been extensively researched using secondary data, is whether and sporting facilities have displaced economic activity from other areas. It seems sensible that this issue should be considered in any future research.

1.1 Document Structure

The remainder of the document is structured to cover the following sections:

A Review of Impacts Research – This broad literature review covers the policy and academic literature on methods used to assess economic, social and regeneration impacts of investment in C&S infrastructure and area regeneration.

An Assessment of Approaches – This section examines studies that have used secondary data sources to estimating the impact of C&S investments. It includes a review and appraisal of the data sources and methodological approaches that have been used in this context. This section then considers the viability of these approaches and how any limitations may be overcome, or the approach moderated to help assess the impact of C&S investments.

Study conclusions – The study concludes by drawing together the assessment of approaches to make recommendations for an approach to analysing impact.

Annex – This section contains a more detailed literature review and methodology, as well as a broad assessment and examples of regeneration project data and impact/outcome data collected as part of the study approach. It also includes tables, which summarise the candidate approaches and their features and a bibliography.

2. A Review of Impact Research

This section is a brief summary of research approaches used to measure the impacts of investment in cultural and sporting infrastructure using both primary and secondary data (The full literature review is contained in Appendix 2). This has informed the assessment of appropriate methodologies for the feasibility study. These methods are broadly represented in the literature in three groups:

1. Economic impact, which makes a financially-based assessment of projects in terms of local and wider impacts on employment, economic/business activity and income/wealth creation.
2. Social impact, which attempts to measure or assess a range of consequences for individuals, participants and communities.
3. Physical impact, which assesses the effect of (often new) buildings, space and structures in terms of image (inc. 'brand'), aesthetic values, land values, as well as the wider social and economic effects from investment that transforms a local place.

Table 1 shows the distribution of studies covered in this study by cultural and sporting sector and prime impact type. Primary research is the dominant approach, however models arising from primary research (e.g. multiplier, contingent valuation) are often used in single facility 'impact' case studies as well as sectoral or area based evaluations.

Table 1: Summary of Impact Studies[i] by main type and sector

Impact study	Arts	Heritage/Green spaces	Museums & Libraries	Sports	Total
Social Impacts	18	8	6	2	34
Economic Impacts	26	22	23	40	111
Physical Impacts[7]	1	3	-	-	4
Secondary Data (full or partial)	8	9	3	9	29

[i] includes meta and systematic reviews incorporating a number of impact studies

It should be noted that there exist a significant number of studies reliant on primary data and multipliers to assess impact, but there are very few that attempt to do so using secondary data. This explains in part the motivation behind this report.

A detailed review of impact research in public investment evaluation in particular, is beyond the scope of this study. However the three main impact types – social, economic and physical – utilise a range of standard and adapted impact measurement methodologies and often combine these. For instance the use of user/visitor surveys and capital spending combined with sectoral multipliers to estimate the numbers of jobs created and/or income generated in the economy.

A key aspect of impact measurement including C&S facilities and investment is the geographic extent or area within which change effects can be realistically and usefully captured. The impact or catchment area is therefore an important factor in applying secondary or primary data in order to model and quantify these effects over time. Public, and particularly regeneration investment has tended to use area based initiatives (ABIs) as a strategy to target development and achieve policy goals. Successive government (and European Union) interventions have therefore delineated

[7] Physical impacts in this context refers to improvements in the physical attributes of buildings or spaces

areas according to their social, economic and physical situation and relative decline (e.g. compared with national or EU averages) using targeted investment - including C&S facilities – in order to help generate improvement in a local economy, community, quality of life and attractiveness of the area. The area factor and measurement is therefore highlighted in our review of case studies since this largely predetermines data availability and how change effects in a locality might be attributed to C&S facilities.

A review of these impact measurement methods as applied to C&S facility types - including economic and social impacts, multipliers, contingent valuation, design quality, cultural vitality and regeneration area-based initiatives - is outlined in Annex 2.

3. An assessment of approaches

This examines studies identified by the literature review for their relevance in establishing the feasibility of estimating the impact of cultural and sporting investments with existing data sources. Their methodologies and use of data have been assessed to determine whether they could be pursued in the UK.

This section reviews the following studies;

A. Descriptive statistics based

1. "The Spillover Effects of Investments in Cultural Facilities" (Jones et al, 2003).

B. Regression-based studies

Regression analysis is a statistical technique in which the changes in a variable (the dependent variable e.g. house prices) are analysed in terms of their relationship to other variables (the explanatory variables/independent variables e.g. type of house, location, green space etc.) or historic values of the variable or values at different geographic locations. This allows the effects of different factors to be controlled for.

Regression analysis takes many forms and the studies examined are grouped under the types of analysis they involved.

- **Time series intervention studies**
  This approach uses data over time to assess how an area is affected by an event, such as the opening of a new gallery.

  2. "On Some Challenges and Conditions for the Guggenheim Museum to be an effective economic re-activator" (Plaza, 2008) and "The Return on Investment of the Guggenheim Museum Bilbao" (Plaza, 2006). These studies have been examined together due to their common subject matter.

- **Cross-sectional area regression studies**
  This approach uses data across a range of areas at a given point in time to assess how variation in area characteristic (e.g. average house prices) can be explained by variations in other characteristics, such as the amount of green space in an area.

  3. "Valuing Greenness: Is there a segmented preference for housing attributes in London?" (Varma, 2003).
  4. "Paved with Gold: The real value of good street design" (CABE, 2007).

- **Spatial lag regression studies**
  This technique is often used with the analysis of spatial data, i.e. data which includes direct information on location. It controls for the fact that the economic characteristics of a location (e.g. house prices) may be affected by the characteristics of the areas around it.

  5. "Assessing the Economic Impact of Sports Facilities on Residential Property Values" (Feng and Humphreys, 2008).

6. "Cultural Clusters: The Implications of Cultural Assets Agglomeration for Neighbourhood Revitalization 2010" (Stern and Seifert 2010) – this study is a continuation of the 2007 work.

- **Panel data studies**
  This approach uses both cross sectional (data for a number of different areas) and time-series (repeated observations over time). In this instance it is used to assess the impact of sports stadia construction in the US. In principle, panel data can help mitigate problems that may arise where data is not available for key time-invariant explanatory variables.

7. "The Growth Effects of Sport Franchises, Stadia and Arenas" (Coates and Humphreys, 1998).

Tables summarising key aspects of the studies are provided in the Annex 6 (Page 97). These allow comparisons between the studies' data, econometric techniques and approach to tacking evaluation issues to be made. The findings of each study are summarised and a brief description of any limitations to the analysis given.

Two further studies were reviewed as supplements to the case studies cited above. These papers are:

- 'Impact of sports arenas on land values: evidence from Berlin', Ahlfeldt and Maennig, Annals of Regional Science 2008.
- 'The Impact of Stadium Announcements on Residential Property Values: Evidence from a Natural Experiment in Dallas-Fort Worth', Dehring, Ward and Depken, International Association of Sports Economists, 2006.

3.1 The spillover effects of investments in cultural facilities

Full Title: Lea, T., Jones, K., Sharpe, D., Jones, T. and Harvey, S. "The spillover effects of investments in cultural facilities", 2003.

Type of Study: Descriptive statistics.
Peer Review Status: No – study is part of a working paper.

Introduction: A study led by Dr Ken Jones at Ryerson University, Canada, (2003) investigated the spillover effects of investments in cultural facilities in Vancouver and Toronto, with an objective of "developing a new set of measurement tools and benchmarks to assess the economic, social, and cultural impacts of investments in cultural facilities at a variety of spatial scales."[8]

Overview of methodology:
The study uses descriptive statistics, charts and maps to illustrate change in areas experiencing significant investment in a specific cultural facility. A number of cultural and socio-economic indices were also constructed derived from Florida and Gertler's (2002)[9] work on the relationship between talent, technology, creativity and diversity in city-regions. Indices constructed by Jones et al included a Talent Index which assessed education levels and a Bohemian Index which considered the prevalence of artistic and creative occupations.

Summary of results:
While the authors consider the research as work in progress, they conclude that the artistic and cultural activity of an area is strongly associated with growth, development, gentrification and investment.

[8] The Spillover Effects of Investments in Cultural Facilities, Jones et Al, 2003.
[9] Gertler M, Florida R, Gates G and Vinodrai T (2002) *Competing on Creativity: Placing Ontario's Cities in Continental Context, Toronto*: Institute Toronto, Program on Globalization and Regional Innovation Systems, Centre for International Studies, University of Toronto.

3.1.1 Case study methodology and use of data

The work was aimed to take forward research which indicated that an area's cultural and artistic 'scene' can be a strong predictor of its economic success in unrelated sectors. The authors note that a gap in much of this research is the direct impact socially, culturally and economically on an area. This research aimed to fill that gap. Specifically the objectives of the study were 'to develop:

- a Spatial Decision Support System for the measurement and monitoring of the spin-off effects of cultural investments on various communities, and
- a new set of measurement tools and benchmarks to assess the economic, social, and cultural impacts of investments in cultural facilities at a variety of spatial scales.'

The study considered three facilities - a theatre, an artist's live/work facility containing 28 units and a mixed use development of 9 units. The units were located fairly closely together in Toronto, and the theatre was in Vancouver.

The indicators used were:

- Change in the local community (including age structure, family composition, household income, education levels, ethnic diversity, years of residence[10]).
- Change in the social environment (including community engagement, neighbourhood improvement, crime reduction, local arts "buzz", knowledge and appreciation of arts activities, arts driving neighbourhood improvement).
- Change in neighbourhood character (including diversity of business, loss/gain in local service amenities, diversity of artistic community, investment in streetscape improvements, heritage preservation and use of public facilities).
- Change in local economic conditions (including property values, employment, income, retail sales, vacancy rates, new business creation, building permits).

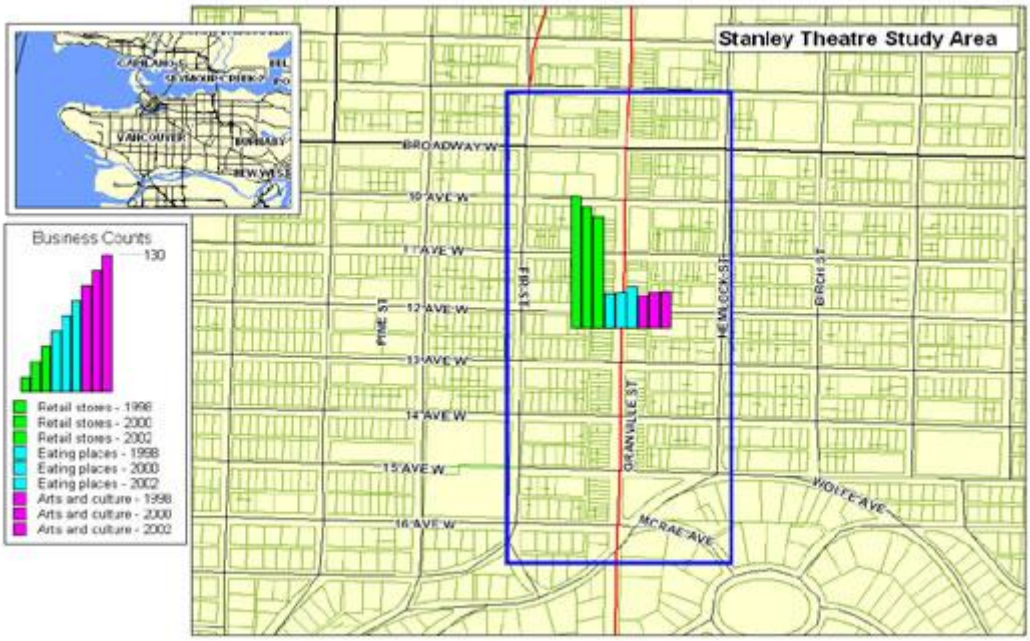
The team also conducted two surveys (one of residents and another of businesses) to gather information on the perception of change in the areas of key factors (including business and cultural diversity, community activity, crime, traffic) as well as attendance at local facilities and their importance in location decisions for business.

The presentation of information is visual, and the data on indicators is primarily in the form of descriptive statistics within tables, graphs and maps, rather than involving statistical modelling. For example,

[10] In the UK such data may come from the Census or to an extent the Annual Population Survey.

Figure 1 depicts the Stanley Theatre Study Area and business change between retail, refreshment outlets and arts and culture organisations. The visual aspect of the study allows change within the case study area to be visualised while also placing it within its geographical context.

Figure 1: Business Change in Stanley Theatre Area



Captured from Jones et al (2003:16)

Where the approach becomes more sophisticated is in building a number of these indicators (based on the work of Florida and Gertler et al (2002)) into comparative indices/location quotients[11]. These were:

Talent Index = (LQ* pop. 20 yrs + with bachelor's degree or higher*100)

Bohemian Index = (LQ* labour force with occupation. in art, culture, rec.& sports*100)

Mosaic Index = (LQ* total immigrants by places of birth*100)

Hardship Index = (LQ* household income below Low Income Cut Off*100)

Where LQ = location quotient; this uses the Census Metropolitan Area as the base.

Such measures are useful to standardise figures to allow for different size areas of study, and to simplify the process of assessing change. Jones et al also effectively combine two or more variables into one index variable, reducing the total number of variables being considered at a time. With a more formal modelling approach this principle of reducing the number of variables, while hopefully not significantly reducing the information content, may be useful if the sample size under analysis is relatively small.

3.1.2 Viability of approach for C&S impact assessment in the UK

This research was a pilot study and there is no suggestion that the areas involved were randomly chosen. This study focused on economic measures, although social measures relating to perceptions of change and the impact of the facility were also assessed through primary research. Limited consideration is given to the direct impact of the investments; there is partial information on user numbers for example (the equivalent to visitor numbers for two of the developments which are workspaces rather than visitor attractions). The only information on the specific facilities used is a short description of their nature, and when they opened. The study does not consider the impact of

[11] A location quotient is a calculated ratio which enables the comparison between a local economy and another (usually national) economy, enabling one to compare the share of economic activities with another geographic area.

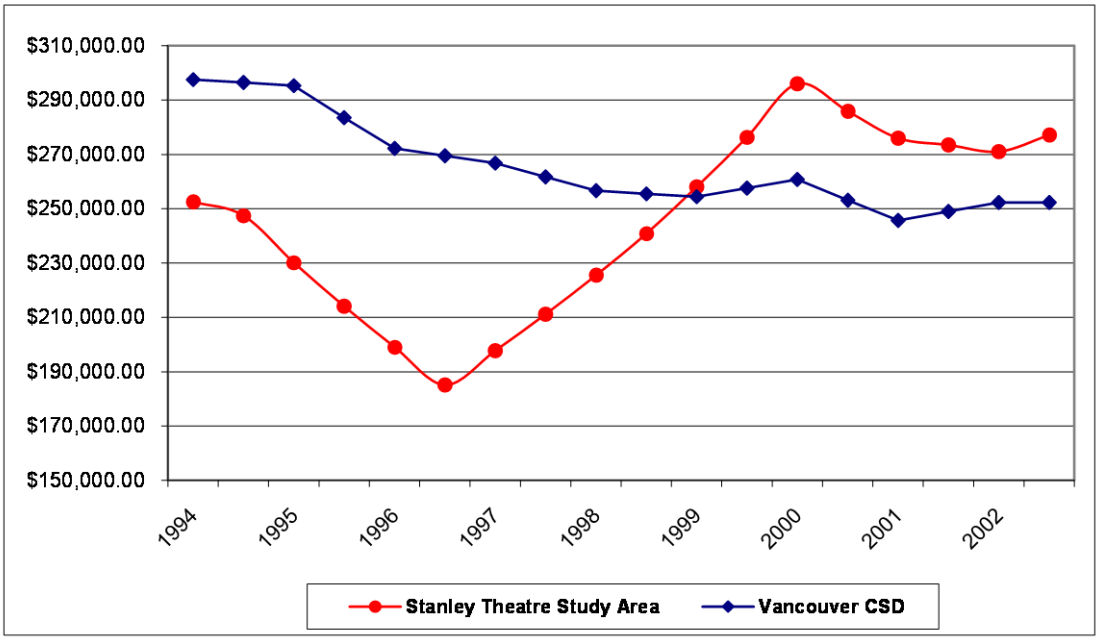
scale of the facilities. To do this a considerably larger sample would be required, together with information about the scale of the facility to enable different sizes of project to be compared. For most outcomes the only issue is likely to be whether the indicator data required is available consistently across all areas.

Most of the data analysis looks at change between two points in time; this appears to be largely driven by the use of Census data, which is provided on a five yearly basis in Canada. Before and after comparisons are made for the Stanley Theatre (which opened in 1998) and 1313 Queen Street (which opened 1997/1998); whereas 900 Queen Street opened in 1995, before the earliest data used.

For the Stanley Theatre area, some data is shown over a longer period, including property data for four years either side of the opening year and building permit data for 5 or 6 years either side in comparison with data from the Vancouver area as a whole.

Figure 2 shows that the Stanley Theatre study area has behaved differently to the wider Vancouver area. The theatre actually opened in October 1998, and it might be argued that the growth trend was simply a continuation of an existing local trend and not a consequence of the theatre. There were also three big investments by major retailers into the area (in 1997, 1998 and 2003), on which the study comments that these are important to the recorded change in retail sales, but it is unclear what effect they might have had.

Figure 2: Average Residential Sales Prices - Stanley Theatre Study Area (1992 Canadian Dollars)



Source: Jones et al (2003: 36)

This use of data illustrates the importance of considering whether there is a continuation of a pre-existing trend either within the area or in the wider economy. Having several years of information before and after an event is therefore important, as is having at least annual data.

Some consideration is given to external factors but although it is stated that, with the exception of the surveys, all information was gathered for a wider area benchmark, the figure for the baseline period is not always given in the results. For example, the study says that the average income of residents has increased from $43,500 to $58,000 compared with a Vancouver average of $44,600, but the Vancouver average at the start of the period is not provided..

While the study areas appear to have improved, there is no discussion of displacement and, with the exception of the trend information for the wider area, the counterfactual position is not clear (i.e. although the area currently outperforms the wider area on many measures it is not known if it has always done so and to what extent). There is no analysis of the neighbourhood at the time the Stanley Theatre operated as a cinema (which closed in 1991), and what would have happened if a different development had taken place is not assessed e.g. if the work units in Queen Street had a different focus.

3.1.2.1 Availability of comparable data in the UK

Key considerations in the assessment of data are:

- Availability of time series data on a consistent basis both before and after the intervention.
- Comparable figures for wider benchmark areas across the same time period.

The main challenges are frequency of data and robustness at a local level. England and Wales census data has a high level of detail but is only updated every 10 years. It is unclear, and would require further investigation, the extent to which surveys used to update and maintain this type of information between census dates are sufficient to reflect very local trends. CACI indicate that they use very large lifestyle surveys to maintain the information on its ACORN population segmentation, but it may be necessary to actually use the data in a small number of case studies to properly test its efficacy.

Robust perceptions data at the local level can only be gathered using a primary survey. Attributing claims in crime and safety ('fear of crime') from interventions is difficult, but generally claims of natural surveillance and animation arising from interventions in the urban environment, pedestrian access, public realm and enhanced vibrancy in an area due to C&S activity can be associated with reduced crime and improved safety. Although, conversely, overcrowding and opportunities for crime and anti-social behaviour can also ensue. Displacement effects are also observed in areas or sites undergoing regeneration, with criminal activity 'relocated', but not reduced overall.

The UK equivalent of area development and land use change data is less precise than the American and Canadian sources. There is no UK equivalent and so to replicate the study, a number of different sources would need to be used in conjunction. The City of Vancouver Development Services data covers information on planning, land use and tenure changes. In order to replicate this in the UK, Generalised Land Use, Land Registry and House Building Statistics would be needed. These do not always lend themselves to analysis at a high level of geographical resolution and as a result would require more information and the release of data not currently in the public domain. Planning information could be obtained from local councils and portals; however this would potentially be time-consuming and costly. Although to omit this information would be to potentially ignore significant information on changes to a local area.

Table 2 below shows the data sources used in the study and the data sources which could be used if a study of this form were to be undertaken in the UK .

Table 2: Data sources used in 'Spillover effects of investments in cultural facilities'

Data Type	Source/Data used	Additional information /recommended	Potential sources for the UK
Business mix, start up and closure – examined through business data by address	Private and public sector data at postcode level (CSCA Retail Strip Database and National Business Database). Looking at firm numbers by: type and mix, birth and death.	Data used indicates a national coverage, which is ideal. However, comparator areas/control values were not presented,	TBR's database, TCR – a longitudinal business dataset which allows for the detailed examination of firm 'births' and 'deaths'. It also goes beyond SIC level. BSD – the new ONS Business Structures Database in principle will allow investigation at a low level, but access is likely to be restricted and information on firm activity is restricted to SIC (i.e. aggregated). It also currently has a particularly limited timeframe on it, and it only includes VAT registered and/or PAYE registered businesses. Other providers of business data which would give view of current business mix (although we understand that historic information is not readily available) include Experian and Market Location.
Retail Sales Data	SARTRE data from Statistics Canada Retail Division (at 3 digit postcode level)	National comparisons	Official statistics in the UK are unlikely to be sufficiently detailed geographically. It is also a piece of information most likely to be missing from private sector databases too. A good deal of estimation occurs, from survey or filed accounts
Property Prices	Survey of Real Estate Agents		Land Registry data is available at postcode level so can be used to 'build' a specific location/neighbourhood. Regulated Mortgage Survey has the potential to provide more detail on property prices but this is problematic to access[12].
Area Development and Change	City of Vancouver Development Services		This would require planning data, and land use changes. The former, in principle should exist at least within local councils. Published information tends to be at a higher level of geography (Region for Housing Building Statistics, Local Authority District for land use statistics). Land Use (DCLG LU change statistics) data can also be useful to show changes in land uses as areas develop (previously developed land).
Employment data	Toronto Planning department Greater Vancouver Research Development Employment Study – at the level of individual buildings		ONS' Annual Business Inquiry (ABI) and other survey based information unlikely to be sufficiently robust/sensitive at the local level, but could be supplemented using a resource such as TBR's business database, TCR, to validate local area information. Other obvious sources are: IDBR/BSD but this is restricted to PAYE return information, which should capture the bulk of employment, but will be missing the self employed working alone; Private sector databases, although they will have an element of missing data and updating may be non-systematic (D&B for example will update records more frequently that indicate a change in a regularly received data element,

[12] The Council of Regulated Mortgage stated that this data is restricted by certain parameters and contractual issues which means that access to this dataset is controlled. In the future it is likely that this will be relaxed.

Data Type	Source/Data used	Additional information /recommended	Potential sources for the UK
			for example a change in phone number).
Socioeconomic and Demographic Data	Canada Census (1996 and 2001) – at dissemination level Variables include: Population over 20 with bachelor degree or higher. Labour force in arts & culture, recreation & sport Low income population	Longer and more frequent time series, to enable better understanding of journey between points, and ensure that an appropriate time frame can be constructed for any investment.	UK Census, but information is only gathered every 10 years and therefore will not closely track changes in a local area. Other sources include: Neighbourhood statistics (which draws on Census but not exclusively). Index of Multiple Deprivation – but this is not annual which would be ideal. Experian MOSAIC and CACI Acorn these feed additional information into a census baseline, but much of this is survey based and therefore may not be sufficiently based on local data for the local area. Annual Population Survey/Labour Force Survey – although this is unlikely to have sufficient sample at the very local level and the trends shown will reflect wider trends.
Perception and Participation data	Primary research - Resident & Business Survey		Taking Part Survey: The National Survey of Culture, Leisure and Sport data is available but not at suitable geographic level. British Crime Survey (BCS) and LAA Performance Indicators ('Fear of Crime'), not available below local authority level
Crime Data	Vancouver Police Department – at Address/intersection level	Wider area comparisons	British Crime Survey – only available at regional level. Local Crime Mapping available at Ward level but time would be required to extract information from the website
Background Mapping	Statistics Canada Boundary Files DMTI Street Files VanMap		Ordnance Survey - Points of Interest Boundaries/ITN Bartholomew's maps

Outcomes considered by this study that are available from known data are:

1. **Domestic property prices** – the main challenge is likely to be whether there were sufficient transactions within a period to provide reliable figures that account for type of property (i.e. if in one period the majority of properties sold were detached and in the next period mostly flats, the price change over time would be due to this rather than an actual change in property values).

2. **Firm dynamics** – start ups, closures, growth and relocation can all be studied using TBR's business database (TCR), and in principle BSD as it builds its time series. Whilst TCR currently stretches back from present day to 1996, TBR hold at least annual data back to 1986. Data updates are received on 6 monthly basis.

3. **Crime** - Recorded crime (point) data can be obtained under special agreement from Metropolitan and local police authorities, and through local authority crime and community safety partnerships. New web-based tools such as the UK Crime Map would allow crime statistics to be assessed.

Outcomes considered that may be available from sufficiently robust modelled data are:

1. **Demographic changes, Education, some wider social measure** – using tools such as CACI ACORN and Experian MOSAIC. Whilst these are based on Census data, providers use a range of sources to update trends. The infrequency of Census data is overcome through modelling techniques and the use of more frequent, less comprehensive data (such as annual population estimates).
2. **Employment** – by using a tool such as TCR to disaggregate ABI data it should be possible to provide a robust view of change at a local level including the scale of that change.

3.1.3 Conclusions on viability of approach for C&S impact assessment in the UK

The study's use of descriptive statistics and mapping provides a starting point for investigation of the effects of cultural and sporting investments. The method could be improved by the systematic inclusion of broader area benchmarks, but where data is available in the UK such wider area information is also available. This addition would address the evaluation issue highlighted concerning external factors.

There are caveats for the data available in the UK, but robust information should be available for:

- Business start-ups and closures
- Business mix
- Domestic property transactions and prices
- Crime as a wider social measure

TCR provides data on businesses on the basis of individual address and holds data back to 1986, although samples are larger from the early 1990s. The Land Registry hold electronic information on the house prices of individual properties back to 1993,

Information that is provided at a small spatial level but is sample based and will therefore be modelled/estimated to some extent and may therefore not be sufficiently sensitive to measure impact at the local level include:

- Business performance (in terms of employment)
- Demographic changes (level and composition)
- Visitor numbers

- Quality of life measures
- Education and health measures
- Wider social measures (perceptions of area, services etc)

Data that is considered insufficiently robust at an appropriate geographic level is;

- Commercial property transactions and prices – data on this does exist in the UK, provided by the Council of Mortgage Lenders (the Regulated Mortgage Survey). It is already used in hedonic pricing models such as that employed by the Department for Communities and Local Government in the production of its house price index.
- Business performance (in terms of financial performance) – the study itself only looked at retail performance (through SARTRE) but other sectors could be included.

The study does not specifically aim to address many evaluation issues (e.g. displacement, the effect of the quality and nature of investment, the impact of concurrent but separate investments). To attempt to assess these in more detail would probably require additional information on:

a. Diversity and quality of projects – to assess whether project characteristics are affecting impact a much larger sample would be required.
b. Concurrent non-C&S investments – there are a range of activities that will impact on the outcome variables, potential issues with gathering planning and development data, and knowledge of local conditions have already been highlighted as important. Some of this could be gained from business databases, but other activities will require knowledge of local assets not captured by such sources.
c. Consideration of activity in neighbouring areas including (but not limited to) inward migration of business/residents that may see decreases in occupancy levels in surrounding areas.

3.2 Studies on the Guggenheim museum in Bilbao

Full Titles: Plaza, "The Return on Investment of the Guggenheim Museum, Bilbao", 2006; Plaza "On Some Challenges and Conditions for the Guggenheim Museum to be an effective economic re-activator", 2008; and Plaza et al. "Bilbao's Art Scene and the 'Guggenheim effect' Revisited", 2009.

Type of Study: Time series event study

Peer Review Status: Yes – all published in academic journals.

Introduction: These three related studies by Plaza (2006, 2008, 2009) build on her earlier research on the impact of the Guggenheim Museum in Bilbao (GMB) on the local and city economy. The studies look at a number of economic indicators in attempting to measure outcomes over time (pre and post GMB opening in 1997) including:

- Visitor numbers
- Business (firm and employment) change
- The return on investment

Summary of results: The 2006 study based on a time series analysis of visitors, service sector employment and revenues, estimated that up to 907 FTE (full time equivalent) jobs were attributable to the museum, and calculated that its return on investment (ROI) to the city of Bilbao was 10.9% discounted (NPV) at 8%. Initial public investment was recouped after 9 years since opening, or 18 years after discounting (NPV) and after accounting for continuing operational funding (deficit/subsidy and franchise costs). The 2008 study found that employment in the hotel and restaurant sector increased by 4,000 between 1995 and 2005 due in part to the GMB.

Overview of methodology: The studies are based primarily on secondary data and time series modelling, related to a single facility case within a metropolitan and regional economy. Project related data includes visitors to the museum, hotel occupancy, and public investment in the facility by the metropolitan authority. The studies do not use any external comparators, although the use of time-series analysis provides a degree of control and generates an estimate of the impact of the museum.

3.2.1 Case study methodology and use of data

The main (2006) study's primary method to attribute economic (employment, tax revenue) change effects is an ARIMA time-series model. ARIMA models are a widely used methodology for analysing time series and are frequently employed in tourism research.[13] They help adjust for seasonality and underlying trends in data allowing estimates to be made of the venue's effect on visitors to the city, as well as employment generated in hospitality sectors.

3.2.1.1 Assessment of the Guggenheim's effects on overnight stays

The ARIMA statistical model used to assess the impact on the numbers of overnight stays is shown in the box below:

$\Phi(L)Y_t = \Theta(L)\varepsilon_t + \mu + \delta$ where Y_t are the overnight stays (seasonally adjusted), $\Phi(L)$ and $\Theta(L)$ are polynomials in the lag operator L (i.e. $LY_t = Y_{t-1}$), μ is the constant and δ is a dummy variable (DMMGMB in Table 1) defined as 0 up to 1997M9 and 1 from 1997M10 onwards to measure the GMB impact.

Logarithms and first differences of Y_t have been taken to stabilize variance and mean respectively [D(LOG(ONSsa)) in Table 1]. The presence of outliers is corrected through the use of dummies.

Plaza, The Return on Investment of the Guggenheim Museum, Bilbao, 2006

Figure 3 shows the findings of the ARIMA time series analysis. The presence of outliers is corrected through the use of dummy variables (DMM indexed by date).

[13] ARIMA (Autoregressive Integrated Moving Average) models use past values of the variable that is being predicted (The Autoregressive (AR) component) and forecast errors (The Moving Average MA component) combined with differencing to remove the effects of any non-stationarity (The Integrated (I) component). Broadly speaking, the objective when specifying an ARIMA model is develop an efficient forecasting equation that closely matches the historic data, while ensuring the historic forecast errors are not autocorrelated i.e. they look like random noise.

Figure 3: ARIMA (4,1,1) for the number of overnight stays in the Basque Country[14]

Variable	Coefficient	Std Error	*t*-statistic	Probability
C	–0.000208	0.001564	–0.132797	0.8944
DMMGMB	**0.006427**	0.003087	2,082,216	0.0381
DMM79M07	–0.147334	0.047701	–3,088,716	0.0022
DMM79M09	0.185401	0.046886	3,954,302	0.0001
DMM81M08	0.132837	0.044043	3,016,103	0.0028
DMM89M03	0.288764	0.054455	5,302,785	0.0000
DMM89M04	–0.245634	0.054288	–4,524,672	0.0000
DMM90M07	–0.133927	0.044557	–3,005,774	0.0029
DMM90M10	0.146889	0.044286	3,316,794	0.0010
DMM02M03	0.166586	0.054834	3,038,013	0.0026
DMM02M04	–0.206736	0.054706	–3,779,074	0.0002
AR(4)	0.130412	0.057628	2,262,995	0.0243
SAR(6)	0.138867	0.055518	2,501,289	0.0129
SAR(12)	–0.215099	0.054669	–3,934,534	0.0001
MA(1)	–0.613014	0.047332	–1,295,124	0.0000
R^2	0.479			
Adjusted R^2	0.456			
F-statistic	20.7			
Prob(*F*-statistic)	0.00			

Dependent variable: D(LOG(ONSsa))
Method: least squares
Sample (adjusted): June 1977 to December 2004
Included observations: 331 after adjusting endpoints
Convergence achieved after 13 iterations
Backcast: May 1977
Note: Bold figure represents the change in trend due to the GMB. Logarithms and first differences of ONSsa, D(LOG(ONSsa)) have been taken to stabilize variance and mean respectively.

Plaza, The Return on Investment of the Guggenheim Museum, Bilbao, 2006

An analysis of 348 months of data on overnight stays in the service sector in the province of Biscay found that the GMB produced an extra 61,742 monthly overnight stays (0.64% increase - equivalent to 740,904 overnight stays per year). This finding was then compared with non-local visitors to the museum itself: 66,064, a similar figure.

3.2.1.2 Assessment of the Guggenheim's employment impact

Employment growth since the museum opened is calculated at 4,500 based on traditional input-output methods and using Provincial Treasury data. Service sector employment in the province grew by 709 jobs per quarter between 1976 and 1997, and by 771 jobs per quarter between 1997 and 2004. From the ARIMA analysis of service sector employment (fitted relationship in Figure 4 below), the author concludes; 'This change in trend could be read as the generation of 907 new full-time jobs as a result of the opening of the Guggenheim in Bilbao'. In the hotel sector alone, the numbers of persons employed rose from 415 to 932 between 1997 and 2004.

[14] Monthly data, seasonally adjusted, from Jan 1976 to Dec 2004. The model specification also includes seasonal autoregressive (SAR) terms and dummy variable to capture outliers.

Figure 4: ARIMA (1, 0, 0) for the number of persons employed full time in the service sector in the province of Biscay[15]

Variable	Coefficient	Std Error	*t*-Statistic	Probability
C	1514907	5009148	3024280	0.0000
@TREND	0.709139	0.077975	9094391	0.0000
@TREND*DMMGMB	**0.062654**	0.031711	1975773	0.0509
AR(1)	0.824869	0.063906	1290750	0.0000
SAR(3)	0.263541	0.109146	2414570	0.0175
R^2	0.986			
Adjusted R^2	0.986			
F-statistic	1929.6			
Prob(*F*-statistic)	0.00			

Dependent variable: LB
Method: least squares
Sample (adjusted): March 1977 to February 2004
Included observations: 108 after adjusting endpoints
Convergence achieved after 10 iterations
Note: Bold figure represents the change in trend due to the GMB.

Plaza, The Return on Investment of the Guggenheim Museum, Bilbao, 2006

A third comparative estimate using multiplier analysis applied to visitor numbers (GMB = 900,000 p.a.), as derived from heritage venues[16] produced 834 total FTE jobs (made up of direct jobs, plus indirect jobs created through spending on suppliers, services etc. and induced jobs through further rounds of spending in the economy from indirect jobholders).

3.2.1.3 Assessment of the Guggenheim's impact on Bilbao's business structure

Plaza cites an earlier study of the GMB's effect on Bilbao's business structure (Del Castillo and Haarich, 2004). This found that the sector dealing directly with tourists (restaurants, hotels, retail) benefited most from the GMB, although some positive effects were also found on cultural and creative sectors, such as translation and secretarial services and the artistic, library and handicraft sectors. From this perspective, the opening of the city to tourists and other visitors has induced new skill requirements, new offers and new amenities - online reservations, strategic alliances between hotels, restaurants and tour operators, knowledge of foreign languages, improved and enhanced advertising - all of which constitute an additional demand for business services, for managing change and restructuring (Plaza 2008). This is confirmed in Plaza's most recent study on the GMB effects (Plaza 2009) where the number of firms in cultural tourism, art and related sectors in Bilbao were measured between 1995 (two years prior to Guggenheim opening) and 2005. The largest increases in the number of firms created during this period were, however, in 'Other business activities' (e.g. consulting) (+6,094); Architectural services (+1,200); Computers (+438); Publishing & Print/Media/News/Film & Video (+220); Advertising (+203) and these sectors together accounted for over 35,000 additional jobs in the province. Other growth activities included Sports (+159); Travel & tourism operators/assistance (+153), Artistic & Literary Creation/Arts Facilities/Galleries (+150); Interior design (+111) and Museums (+5). The hotel & restaurant sector recorded an increase in the numbers employed of 3,804, although the number of firms fell from 6,661 to 6,110 during this period, indicating expansion by existing firms. In terms of productivity, this region also ranked highest of all Spain's provinces in 2003 measured by value added per employee (Plaza 2008).

[15] Quarterly data from third quarter 1976 to second quarter 2004. There is also a seasonal autoregressive (SAR) term and trend terms.

[16] Greffe, X. (2004) Is heritage an asset or a liability? *Journal of Cultural Heritage* 5, 301–9

3.2.1.4 Assessment of the Guggenheim's Return on investment

Plaza uses the findings of the time series analysis to calculate the return on investment (ROI) produced by the Guggenheim's economic impacts (Figure 9). This compares the capital investment and operating (franchise) costs incurred by the metropolitan authority and other public funders, with the cash flow generated by visitors to the museum/City measured by additional tax revenues received by the metropolitan authority. A time series 1997-2017 uses a cash flow calculation discounted at 8% p.a. to calculate the net present value (NPV) and pay back of the initial capital investment, after allowing for residual land values. The ROI of the GMB is calculated taking cash flows corresponding to the net income plus depreciation and amortization calculated from the GMB's income statement. This produces a ROI of 10.9% and indicates a payback (breakeven) point will be reached by 2015, including purchase of the costs of the permanent collection (excluding this initial cost, payback would have been reached by 2006).

Figure 5: ROI of the GMB to the public treasuries[17]

Year	Rest of Spain + Foreign Visitors	Taxes: Additional Revenue due to GMB (€)	Deficit GMB (€)	Amortization of the Building (€)	GMB's Deficit + Amortization (€)	Investment in GMB's Building + Operative Costs (€)	Purchase of the Permanent Collection	Residual Value of GMB in Year 2017 (€)	Cash-flows Public Treasury (€)	Net Present Value at an 8% Discount Rate
						−126,495,018	−32,310,411		−158,805,429	
1997	178,871	5,871,888	−9,967,820	2,394,492	−7,573,328		−4,240,000		−5,941,440	−152,135,891
1998	901,875	27,562,415	−5,484,236	2,394,492	−3,089,743		−4,240,000		20,232,672	−136,074,543
1999	920,881	29,359,441	−5,919,903	2,394,492	−3,525,411		−4,240,000		21,594,030	−120,202,286
2000	787,566	27,784,790	−5,818,225	2,394,492	−3,423,733		−4,240,000		20,121,057	−106,508,233
2001	771,900	26,949,383	−6,823,670	2,394,492	−4,429,178		−4,240,000		18,280,205	−94,988,603
2002	723,884	25,988,685	−7,607,253	2,394,492	−5,212,761		−4,240,000		16,535,924	−85,340,051
2003	743,586	27,711,580	−7,819,132	2,394,492	−5,424,640		−4,240,000		18,046,940	−75,589,850
2004	818,230	29,465,882	−7,534,776	2,394,492	−5,140,284		−6,000,000		18,325,598	−66,422,489
2005	810,047	29,820,271	−7,760,819	2,394,492	−5,366,327		−6,000,000		18,453,944	−57,874,742
2006	801,947	30,166,032	−7,993,644	2,394,492	−5,599,152		−6,000,000		18,566,880	−49,911,725
2007	793,927	30,501,895	−8,233,453	2,394,492	−5,838,961		−6,000,000		18,662,934	−42,500,417
2008	785,988	30,828,025	−8,480,457	2,394,492	−6,085,964		−6,000,000		18,742,060	−35,609,000
2009	778,128	31,144,582	−8,734,870	2,394,492	−6,340,378		−6,000,000		18,804,203	−29,206,902
2010	770,347	31,451,724	−8,996,917	2,394,492	−6,602,424		−6,000,000		18,849,300	−23,264,816
2011	762,643	31,749,610	−9,266,824	2,394,492	−6,872,332		−6,000,000		18,877,278	−17,754,719
2012	755,017	32,038,392	−9,544,829	2,394,492	−7,150,336		−6,000,000		18,888,056	−12,649,864
2013	747,467	32,318,224	−9,831,174	2,394,492	−7,436,681		−6,000,000		18,881,543	−7,924,776
2014	739,992	32,589,256	−10,126,109	2,394,492	−7,731,617		−6,000,000		18,857,639	−3,555,233
2015	732,592	32,851,635	−10,429,892	2,394,492	−8,035,400		−6,000,000		18,816,235	481,756
2016	725,266	33,105,507	−10,742,789	2,394,492	−8,348,297		−6,000,000		18,757,211	4,207,984
2017	718,014	33,351,017	−11,065,073	2,394,492	−8,670,580		−6,000,000	229,961,622	248,642,059	49,943,330
								ROI = 10.9 %		

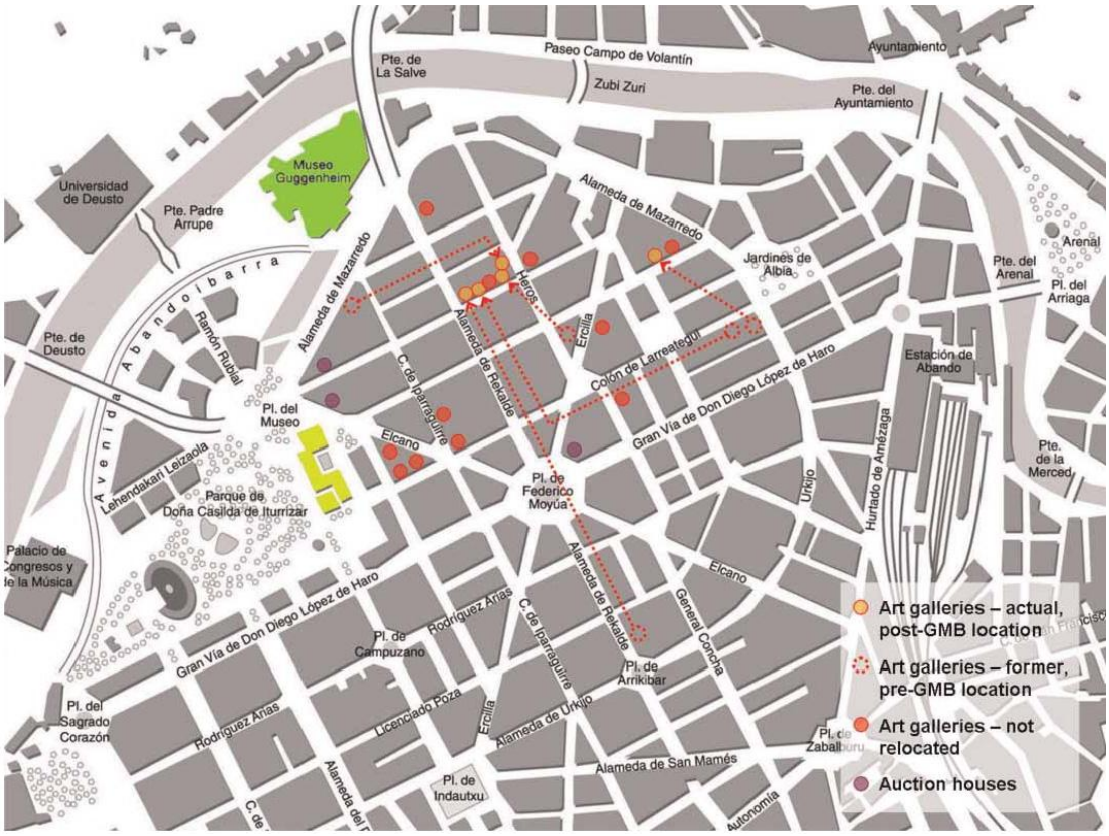
Plaza, The Return on Investment of the Guggenheim Museum, Bilbao, 2006

3.2.1.5 Assessment of the Guggenheim's effect on locations of cultural activity

Using firm location data Plaza (2009) mapped the location cluster of art-related establishments (art galleries, auction, antique houses etc.) pre and post the GMB as at 2006. Figure 8 illustrates this cluster effect in proximity to the GMB.

[17] Purchase of the permanent collection included.

Figure 6: Art-related Cluster in inner-city Bilbao 2006



Plaza et al., Bilbao's Art Scene and the "Guggenheim effect" Revisited, 2009

While this study found that galleries had relocated closer to the GMB and new establishments also opened up in the same area (a total of 81 establishments), this was not at the cost of other cultural districts in the city. A separate cluster of 32 contemporary art galleries, antique and auction houses has developed in the Casco Viejo area adjoining the Abando (GMB) district, including handicrafts, manufacturing as well as retailing and art market activity. The Province (Biscay) exports in foreign trade for art have increased bv over 400% between 1990 and 2007, and the amount in imports by over 500%, together indicating a vibrant international import/export art market centred on Bilbao.

3.2.2 Viability of approach for C&S impact assessment in the UK

Although Plaza acknowledges the wider social and economic regeneration that occurs both in the immediate area and city-wide, it is difficult to draw direct relationships between a cultural facility like the Guggenheim and particular employment and economic variables. It is possible that the relationship may not be direct and is also associated with some of the wider infrastructure projects in Bilbao that have supported the Guggenheim, such as new airport terminals, waterfront office developments and housing etc.. While the results indicate that increases are associated with the museum opening, there is limited information about external influences.

No use of an external control has been made in these studies, or an assessment made of the effect of other cultural/non-cultural attractions and local/domestic economic factors in the area. Although increased visitors to other cultural establishments is evident (e.g. visitors to Bilbao Museum of Fine Arts grew from 95,000 in 1996 to 154,000 after GMB opening – c.40,000 attributable to the Guggenheim where a combined GMB-MFA ticket operates), as is growth in firms/employment and co-location. As a check on the research model, the findings have been triangulated with internal (venue visitors) and external data (employment, visitors).

As a check on the research model, the findings have been triangulated with internal (venue visitors) and external data (employment, visitors).

The NPV calculation is a straightforward capital investment appraisal method, but relies on I-O multipliers for tax revenues. As a single case the example demonstrates how project based data (visitor numbers – tourists: local) and capital spending (investment) can be important in modelling the effects to the wider economy.

3.2.2.1 Availability of comparable data in the UK

Data used to develop an impact model and attribute effects to the cultural facility included those identified in Table 3.

The studies use data that is broadly equivalent to that available in the UK and so a similar approach could be adopted. The model requires information from the study venue and there maybe problems associated with this where visitor data is not disaggregated between origin/type (e.g. overseas/overnight tourist). As a primary data source, it is possible that this could be developed by building estimates of venue data (from secondary data sources and comparators) into the model. However, there are significant limitations in doing this without some verification of visitor profiles and consumption behaviour (e.g. travel hotel accommodation). In the UK this level of information is drawn from public but particular private sector and 'proprietorial' sources, including market research companies, commissioned member surveys by trade associations (e.g. British Hospitality Association) and bespoke models, notably STEAM and Cambridge (Table 8. below).

Table 3: Data sources used in Guggenheim studies

Data	Source	UK Equivalent
No. of visitors to GMB since inception - 1997-2006. Visitors to other museums	GMB and other museums own data	Individual venue (and Arts Council/English Heritage et al.), CultureMap venues (e.g. Audiences London, Audiences South)
Overnight stays by foreign visitors to the province (Biscay)	Spanish National Statistics Institute (INE)	Visit Britain, local authorities/RDA, STEAM & Cambridge models (disaggregated national arrivals) Local authority, tourist board and hotel industry (BHA) survey of bed nights
Nos. employed in 3* to 5* hotels in the City 1992-2007 and in the province 1992-2004	Spanish National Statistics Institute (INE)	All hotel, hospitality establishments - ABI (SIC, sample), IDBR, Trade Associations (HIA, BHA)
No. of hotel beds in province 1992-2004	EUSTAT (Basque Statistic Institute)	Regional (RDA) and local authorities, Visit Britain, HIA, BHA
Nos. employed in service sector in province 76-2004	EUSTAT (Basque Statistic Institute)	Annual Business Inquiry (ABI)
Industry employment change in the city by NACE sectors 1995 and 2005	EUSTAT	ABI
Business services/ establishments (firms) and employment therein 1994/5 and 2004/5; Art Enterprises by District	EUSTAT, Bilbao City Council	ABI
Labour productivity by national province per employee - 2003	INE	ONS (GVA) region, sub-region (NUTS3)
Capital costs of GMB pre-opening (Euros 166m)	Tribunal Vaxco de Cuentas Publicas	Venue organisation; Funding bodies (e.g. Lottery, NLDB/NDPBs)
Additional tax (direct + indirect) revenue due to GMB using input-output analysis (Euro36 tax revenue per non-Basque visitor)	Provincial Treasuries of Biscay	Published sectoral multipliers, regional I-O (ONS), comparable venues/visitor economies, IDBR (VAT, Tax)

3.2.3 Conclusions on viability of approach for C&S impact assessment in the UK

The study was of a single facility (the Guggenheim) based on longitudinal data on visitors (tourists, overnight stays, tax revenues) and employment in local hotels as well as firms/employment change pre and post the museum opening. This exercise also estimated the return on public investment in the facility from additional tax revenues.

In cases where robust before and after data on visitor numbers (local, non-local), and local employment in key sectors (hotels, tourism) is available annually this method could be applied in the UK. This level of data is available in locations and local authorities where visitor and local economic data is collected regularly throughout the year (Table 3). The approach could potentially address the investment impact of C&S projects on: Business start-ups; Business mix and performance (growth, employment, GVA and visitor numbers.

It should also be possible, as in the Bilbao study, to compare the results of any analysis with those obtained through appropriate multiplier analysis. The richest and most up to date data is therefore more likely in destination areas where key stakeholders (local authorities, trade associations, tourist promotional agencies, venues) produce detailed data on visitor activity, including origin, overnight/day visitors and related spending in the local area through systematic surveys and returns to funding bodies (e.g. ACE, MLA, DCMS). Regionally and in key tourism areas, access to national (e.g. tourist boards) and trade association survey data on hotel/bed nights and visitor spend would ideally be required in order to validate and assess the spatial distribution of visitor activity, i.e. impact and catchment areas (DCMS, 1998).

The methodology used would be most applicable to C&S facilities in the UK where similar conditions existed – i.e. a unique facility, a visitor attraction, established for a number of years and located in a 'destination'. The Guggenheim in Bilbao is likely to be most comparable to areas where a new C&S facility is located in an undeveloped site or area with no pre-existing facilities of a similar nature (e.g. Tate St Ives, Eden Project, Salford Quays). These area/facility types are also likely to be the locations where regular visitor and local economic data has been collected since opening, as the prime source for the required time series data and where effects are most easily attributable. On the other hand, cases of upgraded facilities and those attracting primarily day visitors would be less feasible (e.g. Wembley Stadium, Arsenal FC Emirates Stadium).

3.3 Valuing Greenness

Full title: Varma, A. for the Greater London Authority (GLA). "Valuing greenness: is there a segmented preference for housing attributes in London?" 2003.

Type of study: Cross-sectional regression analysis of variations in average house prices across London wards.

Peer Review Status: No – commissioned research report.

Introduction: This study undertaken for the GLA uses statistics on open green spaces along with socio-economic indicators at ward level and below to explain the variation in house prices. The analysis provided the basis for a 2003 GLA report, *Valuing Greenness: Green spaces, house prices and Londoners' priorities*.

Summary of results: The study found that if a ward had 1% more green space then this would be associated with average house prices in that ward being 0.3% to 0.5% higher than in other wards.

Overview of methodology: A form of hedonic pricing methodology (HPM) was applied: a simple semi-log regression model using selected ward level attributes including open green spaces to explain the variation in house prices across London wards. The research attempts to isolate the significance of green spaces in explaining the variation in house prices from the other area characteristics.

3.3.1 Case study methodology and use of data

The study utilises the hedonic price method (HPM). This is a well-established indirect valuation technique which uses the cost (price) of housing to estimate the amenity value of an environmental improvement, through the observed behaviour of individuals in the housing market. Thus the HPM is used to estimate the amenity benefits accruing to local residents from changes to those attributes which influence the market price of a dwelling. HPM studies have tended to examine the effects of environmental attributes on house prices, for example: urban air quality, water quality, waste sites, airport noise, woodland, landscape and parks and open spaces (Powe, Garrod & Willis, 1995). In the USA, sports stadia have also been examined as an amenity impacting on house prices (see Feng & Humphreys, 2008; Dehring, Depken & Ward, 2006 and on Berlin, see Ahlfeldt & Maennig, 2008.

In *Valuing Greenness*, it is assumed that the purchase price of a house is determined by a number of characteristics, including: local socio-economic factors (e.g. quality of schools, access to health services and the local unemployment rate), as well as environmental quality and local amenities such as green spaces, transport links and access to other services. Geographic information system (GIS) data has also been used to complement available statistical data.

The model is based on a semi-log regression equation estimated on a cross section of London wards; details are given in the box below;

$$InHP = \alpha_0 + \beta_i \sum_{i=1}^{10} X_i + e_i$$

where HP is the average house prices in a ward

α_0 is the intercept

β_i are the coefficients of the explanatory variables

X_i (i=1-10) are the explanatory variables, respectively:
1 is Travel time to central London
2 is Income support
3 is Dwelling density
4 is Percentage of ward that is green space
5 is SATs (education indicator)
6 is Domestic burglary (crime indicator)
7 is High affluent dummy variable
8 is Overcrowded households
9 is NO 2 average (environment indicator)
10 is Health facilities indicator
e_i is the error term

Varma, A. Valuing greenness: is there a segmented preference for housing attributes in London?, (2003)

Regressions were run based on data from 760 wards (using 1998 ward boundaries). The explanatory variables all had significance at 95% confidence intervals. The coefficient of determination (known as R squared, R^2) which measures how much of the variation in house prices is determined by the chosen explanatory factors shows that the model explains about two-thirds of the variation in home sale prices.

In relation to the green space factor, on average a 1% increase in the amount of green space in a ward (as measured) was associated with a 0.3% to 0.5% increase in the average house price in that ward.

More significant factors in determining house prices were the proportion of income support claimants in a ward, where a 1% fall was associated with a 3.1% to 4.2% higher average house price; a 1% reduction in travel time to central London associated with a 1% to 1.5% increase in price; and a 1% decrease in the number of pupils scoring less than level 4 (as a proportion of total pupils aged 10) was associated with a 0.4% to 0.7% increase in house prices.

Varma acknowledges that controlling for the level of green space in an area is difficult. This is mainly because the attributes of green spaces are numerous and require different methodologies to measure them. For example, measuring biodiversity values is different from the active sports value of green spaces. Survey based techniques can value green space as a whole or an aggregate of individual attributes. This study excluded key green space amenities from their measure, including urban parks, gardens and commons. Subsequent studies have focused on the impact of parks and green space provision in relation to deprivation and ethnic minorities, using GIS-based mapping of green space, correlated with IMD (deprivation), census and accessibility indices – see Brainard et al. (2005) and most recently *Urban green nation: Building the evidence base* (CABE 2010). These combine qualitative (survey) and quantitative spatial data analysis techniques. New open and green space data sets are now available (notably the Generalised Land Use Database), such that if this study were to be undertaken today, a more comprehensive land use cover and local data on this amenity factor would be obtainable, in combination with local area demographic, house price and amenity statistics.

3.3.2 Viability of approach for C&S impact assessment in the UK

In terms of transferability to Culture and Sports facilities, the issue of how far parks & green space are comparable amenities obviously arises, and the extent to which C&S venues add value to property prices has until very recently not been examined in the UK.[18] Causality between the C&S venue and house price/value may be hard to determine since, as shown by this study, many factors are found to affect house prices.

This study focused on domestic property purchases (not rents) so did not consider effects on other property values, i.e. non-domestic premises (e.g. using Valuation Office - VOA data) - a common feature of HPM studies (Powe, Garrod and Willis, 1995). The value link for non-residential property will be different to house prices, but is likely to be influenced by sales/customers associated with a C&S facility (cf. *Does Money Grow on Trees*, CABE) and the amenity value for employers/employees (as found in Powe et al. 1995, Myerscough 1988, and in city location decisions such as in The Netherlands, Marlet 2005). Data sets used for other property values and business activity are however available at various geographies for the C&S investigation.

The appeal of this methodology is the combination of higher level ward level comparative data, with lower level geographic area data, visualised in GIS map format. Data at ward level combined with local area data (including facilities) could therefore provide a ward by ward comparison of the effect of a group of facilities, particularly given their uneven distribution at ward and local authority level. Benchmarking C&S provision and performance quality, (e.g. Best Value/NIS Performance Indicators) also takes place at these levels, rather than at single facility or even neighbourhood. With the improvements in physical asset data mapping (*cf*. CASE, *Living Places*, Cultural Planning Toolkit - Evans, 2008), a regression-based model

[18] During the final phases of drafting this report, a new working paper by Ahlfeldt has been published which examined the impact on property prices by Wembley and the Emirates stadia using secondary data. See Ahlfeldt & Kavetsos (2010), *Form or Function; The Impact of New Football Stadia on Property Prices in London*

could aggregate and cluster C&S facilities and other ward level amenities against socio-economic and environmental characteristics, including house and other property prices.

Using time-series/panel data, rather than the cross-sectional data used here, could potentially increase the robustness of the analysis, as the author notes: 'a time series analysis could realistically show any channels of influence and implications resulting from changes in variables' (p.16). The value of time series data, or at least the use of several data measurement points over time, would be to reduce the impact of short term factors or area characteristics that are not controlled for. This would highlight the effects post facility development and the build up of amenity benefits reflected in house values arising over time. Other hedonic pricing studies have used several measurement points, including 'before and after' the introduction of improvements and new facilities (Ahlfeldt & Maennig, 2008 & 2009).

3.3.2.1 Availability of comparable data in the UK

Adopting an approach that analysed data at the ward and local authority level would suggest the use of aggregate C&S data on facilities, but one that draws on consistent facility level data. This is available through the Culture and Sport Physical Asset Mapping Toolkit (CASE, August 2010) which provides a typology of C&S facilities and comparable sources of data at point locations, which can be quantified and visualised in GIS at varying geographic levels. Wards, groups of wards (e.g. regeneration areas, deprivation clusters, town centres) and even whole boroughs could be mapped in this way, using the C&S facility types (e.g. museums, theatres, arts venues) or combinations of these (e.g. all cultural, all sporting etc).

The regression analysis could be undertaken using the C&S facility ('count') factor in place of the green space areas used in this study. The significance of the C&S variable would be ascertained using a similar approach to the Varma study. Weighting of the C&S facility factor could, in principle also be further applied to reflect scale or significance, again using the Mapping Toolkit and facility-specific data (e.g. usage/visitor numbers, capital cost - per Project database). Although, the assessment of the information on projects that is available has found that such information is not always readily available and time consuming to collect. In terms of the availability of potential explanatory data:

Travel time Due to the study's location (Greater London) there may be data issues with replicating the data on travel time elsewhere in the UK. Travel time to central London is available for the London area but is not necessarily available at the same detailed level for other urban and rural areas in the UK (e.g. travel time to nearest urban centre). For the data to be collected for other locations in the UK, a number of sources would need to be consulted which could be time consuming. For example, to map travel time in Newcastle Upon Tyne would require information from the operators of the Metro, bus-services and information on car journeys. The census provides some insight into the distance and travel mode of commuting, but not time taken to commute. Local Authority Transport and Accessibility Plans will provide some guidance on this, likewise the Department for Transport's GIS-based Accession model (www.citilabs.com/news/items/accession-16-released.html) and annual Accessibility Indicators, which provide a local level measure of the accessibility of key services (i.e. time taken and proportion of the population able to access them).

Air quality There is currently more data available on air quality than in 2003 and as a result there are a number of different sources of information on air quality in the UK to be used. This would provide the model with more scope and up to date information. In particular DEFRA produce air quality statistics which would be of benefit for undertaking an evaluation study on a wider scale and the Environment Agency's Environmental Quality Index (EQI) which ranks Air Quality and a range of other environmental factors at Super Output Area (SOA) level (http://science.environment-agency.gov.uk/EQIOnline/).

Educational attainment The data availability of SATs is different to 2003 and it is possibly that different sources may be consulted. The *Department for Children, Schools and Families* (DCSF) provides data on key stage 2 assessments and attainment in Maths, English and

Science. Furthermore, data is available over time and contextual value added scores are available. These can be used to provide insight into the benefits of proximity to green spaces or cultural and sporting venues on educational attainment.

Crime levels and health facilities There will be variations in the data sources for burglaries and health facilities indicators because of structural and funding changes in government since 2003. As such, local crime mapping websites, local police authorities and Crime Reduction Partnerships, Public Health Observatories and the NHS information centre would need to be drawn upon to provide data for proxies for any wider analysis in an equivalent study. The addition of 'street crime' would be a more useful indicator than burglary, since this is most directly influenced by changes to public realm, access and community safety (e.g. fear of crime – Evans, 2009), some of which may be effects attributable to C&S facilities and related activity (e.g. animation, footfall, 'eyes on the street').

Table 4: Data used in 'Valuing greenness'

Variables	Source	Potential Replication Data
1. Income support	Income support claimants as a percentage of population over the age of 18 for each ward. Source: Department for Work and Pensions, 1998	DWP income support claimants. Available at LA and Lower Super Output (LSOA) level.
2. Travel time to central London	Travel time zones to central London averaged for each ward. Central London is defined as roughly the same as zone 1 of the underground map. Transport for London divides London into 1,019 travel zones. The following modelling periods were used: morning (07:00- 09:59), interpeak (10:00-15:59) and evening peak (16:00-18:59). Source: Transport for London, 2001	No comparable single data source available outside of London. Data may be sourced from Department for Transport (Core Accessibility Indicators) and ACCESSION GIS model. Local sources such as bus and train companies and local/county councils/ Passenger Transport Executives (PTEs).
3. NO_2 average	Levels of nitrogen dioxide in parts per billion (ppb). The data are derived from mapping of NO2 concentrations in London. The continuous surface map is modelled with the use of data on emissions of air pollutants together with weather data and geographical information to calculate the likely pollution concentrations. Source: South East Institute of Public Health, 1999	UK Air Quality Archive and DEFRA Air Quality Statistics can be used to calculate pollution concentrations, as well as EA EQI data as SOA level.
4.Dwelling density	Total dwellings for each ward divided by the ward area, expresses as number of dwellings per km2. Source: Valuation Office Agency, 2001	Valuation Office data for total dwellings still exists. OS point/polygon data also available
5. Per cent green space	Total identifiable 'strategic green spaces' (km2) for each ward. The identifiable green spaces are the Green Belt, Metropolitan Open Land, Sites of Metropolitan Importance, Sites of Borough Importance and Sites of Local Importance. This is divided by the total area of the ward and expressed as a percentage. Green spaces such as urban parks, private gardens and common green spaces around flats are excluded from this study, except in the Green Belt, as data are not available. Source: Connecting with London's Nature: The Mayor's Draft Biodiversity Strategy, 2002	Comparable data available from Point X (OS) and Generalised Land Use Database (GLUD) C&S facility data and types – C&S Physical Asset Mapping Toolkit (CASE, 2010)
6. Standard Achievement Targets (SATs)	Standard Achievement Targets 2 scores. Pupils scoring at less than Level 4 as a proportion of total pupils aged 10. Data are for 1998 and refer to school addresses in the absence of pupil addresses. Values for schools have therefore been attributed to the wards in which the schools are located (and aggregated across schools where there is more than a single school in a ward). Where there is no school in a ward, the ward has been attributed the average value for all schools in the borough. (London Index of Deprivation, 2002). Source: Department for Education and Skills, 1998	SATs data, DCSF Key stage 2 attainment, ILR data, Ofsted reports
7. Domestic burglaries (crime indicator)	Domestic burglaries as a per cent of adult population (18 years+). The dataset was originally compiled with grid references and the number of offences. The grid references and their values were plotted and attributed to wards. The most common reported crime is domestic burglaries. Source: MPS, (1999/2000).	Local Crime mapping provides ward level detail on recorded crime. Location-based crime statistics may be available via Police, LAs/Crime & Community Safety Partnerships

Variables	Source	Potential Replication Data
8. Over crowded households	Percentage of households living at densities of one or more persons per room. Source: 1991 Census (estimated to 1998 ward boundaries)	Census data would provide data on household density at LSOA
9. High affluent dummy variable	Wards with average house prices greater than £500,000 located within Underground zone 1. This indicator is included to avoid the data being skewed because of large deviation from higher average house prices.	UK House Prices.com Valuation Office, Land Registry
10. Health facilities indicator	Postcode level data for hospitals, NHS trust sites, dentists and GPs are summed and then mapped to obtain a ward level health indicator. Source: London Health Observatory, 2002	This data is available from the NHS website (as a web service) and Point X data

3.3.3 Conclusions on the using the approach to assess the impact of C&S

The study has assessed the amenity value of open green spaces through their effects on property prices. Green spaces are perhaps larger and more homogenous areas than most C&S facilities. Attributes and their influence on the impacts arising may therefore be different, 'use values' being perhaps more important for C&S facilities, rather than environmental benefits, lower densities, views etc. in the case of green space.

The adaptation of ward level analysis to include aggregate C&S facility data could provide a cross-sectional analysis of C&S facility types and location factors and their comparable effect on house prices. Green Space as an explanatory factor in amenity values (house price, quality of life indicators) would probably need to be retained as one of the explanatory variables, given it has been found to be significant in hedonic pricing studies.

To undertake a study of this form the data used by Varma would have to be supplemented with new data sets on local amenities, environmental quality, demography and land-use, and C&S facility physical asset mapping such as that collected the Culture and Sport Physical Asset Mapping Toolkit.[19]

The modified impact model would potentially address the impact of C&S projects on: Commercial and domestic property transactions and prices; Demographic variation (level and composition); Quality of life and perceptions of the area.[20] The available data on environmental quality and green space, has also improved since the 2003 study.

The approach adopted by this study is a cross-sectional one whereby the determinants of variations in average ward level house prices are assessed at a given point in time. A potential extension to the analysis could be to adopt a panel data approach whereby information on average house prices over time in a number of areas is assessed in terms of changes in the number of cultural assets and other factors. Such an approach would have an advantage in terms of establishing causality and controlling for area characteristics. Over the longer-term, the data collected by the Culture and Sport Physical Asset Mapping Toolkit on cultural facilities may allow this kind of approach to be adopted.

3.4 Paved with gold

Full title: Paved with Gold: the real value of street design, Colin Buchanan for CABE, 2007

Type of study: Cross-sectional regression with street design quality evaluation

Peer Review Status: No – commissioned research report.

Introduction: *Paved with Gold* examines the extra financial value that good design contributes to the value of property in shopping streets. The research is part of CABE's programme of 'Valuing Good Design', including the development of the Construction Industry Council's building-based Design Quality Indicator (DQI) and equivalent SpaceShaper open spaces toolkits[21]. The study shows how financial benefits can be calculated from investing in better quality street design. It also demonstrates how, by using stated preference surveys, public values can be measured alongside private values, so that they can be included in the decision-making process. Ten London high streets were selected as case studies.

Summary of results: The study finds direct links between street quality and both retail and residential prices. In the case of homes on the case study high streets, improvements in street quality were associated with an increase in prices. Specifically, for each single point

[19] www.culture.gov.uk/what_we_do/research_and_statistics/7290.aspx#Culture
[20] The level of commercial property information being less than what would be required for a more detailed local area study such as that by Jones et al.
[21] http://www.dqi.org.uk/dqi/Common/DQIOnline.pdf; http://www.cabe.org.uk/public-space/spaceshaper

increase in the street quality scale (using the Pedestrian Evaluation Review System - PERS), a corresponding increase of £13,600 in residential prices could be calculated. This equates to a 5.2% increase in the price of a flat for each PERS point. Although the finding was not statistically significant due, it is considered, to the small sample size of the study The analysis also showed direct links between zone A retail rents (the rent for the most valuable space closest to the shop fronts) and street quality. For each single point increase on the PERS street quality scale, a corresponding increase of £25 per m^2 in rent per year could be calculated.

Overview of methodology: The study method combines primary ('street audit') and observational research, with quantitative analysis of secondary data on property prices (value/rent), retail and travel catchments and socio-economic characteristics of the selected areas. Regression analysis was then undertaken to model the relationship between property prices and the selected explanatory variables.

3.4.1 Case study methodology and use of data

The study's objective was to develop a model that helps to predict the property value performance of a high street and identify the contribution of street design quality to this performance.

Regression models were developed for **Retail** - using dependant variables: average zone A rent per m^2; annual comparison spend per zone A m^2, and **Housing** - dependant variable: average high street flat price (2005). Explanatory variables used for Retail were: PERS score, total weekly expenditure in 800m buffer per km2, core attachment market penetration, proportion of retail units vacant, charity or betting shops; and for Housing: PERS score, average terraced house price in 800m buffer (2005).

Observed turnover data was thought to be a good retail performance indicator, but no published data was found. Turnover figures modelled by both CACI and Experian for comparison goods floorspace needs assessment, conducted as part of GLA's London town centre assessment (2001), were available for nine of the ten high streets surveyed.

The sample of high streets was chosen to ensure the sites were as comparable as possible:

- no major streetscape improvements since the 2001 census, to maximise comparability;
- mainly retail uses at ground floor level and flats above to maximise comparability of design characteristics;
- similar retail centre classification broadly in line with the CACI and GLA retail centre hierarchy;
- similar level of public accessibility to central London;
- availability of data on retail turnover and average turnover as a potentially important performance measure for the retail study;
- no significant off-street shopping mall in the study area as these would be unaffected by the quality of the public streetscape; and
- variation in street design quality.

A comparable set of 10 high streets was selected from a larger sample of 50 on this basis. See Figure 7 below for high street profiles.

Figure 7: Sample profile

	Hampstead	Chiswick	Swiss Cottage	North Finchley	Streatham	Tooting	Clapham	Kilburn	West Ealing	Walworth
General data										
Population – residents[1]	22067	27505	36255	21800	41684	40370	37794	45342	27490	50992
Population – jobs / workplace[1]	12688	13536	14342	8396	9188	16211	12810	12055	12802	13498
Population density, no people per km²	116	131	169	75	116	139	143	161	108	239
Average weekly expenditure per head[2]	£219	£191	£181	£155	£120	£134	£127	£120	£154	£84
Total weekly expenditure	£4,831,554	£5,250,960	£6,923,678	£3,382,504	£5,007,539	£5,412,485	£4,801,777	£5,443,171	£4,233,328	£4,264,148
Total area km² of 800m buffer zone	3.41	2.918	4.321	4.541	5.224	4.912	3.526	4.425	3.102	4.257
Length of high street in km	1.517	2.552	2.848	2.460	3.457	3.844	1.947	2.410	1.378	1.715
Retail data										
Average zone A rent per m² [3]	1151	743	439	418	251	451	444	411	416	341
No. of shops: Comparison shops %[4]	40%	42%	30%	27%	22%	34%	15%	29%	29%	38%
No. of shops: Services and banking %[4]	30%	29%	33%	34%	32%	25%	32%	24%	26%	25%
No of shops: Catering %[4]	19%	20%	21%	19%	21%	18%	30%	21%	14%	18%
No of shops: Vacant, charity and betting %[4]	1%	6%	6%	10%	9%	8%	10%	6%	14%	9%
CACI retail offer footprint score 2005	140	129	86	106	97	169	28	146	90	86
CACI annual comparison spend 2005	£118,803,741	£85,984,723	£18,293,539	£52,779,492	£42,736,290	£78,073,230	£6,708,387	£37,539,726	£33,776,855	£20,164,444
CACI core catchment potential 2005	6.1%	2.9%	1.5%	6.5%	2.7%	5.5%	0.7%	2.4%	4.6%	1.7%
Housing data										
Average terraced house price 2005[5]	£761,191	£520,830	£841,859	£309,666	£266,396	£335,676	£440,330	£545,760	£298,310	£332,386
Average high street flat price 2005[5]	£454,000	£272,318	£279,050	£219,329	£179,860	£208,891	£254,879	£300,143	£246,791	£180,000
Public rented (%households)[6]	16%	14%	20%	11%	27%	16%	38%	36%	18%	70%
Private rented (%households)[6]	31%	29%	33%	29%	25%	27%	21%	25%	20%	10%

1 2001 Census
2 Expenditure figures from IMD Rank 2004 and ONS Family Expenditure Survey 2003
3 Rent figures from Valuation Office Agency 2005
4 Retail use breakdown from Colin Buchanan survey 2006
5 Property prices from Nethouseprice.com 2005
6 Rent breakdown from 2001 Census

The first phase of the research involved assessing the design quality of each of the case study high streets. This assessment used the pedestrian environment review system (PERS), a tool for measuring the quality of the pedestrian environment. PERS was developed by the Transport Research Laboratory (www.trl.co.uk/pers.htm - see Evans 2009[22] for a critique of

[22] Evans, G. (2009) 'Accessibility, Urban Design & the Whole Journey Environment', *Built Environment* 35(3):366-85

this and other pedestrian assessment tools). PERS scores the way a street works as a link, facilitating movement from A to B, and as a place in its own right. The PERS tool was used to assess the quality of each high street. The final scores, calculated on a seven-point scale from -3 to +3 show relatively wide variations in quality, from +0.98, to 1.70. The weighting of individual PERS factors rates Quality of Environment (24%), Personal Security (13%), Permeability (12%), User Conflict (10%), Surface Quality (10%) and Maintenance (9%) more highly, compared with Legibility, Lighting and other physical street attributes.

The next research phase applied regression analysis to determine whether street quality is responsible for some of the variations in retail rents and in property prices seen across the 10 case studies. The study also used the outputs of work undertaken by Colin Buchanan and Transport for London (TfL) on the valuation of pedestrian user benefits from improvements in street design. That work valued the benefits accruing to individuals from walking within a nicer street environment. This was based on two sets of inputs: a large stated preference research exercise with 700 separate interviews carried out on two London high streets; using PERS to provide a multi-criteria system for rating quality of public realm.

In order to provide a comparison with the market price impact on flats, an estimate of the scale of user benefits accruing to the occupants of an individual flat was required. This calculation was based on a number of simple assumptions about occupancy and usage of the street. The values produced were only for the time spent in the street and do not consider benefits that might accrue to residents within their homes from improved street quality, such as noise, air quality and visual attractiveness. Assumptions included:

- Average occupancy of flat: two people
- Average time per person per day spent in street: 30 minutes
- Value per minute from scenario 'each score up by one': 0.017 pence per minute
- Days of usage per year: 300

The value of residents' user benefits per year per flat was estimated as: £306 (2 x 30min x 0.017 x 300)

CACI's retail footprint model provided a retail catchment area calculation. It is a gravity model[23] based on four components:

- A combination of distance or travel time by car;
- The 'attractiveness' of the retail offer;
- The degree of intervening opportunities or level of competition; and
- The size of the population within an area.

Prices for flats were taken from property websites, and zone A retail rents were taken from the Valuation Office website (www.voa.gov.uk). Buchanan's public transport accessibility model, ABRA, was used to calculate the number of people in catchment areas along the high street measured in journey time between the high street and their home – see Figure 8.

[23] The gravity model takes into account the population size of two places and their distance. Since larger places tend to attract people, ideas, and commodities more than smaller ones and places closer together have a greater attraction, the gravity model incorporates these two features.

Figure 8: ABRA Model for Finchley Road, Swiss Cottage

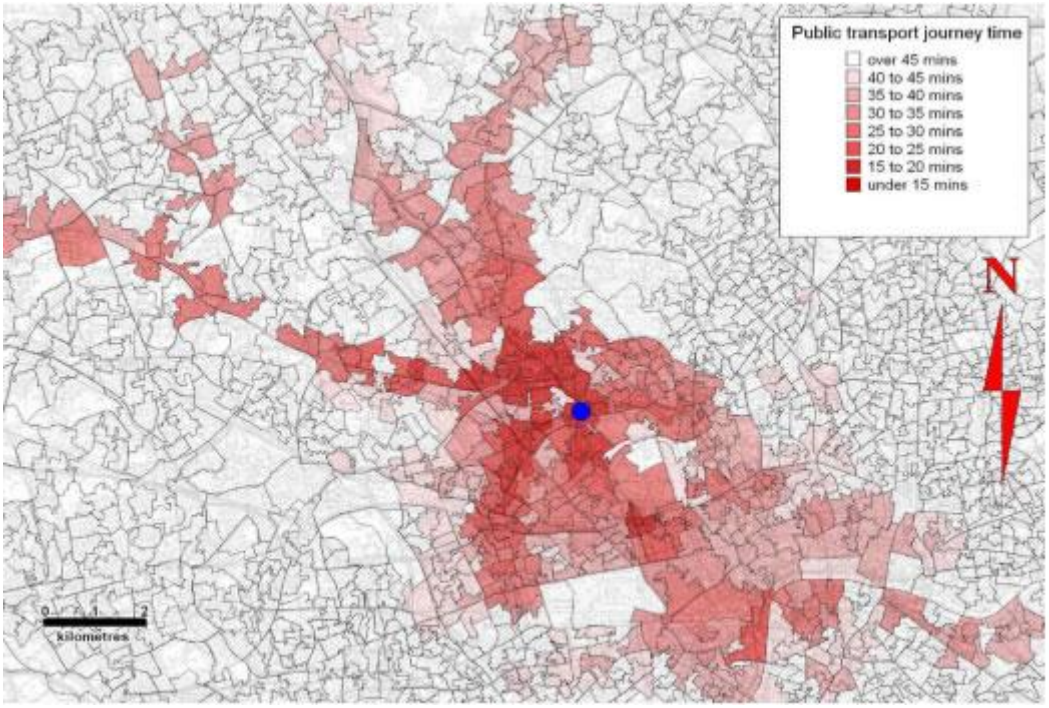
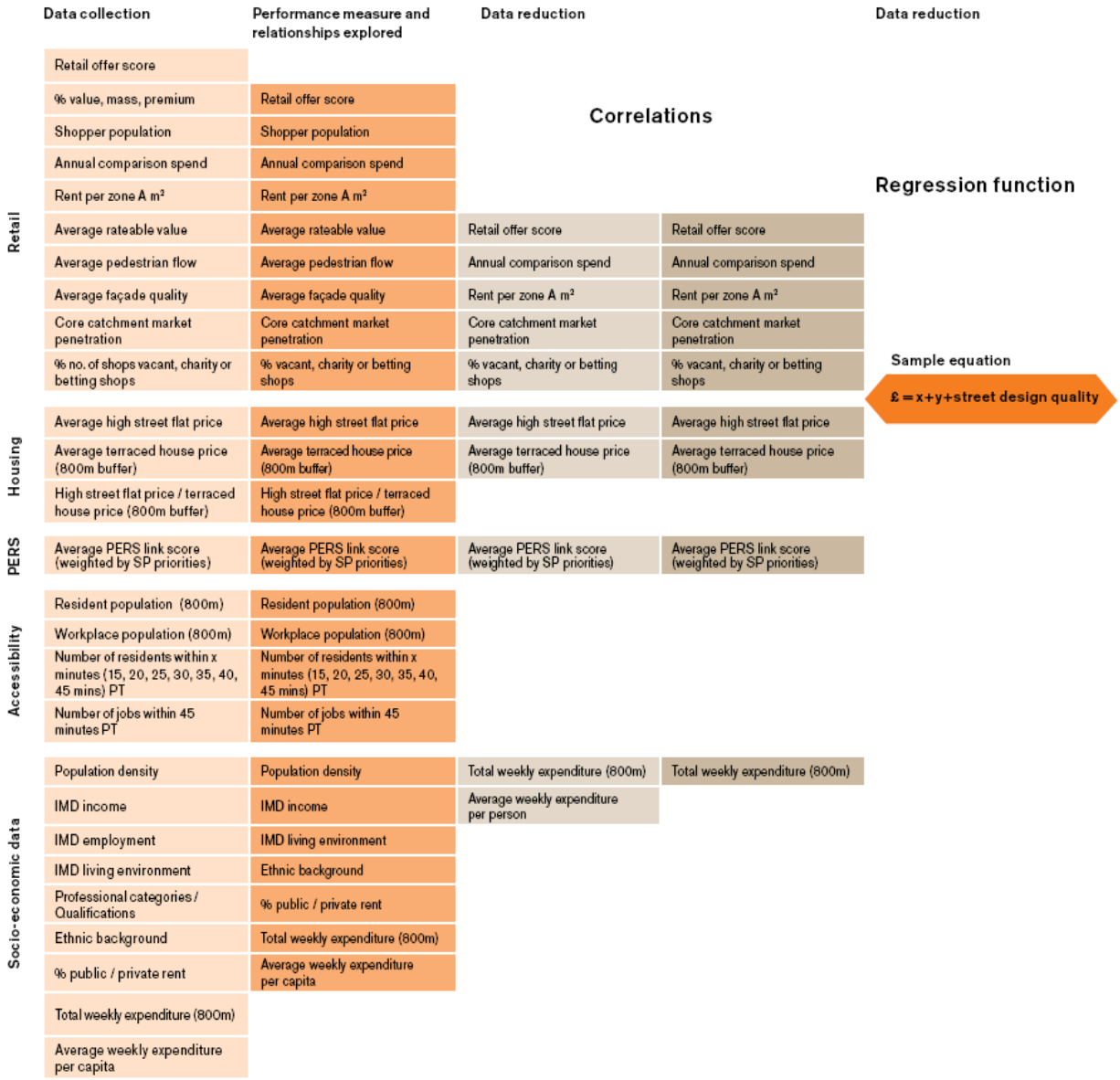


Figure 9 below illustrates the range of data collected and shows how the filtering process was used to reduce the data sets down to the ones that were most helpful in the statistical analysis.

Figure 9: Data reduction



The 'best fit' (i.e. the highest R^2) regression results for Retail rents were as follows:

Zone A rent of shops in £/m^2 = (-£4600 x V)+ 0.26 x E + £5000 x C + £25 x street design quality score

where:
V = Proportion of units vacant, charity shops or betting shops/amusements
E = Total weekly expenditure in 800m buffer per km^2 (£000)
C = CACI core catchment market potential (measure of competition)

and for Housing, the 'best fit' model had the following function:

High street flat price £ = £129k + 0.28 x terraced house prices in surroundings + £13,600 x street design quality score.

This study was intended as a demonstration of a new approach to assessing design value. It acknowledges that further work is needed to validate its methodology. Although the model

was found to explain a high proportion of house price variation , the results in general were not felt to be statistically significant due to the small survey sample (n=10). However, the authors consider that the results would demonstrate trends that are replicable with larger samples. Further research could also extend the investigation to include offices and mixed-use schemes, looking at the relationship between office rents and street design quality.

3.4.2 Viability of approach for C&S impact assessment in the UK

Some variables of interest for assessing the impact of cultural and sporting projects are included in this model such as the socio-economic characteristics of each local area, commercial and domestic property values and rents. However, although business mix and performance were considered, this was for the purpose of ensuring comparability between shopping streets rather than for inclusion as additional independent variables when investigating the value of the properties.

Much of the methodology relies on primary data and extensive desk research to establish property values and PERS scores for high streets. The approach was appropriate for investigating street design and its impact on property prices, but it would be very difficult to amend it for use of C&S investments without using some primary data.

A different approach might be adopted however, using the C&S facility/cluster of facilities and associated improvements, instead of the street design quality interventions as measured in this study. Some similar effects could be observed where C&S facilities which were part of area or site based regeneration schemes had a positive effect on retail and other aspects of the visitor economy, as well as on amenity values for residents and businesses (e.g. housing and commercial premises values). The retail and place 'attractor' model created for this study could potentially be developed for selected C&S projects that formed part of a mixed-use area, including retail and/or visitor activity and drawing on secondary data, including GIS mapped C&S and other amenity data.

3.4.2.1 *Availability of comparable data in the UK*

CABE relied on key primary research to provide some of the data used in this study. In an effort to replicate this study it is necessary to investigate if there is any secondary data that could be used instead of primary data. Secondary data does not adequately cover the same characteristics as street quality measures and pedestrian data and it would therefore be difficult to replicate these data sources exactly. As a consequence it would be necessary to change the mode of enquiry to focus upon other aspects of pedestrian and street quality measures. As such, data from Neighbourhood Statistics, IMD, EQI, land use and retail business data sources (Experian, TCR, Point X, VOA) may be used to build a description of a street's characteristics and estimate the numbers of people entering shops.

Secondary data on property prices (value/rent), retail and travel catchments and socio-economic profiles of the selected areas would also be available for the C&S study. In addition to modelling the population and street characteristics outlined above, it may also be able to develop a proxy for measuring 'good design'. Where design quality audits have been undertaken for specific buildings or open spaces, e.g. CABE's Design Quality Indicator (DQI) SpaceShaper model, these could be incorporated into an impact assessment as a design quality measure, alternatively architectural prizes may be used - albeit primary research exercises using established scoring models. These would however be limited to these specific areas/facilities e.g. where these reviews have been undertaken.

The primary retail data sources in the study can be replaced by secondary data sources. Information regarding retail catchment, competition and shops can be drawn from secondary data which can identify the type of business, catchment areas and businesses nearby. However, detail on expenditure and retail customers is not available from secondary data sets as the ones that are potentially suitable do not cover geographic areas and instead use modelling to build aggregate, non-spatialised information on customers and expenditure by sector.

The high street profiling is broadly replicable but also has some data that is only obtainable from primary research. The spider diagrams which show the relative design quality of each high street by the area/assessment factor and which are produced as part of the assessment of high street quality and land use, would be difficult to replicate with secondary data and therefore desk research or a range of complementary secondary statistics may benefit this part of the analysis instead.

The detailed statistics on public transport accessibility the study uses are held by Transport for London and modelled by the study authors, consultants Colin Buchanan. For other areas of the country, it may be suitable to use Census data on travel to work distances. These have been grouped together as Travel to Work Areas (TTWA), which could be used to calculate the number of people that are within specific travel distances. TTWAs are widely used in labour market analysis in order to look at the work locations of residents and rely heavily on analysis of Census data and commuting patterns. The Transport Ministry's annual Core Accessibility Indicators and recommended Accession GIS transport access model would also provide travel time distance metrics for key local services.

Table 5: Data sources used in 'Paved with gold'

Data type	Source	Potential Replication Data
Socio-economic	Measures of population, employment, deprivation, incomes and spending power. Source: Census, IMD, ACORN	2001 Census, IMD 2004 & 7, ACORN, Neighbourhood data, EXPERIAN-MOSAIC lifestyle data
Retail	The mix and number of shops and data on the comparison goods spend, the size of the retail catchment and the extent of retail competition. Source: Primary observation/count	No secondary sources provide this specific data, but data sources like TBR's business database, TCR, could provide detail on the mix and number of shops. No secondary public sources are available on spending and catchment although ABI survey (sample) data by industry type (SIC) provides turnover/GVA, employment as an indication of activity
Accessibility	How many people were within specific travel times by public and private transport Source: TfL	Census data can provide insights, but does not possess data on commuting time. DfT's Core Indicators and the Accession model will provide catchment and travel times to key amenities. In London, TfL's PTAL model measures public transport accessibility levels.
Prices	Analysis of flat prices on the high street, surrounding streets, retail rents and value of sales. Source: nethouseprices.com, rightmove.co.uk	UK House prices, Survey of English Housing, Dwelling Stock, Regulated Mortgage Survey (Survey of Mortgage Lenders prior to 2005), rental data from Cambridge University , house price index. Land Registry (VOA)
Pedestrian data	Counts of pedestrian activity at various points along each high street and through the day. Source: primary pedestrian counts	Primary research, e.g. Space Syntax model. Local authority (and police) monitoring data
Street quality measures	Based on the pedestrian environment review system. Source: Primary PERS Street Audit	Primary research

Table 6: Data used to profile high streets

Data type	Source	Potential Replication Data
Maps introducing study areas and the surveyed high streets (24 km of footpath)	OS (Ordnance Survey)	OS Raster Mastermaps
Socio-economic characteristics of each local area	Office for National Statistics	IMD, Combination of economic, social and cultural stats
Spider diagrams of the 10 street design quality audits, land-use surveys, visual footage of the high streets and surrounding housing areas	PERS Street Design Review survey and mapping (Primary)	Primary surveys
Length of high streets surveyed and other general data such as population and employment density	Observation/measurements taken (Primary), ONS (Census, IMD, ACORN)	Local Data company, OS Mastermap/ITN Census, IMD, TCR, ABI, Point X
Key retail collated as part of the desktop research	Observation/measurements taken (Primary)	TCR, Experian, CACI, EXPERIAN
Housing data collated as part of the desktop research	ACORN (CACI)	TCR, Experian, UK House prices, Survey of English Housing, Dwelling Stock, Regulated Mortgage Survey (Survey of Mortgage Lenders prior to 2005), rental data from Cam University, Neighbourhood stats, house price index, VOA.

3.4.3 Conclusions regarding case study as a candidate for C&S impact assessment

The method developed for this study, as it stands, is unlikely to be directly suitable for use in assessing cultural or sporting investments for two main reasons. Firstly, the adaptation of the PERS system to allocate a quality score for each cultural or sporting facility would probably mean the development of a new system designed specifically for this purpose. The model has some appeal for C&S impact assessment in combining design quality, accessibility and their value added to property prices. However, the factors used to measure quality of a C&S project are likely to be different from those considered in street design and a new system would have to be developed, which would probably entail some considerable work to achieve. A modified approach would also require an expanded range of data on local area characteristics (local economy, population, property), and supplementary data as a proxy for design quality, as well as a more statistically valid time series for property values (sales, rents). The current sample only uses 10 locations, and it is likely that to obtain statistically robust estimates in an adapted study the sample size of the analysis would have to be increased.

Finally, the second issue, which is a greater barrier to using this method, is the heavy reliance on primary data for key aspects of the assessment. Whilst it has been established that some UK data sources exist which could replicate to an extent the primary data created as part of this study, these would not generate data on facility specific effects, only general area effects within which a facility is located and would not fully replicate the design and street quality scores produced by *Paved with gold*.

3.5 The impact of sports facilities on property values

Full Title: Feng X. & Humphreys B., "Assessing the economic impact of sports facilities on residential property values", 2008

Type of Study: Spatial-lag regression study

Peer Review Status: No – working paper.

Introduction: This study estimates the effects of two sports facilities in Columbus, Ohio on residential property values.[24]

Overview of methodology: The research estimates how proximity to major sports stadia affects residential house prices. Property values were chosen in order to capture the monetary value that residents may place on living near to a stadium. Regression analysis was used to assess the impact of characteristics that may affect house prices. The spatial-lag technique adopted allows the analysis to control for the price of a given property being affected by the properties in the surrounding area.

Summary of results: In the areas surrounding the two sports facilities studied (Nationwide Arena and Crew Stadium, both in Columbus, Ohio), the results suggest that there is a positive relationship between presence of a sports facility and house values, with property prices increasing as distance to the stadia decreases.

3.5.1 Case study methodology and use of data

In introducing their work, the authors discuss what they consider to be the lack of evidence found by previous academic studies to support the belief that "sports facilities…generate substantial economic impact, in terms of income increases, job creation and tax revenue increases". Feng and Humphreys instead conclude that there may be some intangible benefits from stadia.

[24] Assessing the Economic Impact of Sports Facilities on Residential Property Values: A Spatial Hedonic Approach, Feng and Humphreys, 2008. IASE/NAASE Working Paper Series, No. 08-12.

The authors' aim in investigating the impact of proximity to stadia on house prices is to use house prices to estimate the aggregate 'quality of life' and utility that residents receive from living near to stadia. The intangible effects of the stadia are captured because house prices indicate the willingness of a consumer to pay for a specific good (the house) and its associated benefits. Various variables such as house characteristics and local pollution levels etc. are included in the analysis to help isolate the value that residents place on living nearer to the stadia from other factors which may affect house prices.

This study uses regression analysis to identify the effect of a number of different factors on house prices in the two areas surrounding sports stadia. A spatial lag regression methodology is adopted to address limitations of previous research where spatial effects, particularly spatial autocorrelation, have not been modelled.

Spatial autocorrelation is the co-variation in characteristics because they share a similar geographic space. It can occur in housing prices because houses in the same area will share community characteristics; for example, house prices in a 'nice' area may be similarly high because of the value buyers place on pleasant surroundings e.g. the value of a house is affected by the value of the neighbouring houses, rather than just the characteristics of the house itself. Samples are usually chosen to be random, so investigating a given geographical area means that the individual observations (i.e. house prices) are not random, because what affects one is likely to be affecting all. The model used is based upon a hedonic pricing model developed by Anselin.[25]

The technical details of the model are described in the box below:

[25] Spatial Econometrics: Methods and Models, Anselin, L., (1988). Boston: Kluwer Academic.

Spatial lag model

$y = (I - \rho W_y)^{-1} X\beta + (I - \rho W_y)^{-1} \varepsilon$

where: ***26***

- *y* is an *n* x1 vector of observations on the dependent variable (house prices or log of house prices)
- X is an *n* x *k* matrix of observations of k explanatory variables which include housing structural attributes, neighbourhood characteristics, and sports facility related variables,
- β is a *k* x 1 vector of coefficients to be estimated, and ε is a random error term.
- ρ is the spatial autoregressive parameter
- W_y is an *n* x *n* row-standardised spatial weights matrix that represents the neighbour structure in the data.

The spatial lag term W*y* links each observation of the dependent variable to all other observations and can be thought of as a weighted average of neighbouring values.[27] This is designed to take account of reaction (neighbourhood characteristics that affect all house prices) and interactions (effects of specific adjoining buildings) effects that have been highlighted as key issues using spatial data in econometric modelling.

This weighting (W in the model) of the observations means that the spatial interactions are captured, and can be undertaken by two main methods. The first, known as contiguity spatial weighting, is based on shared boundaries i.e. houses are adjacent in some way, and the second is based on distance between properties. Both of these approaches were investigated, their feasibility was due to the closeness of properties in the urban setting of Columbus, four types of spatial weights were used: rook, second-order rook, queen and distance-based.[28]

The authors estimate a log-log model[29] of the above equation, using a queen weights matrix. The parameters of the log-log spatial lag model were estimated using both the maximum likelihood (ML) and a spatial two-stage least squares robust estimator (S-2SLS Robust). Results using the Ordinary Least Squares (OLS) method are displayed for comparison in the text.

[27] Feng and Humphreys, 2008. IASE/NAASE Working Paper Series, No. 08-12.
[28] Rook contiguity is the existence of common boundaries, Queen contiguity is both common boundaries and common vertices).
[29] A log-log regression model is one where logarithms are taken of both the independent and dependent variables in order to produce a linear relationship.

The variables used in the model are described below.

Figure 10: Variable descriptions

Table 1: Variable Descriptions and Summary Statistics

Variable	Definition	Mean	Std. Dev.
Hsvl	House transaction amount, 2000 dollars	126780	87389
Onestory	Dummy for one-story house	0.47	0.5
Brick	Dummy for brick house	0.44	0.5
Finbase	Dummy for finished basement	0.09	0.28
Garage	Dummy for garage	0.51	0.5
Air	Dummy for air conditioning	0.72	0.45
Fire	Dummy for fireplace	0.48	0.6
Bedrooms	Count of bedrooms	3.05	0.69
Fullbath	Count of full bathrooms	1.43	0.57
Partbath	Count of partial bathrooms	0.46	0.53
Agehouse	Age of house	41.59	30.72
Lotsize	Square feet of lot	9338	13877
Pool	Dummy if house has a pool	0.01	0.1
prtax	Property tax rate by school district, 1998	33.58	3.05
sdrating	School district rating (5=excellent)	2.22	1.52
dpld	Disposal to land on site by census block group, lbs.	1840	35833
pm10	Particulate matter, diameter <10 micrometers, 1999	0.28	2.4
pbk	% of population in block group black, non-hispanic	19.58	24.93
phs	% of persons in block group with HS diploma	28.64	12.67
pba	% of persons in block group with college degree	19.24	13.2
mhe	Median household income in block group	47693	19507
offe	Number of criminal offenses per 1000 residents, 1996	112.61	66.27
DNHL	Distance between each house and Nationwide Arena	5.59	2.42
DMLS	Distance between each house and Crew Stadium	5.49	2.78
DIV1	Dummy for houses within 3 miles of Ohio Stadium	0.16	0.37
DI	Distance from each house and nearest highway interchange	1.28	0.86
Retail	Number of retail trade establishments in ZIP Code	125.64	68.57
Finance	Number of finance/insurance establishments in ZIP Code	51.34	38.97
Food	Number of accommodation/food establishments in ZIP Code	66.55	35.42
Service	Number of services establishments in ZIP Code	77.18	31.08

Source: Feng and Humphreys (2008)

In considering the variables included in the model (Figure 10), it is worth noting that there is no direct equivalent in the UK for the US property tax. The closest would probably be council tax.

Both housing areas studied were near to a third stadium, the Ohio Stadium, which was controlled for using a dummy variable for houses within 3 miles of it to ensure that effects on house prices by this stadium did not affect the model's estimates. As with the two stadia studied, only distance to this additional stadium is modelled. Characteristics of the stadia themselves are not modelled (seating capacity, visitor numbers etc.). Transportation accessibility was also controlled for using data on distance to the Central Business District (CBD) and to the nearest 'highway interchange'; as was proximity to commercial property.

GIS software was used based on data from the 2000 Census to calculate the distance from the centre of each Census Block[30] to both sports facilities studied. The property data used was transactions data for the year 2000. This data set contained 9,504 housing units with values of above $30,000[31] and included detailed characteristics on the properties sold (see Figure 11 for the house characteristics used in the model). This data set also contained details on neighbourhood characteristics such as school quality, environmental quality and crime data which were matched with School District, Census Block Group and Police District data respectively.

[30] The Census divides each US city into Census Blocks, and each Census Block into Census Block Groups containing about 250 housing units.
[31] This baseline was used to remove transactions involving non-habitable dwellings.

The model estimation results are shown in Figure 11 below.

Figure 11: Model estimation results

Table 3: Model Estimation Results

	OLS		ML		S2SLS	
Variable	Parameter	SE	Parameter	SE	Parameter	SE
Spatial Lag			0.496**	0.011	0.519**	0.020
Distance to Nationwide	-0.135**	0.011	-0.096**	0.010	-0.084**	0.011
Distance to Crew Stadium	-.383	0.700	-0.013*	0.006	-0.011**	0.006
One Story	-0.042**	0.007	-0.043**	0.006	-0.041**	0.007
Brick	0.053**	0.007	0.033**	0.006	0.031**	0.006
Basement	-0.017	0.011	-0.011	0.010	-0.010	0.007
Garage	0.034**	0.009	0.008	0.008	0.014	0.008
Air Conditioning	0.109**	0.008	0.086**	0.007	0.080**	0.008
Fireplace	0.049**	0.006	0.041**	0.005	0.036**	0.006
# of Bedrooms	0.031**	0.005	0.037**	0.005	0.036**	0.006
# of Full Baths	0.229**	0.007	0.158**	0.006	0.150**	0.008
# of Half Baths	0.125**	0.007	0.086**	0.006	0.082**	0.007
Age	-0.001**	0.000	-0.001**	1.56E-04	-0.001**	1.89E-04
Lot Size	3.06E-06**	2.25E-07	2.70E-06**	1.97E-07	2.48E-06**	5.15E-07
Pool	0.076**	0.031	0.071**	0.027	0.069	0.038
Property Tax	0.001	0.001	0.002*	0.001	0.002*	0.001
School Rating	0.016**	0.003	0.010**	0.003	0.009**	0.003
Disposal	-1.63E-06**	8.49E-08	-8.70E-07**	0.00E+00	-1.36E-07**	0.000
Particulates	0.002	0.001	0.001	0.001	0.001	0.001
% Black	-0.002**	0.000	-0.001**	1.37E-04	-0.001**	1.52E-04
% HS Diploma	-0.001**	0.001	-2.67E-04	4.72E-04	-4.02E-04	4.88E-04
% College Graduates	0.013**	0.001	0.006**	0.001	0.006**	0.001
Median Household Income	3.48E-06**	2.53E-07	1.01E-06**	2.28E-07	1.06E-06**	2.75E-07
# Crimes per 1000	-1.16E-04*	5.17E-05	-4.80E-05	4.53E-05	-8.86E-05*	4.00E-05
Near Ohio Stadium	0.041**	0.013	0.023*	0.011	0.027*	0.012
Distance to Interstate	0.039**	0.004	0.017**	0.004	0.015**	0.004
# Retail Establishments	4.86E-04**	1.09E-04	3.34E-04**	0.000	3.68E-04**	9.04E-05
# Finance Establishments	-5.91E-04**	1.57E-04	-0.001**	1.38E-04	-0.001**	1.33E-04
# Food Establishments	-9.84E-04**	2.35E-04	-0.001**	2.06E-04	-0.001**	2.19E-04
# Service Establishments	9.42E-04**	2.11E-04	0.001**	1.85E-04	0.001**	1.89E-04
Constant	10.720**	0.062	5.292**	0.129	5.039**	0.229
R^2	0.707		0.775		0.778	

** significant at 0.01, * significant at 0.05.

Source: Feng and Humphreys (2008)

The results show that a 1% decrease in distance from the Nationwide Arena is associated with a 0.175% increase in the price (in dollars) of the average house. The relationship was found to be stronger in the case of the Nationwide Arena, perhaps due to the difficulties in separating the effects of its own location within one of the main areas of Columbus identified as a Central Business District (CBD) – residential property values were therefore considered to be biased upwards to due their proximity to both the Arena, and the CBD. However, this was not thought to affect the general validity of the results.

3.5.2 Viability of approach for C&S impact assessment in the UK

The spatial lag approach allows spatial effects to be controlled for in a regression analysis. Adopting this approach to investigate the impact on property prices of C&S investments would require transactions data on properties surrounding the C&S facility. However, obtaining spatial data in the UK for a C&S impact assessment may present a barrier to this methodology's use, as discussed below in section 3.5.2.1.

Although in this study , two sports stadia were used, the modelling approach could be applied to assess the impact on property prices of proximity to a theatre or other cultural or sporting facility. A potential issue might be whether, as this work assessed large, professional sports facilities, there might be a scale factor at which a facility is too small to impact on house prices.

As the study is only examining the effects of a small number of stadia there is no assessment of how variations in stadia type (the stadia function, its scale, financing or design), variations in the quality of the regeneration projects or other external factors such as taking account of

the wider economy or any selection issues might affect results. Only by substantially increasing the sample size could factors like the scale of the stadia be investigated i.e. whether a larger stadium (by area, seating capacity etc.) has a greater impact on house prices.

3.5.2.1 Availability of comparable data in the UK

The study used transactional data for the year 2000 in Columbus, Ohio. The dataset contains observations on 9,504 single-family housing units which were transacted in the year 2000."[32] Only transactions with a value above $30,000 were used. "The dataset includes detailed housing characteristics such as lot size, building square footage, number of stories, number of bedrooms, number of bathrooms, number of fireplaces, central air conditioning, and other variables. It also contains variables capturing neighbourhood [sic] characteristics such as school quality, environmental quality, and crime data which are matched with School District, Census Block Group, and Police District data, respectively."[33]

The use of GIS to map the spatial data is central to this study and its methodology. In theory, cultural and sporting project data could therefore also be mapped in this way – it would certainly be straightforward to map the position of a specific cultural or sporting facility. However, the extent to which GIS could be used in practice is difficult to assess due to the lack of comparable data sources covering other variables required, in the UK.

Data on the value of properties (sold house prices) local to the facility – is available in the UK. Transactions data are available on individual house sales; however it is not possible to gain *access* to a single source which contains both transaction values and detailed housing characteristics. A source which does contain data on both these factors is the Regulated Mortgage Survey, which contains details on the value of mortgages provided and captures the housing characteristics for the property bought. However, this data source is not publicly available and its commercial availability would require further investigation.

The transactional data the study used is disaggregated down to postcode (Zip code) data, and each property in the dataset has been matched to the School District it is in, the local crime rate and environmental quality. Some of the wider socio-economic data on crime and environmental quality does not go down to that level of detail in the UK, for example, 'Notifiable Offences' data produced by the Home Office in the UK is only available to local authority, which may be too wide an area to record very local impact on house prices. Similarly, other variables in this study could not be replicated in the UK to a sufficient level of detail, such as '% of persons in block group with college degree'.

[32] Feng and Humphreys, 2008
[33] Feng and Humphreys, 2008.

Table 7 below displays the data used in the study and possible sources available in the UK for replicating the approach.

Table 7: Data used in ' Assessing the economic impact of sports facilities on residential property values'

Data Type	Source in study	UK Equivalent
House sale transaction data: data on the characteristics of houses sold i.e. bedroom number, bathroom number, stories etc.	Does not specify, except for it being data for year 2000.	Land use change stats House price index Rental Data/Comparison UK house prices Dwelling Stock (DCLG) Regulated Mortgage Survey (Survey of Mortgage Lenders prior to 2005) However there is no data on characteristics, although the RMS does provide this but is not accessible according to our investigation.
Data on commercial properties	County Business Patterns (US)	Land use change stats VOA data
Census Block Group	U.S. Census 2000	UK Census 2001
Demographic – high school and college diplomas		GCSE and further education results – Department for Education statistics.
School quality	Not specified	Ofsted Reports, DCSF data.
Environmental quality	"	DEFRA Environmental Statistics National Atmospheric Emissions Inventory
Crime data	"	Local Crime Mapping, although there are concerns about the methodology used here.
School district	"	N/A
Police district data	"	Local Crime statistics British Crime Survey – although geographic areas are likely to be too large

3.5.3 Conclusions regarding case study as a candidate for C&S impact assessment

Feng and Humphreys use a spatial lag hedonic regression model to analyse the impact upon house prices of the distance to two local sports stadia in Columbus, Ohio. They found that as distance to the stadia decreased, house prices increased. This relationship could be interpreted as proxying the value that people place on being closer to the stadia.

In undertaking this kind of analysis in the UK a potential issue is that no equivalent data sources exist to model the characteristics of sold houses alongside sale price, for example: number of bedrooms, bathrooms etc. As might be expected, and as found by Feng and Humphreys, house characteristics such as number of bedrooms or bathrooms are a significant determinant of house prices. Although, it is possible to obtain sold property prices from Land Registry data, the Regulated Mortgage Survey, which contains characteristics of properties for which mortgages are obtained, is not publicly available. Licensing costs and terms require further investigation. It is also not available before 2005; prior to this date, the Survey of Mortgage Lending was in operation, which had much lower coverage. The two collection methodologies mean that data would not be comparable before and after 2005.

It may be possible to address issues of potential bias if housing stock in the local area is homogeneous or if there is sufficiently rich panel data on house price sales before and after a cultural and sporting investment so it is possible to compare the price of the same the house sold before and after the intervention i.e. each house can act as its own control.

The use of a spatial lag regression analysis helps to correct for spatial autocorrelation when using data with a spatial element in a regression model. In this instance it is allowing for the influence of house prices in the immediate area influencing neighbouring properties, but more

generally it would be useful in assessing other impacts of a cultural and sporting investment on the surrounding area.
Spatial data could also be used to provide terms that measure distance from a facility for example proximity to shops when considering house prices or as in Feng & Humphreys model distance from a house to the facilities. Anything that can be placed on a map lends itself to such a calculation for example Points of Interest data, or business list data.
The sample used (two stadia) is naturally too small to address how variations in different kinds of C&S investment projects and external factors (e.g. the effect of the wider economy) or any selection issues might affect outcomes. Only by significantly increasing the sample size could factors like the comparative scale of the facility be investigated i.e. whether a larger stadium (by area, seating capacity etc.) has a greater impact on house prices.

The study's approach could in principle be used to assess the impact of proximity to a theatre or other cultural or sporting project on house prices. An issue might therefore be whether, since this work assessed large, professional sports facilities, there is a scale factor at which a C&S facility is too small to impact on house prices.

It should be noted that as this study was being finalised a working paper by Ahlfeldt & Kavetsos (2010) was published which undertook a spatial panel analysis of the impact of Wembley and Arsenal stadium on house prices. The study found that house prices increased as houses got closer to the stadium. [34]

3.6 Cultural Clusters

Full Title: Stern M. & Seifert S., "Cultural Clusters: The Implications of Cultural Assets Agglomeration for Neighbourhood Revitalization", 2010

Type of Study: Spatial-lag regression
Peer Review Status: Yes – published in academic journal.

Introduction: This study is based on 15 years of research on cultural clusters with the Social Impact of the Arts Project (SIAP) at the University of Pennsylvania. The research developed indices of cultural assets[35] per capita for different socio-economic groups to investigate the relationship between clustering of cultural assets, and income, diversity and housing markets. This study is concerned with cultural clusters (organically developed groupings of cultural activity in a particular area), rather than cultural districts specifically designed to stimulate the tourism and hospitality industries.

Summary of results: The research finds that the density of an area's cultural assets is associated with an increase in the median sale price of houses. It also found that diversity, income and distance from city centre were consistent predictors of the kinds of neighbourhoods in which cultural assets are located. However, the research is careful not to draw explicit conclusions regarding causality because the data used for the cultural asset measures is not from the same period as the house price change data (data for the assets comes from two time points 1997 and 2004, whereas the change in house prices was measured between 2001 and 2006). A spatial-lag regression was used to model house price change, which explained 34% of the variance in the increase in sale prices.

Overview of methodology:
Stern and Seifert defined a cultural cluster 'as a geographical area in which a variety of cultural assets are located in proximity', and document it by four types of cultural asset and their geographic concentration in metropolitan Philadelphia.[36] These were compared with

[34] Ahlfeldt G, Kavetsos G (2010), 'Form or Function? The Impact of New Football Stadia on Property Prices in London', University Library of Munich, Germany; working paper series.
[35] These assets were cultural participants, resident artists, non-profit cultural organisations and commercial cultural firms.
[36] In the context of this feasibility study, areas that have seen a major investment may be more akin to cultural districts than the more general concept of cultural clusters. Stern and Seifert note that most of the literature

other socio-economic indicators. Specific analysis techniques included Analysis of Variance (ANOVA) and spatial-lag regression.

3.6.1 Case study methodology and use of data

Unlike the other studies considered in this section of the report, Stern and Seifert are concerned with the impact of groupings or clusters of cultural producers (including local residents, artists, cultural workers and entrepreneurs) that have grown organically in an area, rather than that of single facilities or the development of a deliberate cultural district.

The authors draw on a range of evidence on the ability of such clusters to engender community involvement and civic engagement and the value of this to neighbourhood regeneration. Their approach is designed to integrate with information commonly used by planners, the conclusions and discussion being focused on how planners might encourage and support cultural clusters. The study notes that '*the cultural cluster perspective requires a greater understanding of the changing character of cultural production and the complex and active interactions between producers and participants that characterize the contemporary arts scene. Just as importantly, where a region can support only so many cultural districts, cultural clusters have the potential to generate widespread neighbourhood-centred economic and social benefits*'.

Demographic change and characteristics are also considered both as drivers and outcomes from cultural clustering. The index integral to this work includes numbers of commercial and non-profit cultural providers (i.e. firms/organisations), but these are as drivers of change as opposed to outcomes.

The research created a series of measures of cultural intensity assessing combinations of the following variables:

1. Participation rates by block= number of cultural participants/Number of residents.
2. Non-profit cultural providers = number of such organisations within 0.5 miles of the block.
3. Commercial cultural providers = number of such organisations within 0.5 miles of the block.
4. Resident Artists = number of artists within 0.5 miles of the block.

High levels of correlation are found between the indicators above and factor analysis was conducted to create a single Cultural Asset Index (CAI) using the four indicators. The CAI was used to assess the existence of cultural clusters defined as a geographical area in which a variety of cultural assets are located in proximity.

These measures were then linked with census and other data at block level to examine how these variables, including the CAI, changed across various socio-economic indicators including:

- The Market Value Analysis (MVA), which is used to measure change in neighbourhood housing markets. This is a set of ordinal categories to describe housing markets (with the lowest group "reclamation" describing neighbourhoods that face sizable hurdles to revitalisation to the highest group "regional choice" representing the most desirable neighbourhoods) developed using cluster analysis techniques to identify natural groupings, based on house price change and other indicators.
- Economic diversity. An economically diverse neighbourhood is defined as: one where there are 'higher than average rates of *both* poverty and professional workers'.
- Ethnic diversity. An ethically diverse neighbourhood is one where 'no more than 80 percent of the residents are members of a single ethnic group'.
- Per capita income.

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distinguishes between clusters that improve the flow of information and pool specialist services, and districts or quarters that are consumption-orientated entertainment destinations, and argue that their findings challenge the use of this distinction.

- Poverty decline and population increase.

The study used a mixture of public sector statistics, information gathered through desk research, and data generated in other programmes (the sources of this information are not given in the paper). For participation rates secondary data is used, but in the form of membership lists and class registrations and similar sources.

The analysis is presented in three ways:

1. Cross tabulations showing the value of the cultural intensity measures broken down against other factors e.g. by levels of diversity. The changes in levels of cultural activity were also visualised graphically. For example, Figure 12 below shows changes in levels of cultural activity in Philadelphia based on the CAI measure between between 1997 and 2004.

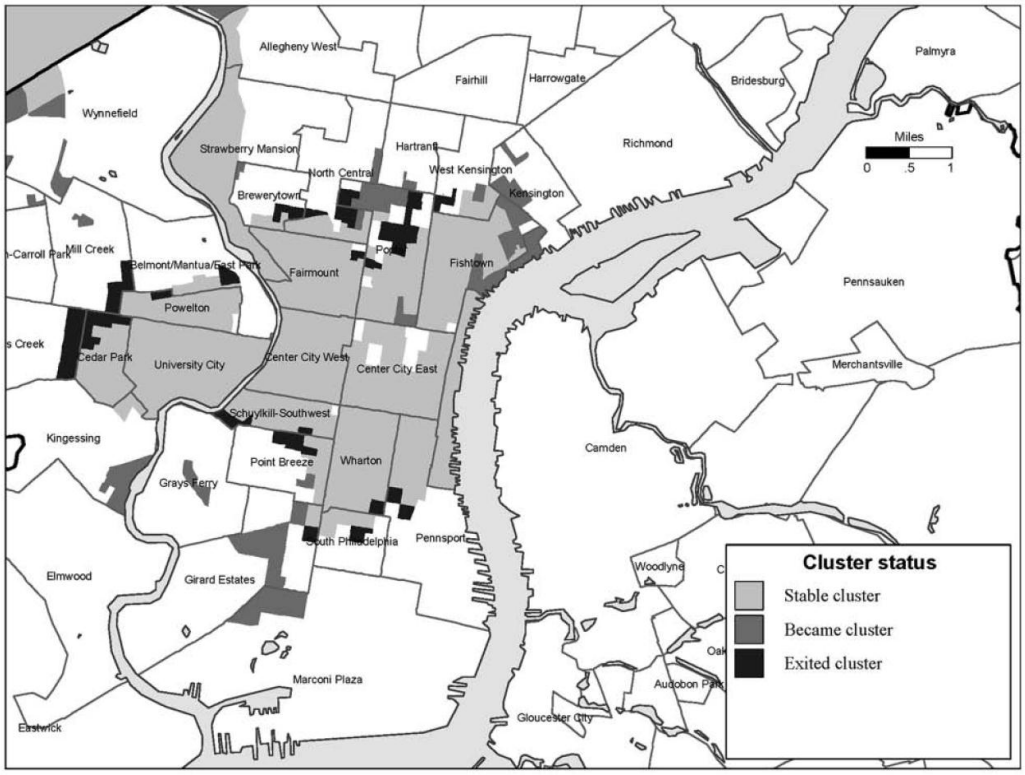
2. ANOVA analysis of the relationship between the CAI and the change in the MVA indicator, as well as between the CAI and the increase in median house prices (using the change in the average figure for 2001 to 2003 by the change in the average for 2004 to 2006), which showed measures of association of 0.56 and 0.5 respectively.

3. A spatial-lag regression where the dependent variable was the increase in the median residential sale price. The model included dummy variables for whether the property was in the one of the top deciles of the CAI, the percentage of residents without bachelor degrees, distance from the city centre, and a measure of diversity (a dummy variable to indicate whether the population was over 80% non-Hispanic white), as well as a spatial lag term for the increase in median sale price. The only coefficient in the resulting model that was not statistically significant was the spatial lag term. The model explained 34% of the variance in the increase in sale price.

The analysis suggests a virtuous circle of cultural clustering, declines in poverty and population increase. This study has a greater focus on the conditions that support higher levels of cultural activity than the others examined. Although in some areas the direction of causality is unclear e.g. higher income areas and nicer areas may better support higher participation and commercial cultural activity, but high levels of cultural activity seem to strengthen and attract higher income populations and improve the area.

The authors do not consider that their research provides compelling evidence for the direct economic impact of cultural assets agglomerations, but believe that it is related to the ‘impact of cultural production and participation on other neighbourhood level social processes’ e.g. in improving community involvement and interaction and reducing negative behaviour. They conclude that their evidence is fragmentary, but suggests a number of hypotheses for future research. Many of these revolve around community engagement, social cohesion and valuing the externalities of cultural assets. It is suggested that some of these aspects of impact may manifest themselves in terms of economic performance, education, health and security.

Figure 12: Change in cultural clusters in Philadelphia between 1997 and 2004



Source: Stern & Seifert, 2010.

3.6.2 Viability of approach for C&S impact assessment in the UK

By assigning a cultural asset value to all areas, the research assesses whether cultural activities affect the local socio-economic environment. This addresses the issue of other cultural activities impacting on outcome, although a single facility is then not distinguishable within the study areas. Rather it is the collective weight of different types of cultural activity that is considered, for which a particular investment may or may not be a significant trigger. The study does not assess the impact of a particular facility; however it may be more practical to consider areas in this way since it has the potential to be used with a wider area, for which more robust information may be available.

This study is focused on organically grown clusters as opposed to organised cultural districts, the latter would more closely describe most, if not all, the facilities considered in this report. The principles and methods applied by Stern and Seifert could be adapted (so that the index includes some measure of investment in large projects for example) to encompass different situations. Although the authors are less supportive of such assessments as they consider that the real value from cultural activity stems from this organic locally focused growth, rather than the development of major venues to attract tourists.

While the study does examine the likelihood of a causal relationship between property values and culture, the only other monetary value considered is income, although not explicitly stated the implication is that higher income areas attract culture rather than, culture causes higher income. The authors state that cultural participation and commercial cultural firms are highly concentrated in areas of high socioeconomic, although poorer areas tended to have similar/or higher levels of non-profit cultural organisations and higher levels of artists.

Most of the data presented looks at two time points. However, some of the time periods compared are not consistent. For example: the Cultural Asset Indicators for 1997 and 2004 is compared with income quintiles for 1999; the 1997 non-profit cultural providers figures are compared against 1980-1990, and then 1990 to 2000 growth, rates. Stern and Seifert give this misalignment as a reason why they are reluctant to draw explicit conclusions about causality.

3.6.2.1 Availability of comparable data in the UK

The data used is a mixture of public sector statistics, information gathered through desk research, and data generated in other programmes (the sources of this information is not given in the paper). For participation rates secondary data is used, but in the form of membership lists and class registrations and similar sources. These are secondary in that they exist, but were this study to be attempted in the UK considerable work is likely to be needed to collect, collate and de-duplicate them. For example, the authors conducted a significant amount of desk research to identify non-profit cultural providers. Experience of identifying voluntary arts organisations indicates this is a substantial task. Subject to data availability, the techniques used by Stern and Seifert should be transferable. If data is not available, alternative measures of cultural intensity may be constructed. There is no reason why the relationship between density of culture and other variables such as health indicators or crime levels should not be considered in a similar way.

The implications of using a wide range of data sources are that replicating it in the UK becomes problematic. This is best evidenced by the regional and cultural participation rate data which Stern and Seifert used. Collation of membership lists, registrations, buying mailing lists in the UK would require a significant amount of time and resources. Using secondary information such as the Taking Part and Active People Surveys and ILR data would provide some insight into regional cultural and participation rates. However, this would not provide as much resolution as that of Stern and Seifert. Taking Part (which covers both cultural and sporting participation) is not designed to produce local area statistics. Usage data, e.g. Public Libraries, CultureMap venues (London) provide some of the few sources attributable to individual venues.

The study does not provide exact details on data used in the housing market value analysis (MVA). Land Registry Valuation Office and other UK housing datasets would be able to provide data in a domestic context (See discussions of UK housing data in 4.5.2.1). For non-profit cultural providers and resident artist data, which do not have UK equivalents, it is possible that desk research or selective resources may provide the same data to supplement Point of Interest (POI) or equivalent location data. The difficulty being that this would require more time and effort to compile. To counter this, a standard procedure could be set out for users to identify Non-profit cultural providers or resident artists present in a locality.

There are issues with the most appropriate sources of demographic data (ACORN and MOSAIC), in that it is not always clear that samples are large enough at a very local level. However it is implied in marketing literature that sample sizes should be sufficient[37].

[37] See page 4 of the Acorn User guide available from www.caci.co.uk and page 4 of the Mosaic UK 2009 brochure available from www.experian.co.uk/business-strategies/mosaic-uk-2009.html

Table 8: Summary of Data Sources and Possible Substitutes in the UK

Data Type	Source	Additional information/Recommendation	UK Equivalent
Commercial Cultural Firms	Digital database of local businesses		Commercial directory data - The main national ones are TCR/D&B, Experian, Market Location (although we understand that this source does not have a textual description of activity only an SIC).
Housing Market Value	The Reinvestment Fund – a community development institution.		Details on exactly how the typology used was developed are not provided in the paper, therefore it is impossible to judge whether the necessary information is readily available in the UK. See section 3.6.1 for a description of the Market Value Analysis groups used in this study.
Ethnic Diversity	Census	Regular information would be required to allow indicators to be calculated for appropriate timeframes.	Census/Neighbourhood statistics/APS – although the latter may not all be available/robust at sufficiently low geographic levels CACI ACORN and Experian MOSAIC are potential alternative sources but there may still be issues of robustness of local trend.
Household Diversity	Census	ditto	Census/Neighbourhood statistics/ APS - although these may not all be available/robust at sufficiently low geographic levels. CACI ACORN and Experian MOSAIC (LSOA level) are potential alternative sources but there may still be issues of robustness of local trend.
Income diversity	Census	ditto	Census/Neighbourhood statistics/APS/ASHE - although these may not all be available/robust at sufficiently low geographic levels. EXPERIAN median household income (LSOA) and CACI ACORN are potential alternative sources but there may still be issues of robustness of local trend.
Regional cultural participation rates	Combination of membership lists, class registrations, ticket buying, mailing lists – of 75 non-profit cultural providers.		Individual Learner Record data should indicate class registrations for formal courses. Membership lists, ticket purchase and mailing lists are by definition the property of the organisation with the members or that is selling the tickets. There may be issues around data protection (since the information used included home address), or simply an unwillingness to divulge information which restrict access. There would also be a significant task to collate such information were it provided. Taking Part Survey: The National Survey of Culture, Leisure and Sport from BMRB and DCMS would cover this to an extent, but not at an appropriate level of geography.
Non-profit cultural providers	Inland Revenue list of tax-exempt organisations; grant applications of arts funders; local newspapers; web searches.		Similar sources exist in the UK. The Arts Council and other NDPB RFO lists are a clear place to start. However this would be a significant task. Websites which list charities and community organisations may help identify some of these.
Resident Artists	Pew Fellowships in the Arts - database of arts developed over the last 10 years.		Possible sources for the UK are currently unclear.

3.6.3 Conclusions regarding case study as a candidate for C&S impact assessment

It would be interesting to develop an indicator along similar lines to the Cultural Asset Index (CAI) for business mix and understand the relationship between cultural assets and business mix. Similar indices could be constructed for non-C&S regeneration in an area, and external factors accounted for. Such indices could be used to undertake a regression analysis as to how social and economic trends are affected by levels of cultural activity.

Of the four variables used by this study to measure cultural density, the 'Artists' measure is the only one for which it has not been possible to identify any consistent equivalent source in the UK. However, although information exists on participation data at a local level it would be challenging to construct into a consistent database and the resulting information would probably be subject to selection/availability issues. It may, therefore be worth considering a version of the index that simplifies this requirement or substitutes other measures such as cultural employment (including considering cultural employment as a second job, although this may only be available at higher levels of geography from the Annual Population Survey) or provision/uptake of cultural education (sources such as the Individual Learner Record database provide high levels of spatial detail on post-16 education and training).

Commercial datasets, such as TBR's business database (TCR) and Experian can provide information on numbers of commercial and non-profit cultural providers, as well as levels of employment in these organisations. Whilst these sources may not be comprehensive they can be expected to be sufficient to understand differences in the density of provision across the country as their data is collected on a consistent basis. Public bodies supporting the sector will also have information on such organisations (for example the RFO data held by the Arts Council).

3.7 The Growth effects of sport franchises, stadia and arenas

Full Title: Coates D. & Humphreys R., "The growth effects of sport franchises, stadia and arenas", 1999.

Type of Study: Regression-based panel data study and event study analysis

Peer Review Status: Yes – published in academic journal.

Introduction: Coates and Humphreys (1998) investigated the linkage between sports (American football, basketball and baseball) franchises[38] and venues and income in 37 urban areas in the United States between 1969 and 1994. The study looks, in particular, at the relationship between the level and growth of real per capita income in an urban area and that area's sporting environment.

Overview of methodology:
The study uses secondary datasets (largely census based) to evaluate the income level and growth effects of franchises or stadia locating to or being established in an area. The sample used for this study was a panel of 37 Standard Metropolitan Statistical Area (SMSA)[39], for which the Coates and Humphreys gathered data on the sports and business environment over 25 years. Coates and Humphreys undertook analysis using two models, a panel data model and an event study methodology for areas that have had franchises or stadia locating in them.

[38] Franchises in the American sporting vernacular refer to teams that often have a geographical monopoly, are run as commercial entities and are liable to move.
[39] A standard metropolitan statistical area is not used anymore. More information available: http://www.census.gov/population/www/metroareas/aboutmetro.html

The authors' aim was to answer the following two questions:

1. Does the sports environment affect the level of real per capita personal income in an SMSA?
2. Does it alter the growth rate of real income per capita?

Summary of results: In evaluating the benefits attributed to new stadia or franchise or both, Coates and Humphreys found that the sports environment impacts negatively on real income per capita. This is in contrast to other research, which has found that expenditure on sporting projects has a positive impact on the economy of the surrounding metropolitan area. They also found no statistically significant impact on the growth rate of real income per capita.

Coates and Humphreys consider that the negative effects of stadia or sports teams being established in an urban area on income can be rationalised through three factors:

- Compensating differential; whereby residents derive non-commercial benefits from the presence of a franchise or stadia and therefore are willing to accept lower wages,
- Substitution in public spending; whereby funds are used to subsidise franchises at the expense of other expenditure programmes which may further economic growth.
- Substitution of consumer spending away from high local multipliers, like bowling alleys or pool halls to stadium events that is less intertwined with the local economy.

3.7.1 Case study methodology and use of data

In attempting to establish the effects of an intervention on the economy of a geographical unit, the study provides understanding of how direct economic impacts can be assessed[40]. The study focused upon whether or not an SMSA experienced change in the number of franchises or the number of stadia. This enabled the relationship between a metropolitan sporting environment and economy to be understood. The loss or arrival of sports teams, or the construction or opening of stadia, allows the marginal impacts of these effects on the local economy to be assessed.

The authors consider that the majority of previous economic impact studies in this area are subject to methodological limitations. In an attempt to address this, Coates and Humphreys use an empirical framework to account for the entry and departure of professional sports franchises, the construction of stadia and other sporting factors over this time period.

The study employs a regression methodology and utilises dummy variables representing relocations or the establishment of a sporting facility (events) for baseball, American football and basketball. For example: first basketball franchise arrival, second basketball franchise arrival, basketball arena constructed – over the past 10 years, any basketball franchise arrived over the past 10 years, any basketball franchise left over the past 10 years, capacity of basketball stadium.

Coates and Humphreys examine the use of multipliers in assessing the impacts of interventions. It is noted that multipliers can be used to indicate indirect spending and demonstrate the economic benefits of a project. However, the authors consider that multipliers often overstate the contributions of sporting structures on a local economy and that they may be influenced by many factors including the actual intervention or policy it is being used to evaluate.

Coates and Humphreys use two approaches in their analysis, which are described in the boxes below. A panel data analysis and event study approach. These are covered in the two boxes below.

[40] Coates and Humphreys (1998).

1) Panel data analysis

A panel data model was used to investigate this relationship. In creating this model, Coates and Humphreys identify that it should include:

- Level of real per capita income in a metropolitan area in a given year
- Variables describing the economic and business climate in that area during the year
- Variables which capture the role of stadia and franchises in the determination of economic activity

This is expressed in the form:

1: The empirical model

$$y_{it} = \beta x_{it} + \gamma z_{it} + \mu_{it}$$

Where:

- *y* is the level of real per capita income in a metropolitan area in a given year,
- *x* is a vector of variables describing the economic and business climate in that area during that year,
- *z* is a vector of variables capturing the role of stadia and franchises in the determination of economic activity and μ is the disturbance (or 'error' term).
- β and γ are vectors of parameters to be estimated.

If the γ's are statistically different from zero, then the sports environment does influence the level of real per capita income. The subscripts *and t* represent each SMSA and time period, respectively.

The disturbance term takes the form of:

$$\mu_{it} = e_{it} + v_i + \mu_t$$

Where:

- *e* is a random shock in SMSA *i* at time *t* which is uncorrelated between observations and over time,
- v_i is the disturbance specific to SMSA *i* which persists throughout the sample period and u_t is a time *t* specific disturbance which affects all areas in the same way. This has the function of removing the effect of national economic events in a given year and assists in demonstrating a SMSA-specific impact.

The regression was estimated under both fixed and random effect specifications.

2) Event-study methodology

The event study is useful for considering the impact of changes in law or regulations. An event-study methodology is used to allow an economic return to be explained by exogenous events or announcements. As a result the "statistical significance of one of these dummy variables indicates that this event explains some of the deviation from the average"[41].

The event study model is expressed in the form:

$$g_{it} = \alpha + \beta \bar{g}_t + \sum_{k=1}^{3} \gamma_k D_{kit} + \varepsilon_{it}$$

Where:

- g_{it} is the level of real per capita income in jurisdiction *i* at time *t*,
- $\bar{g}_t$ g_t is the average level of per capita income at time *t*,
- D_{kit} is a dummy variable indicating the occurrence of an event type *k* in the area *i* at time *t*,
- α, β and γ are parameters to be estimated and ε is a random error.

In using the average level of income across all cities, the relationship between real level of per capita income and the average level of real per capita income can be determined. The average level of real per capita income is used a control because the use of other cities for this function had distinct disadvantages which could bias the results, this is due to the differing socioeconomic characteristics, demographics etc.

Dummy variables are used to capture the variations in the sports environments in each of the study areas. These dummy variables indicate the presence of a number of sports franchises, entries, exits and construction (in the 10 year period following the event). A regression model is used to estimate the "deviation of the return on the chosen stock from the market return"[42] which is influenced by events or announcements.

[41] Coates and Humphreys (1998)
[42] Coates and Humphreys (1998)

From the data between 1969 and 1994, Coates and Humphries found that the use of variables and dummy variables helps to support the notion that the sports environment does not impact upon the growth rate real per capita income. The analysis found that sports-led development either has a negligible impact or a negative impact upon the level of income per capita.

3.7.2 Viability of approach for C&S impact assessment in the UK

Within Coates and Humphrey's methodology, it is not explicitly stated which variables were used to control for the economic and business environment, although the study states that it 'controls for factors other than the sports environment that affect current real per capita income in each SMSA' (page 609). The disturbance term in the panel data model is designed to account for specific local and national shocks that might impact within the specific timeframe.

Coates and Humphreys note that cities without professional sports franchises were not considered in their study. In order to draw wider comparisons, comparisons with geographic areas without sports interventions, would provide more detail to the study and show how these areas fared. This would provide an extra layer of data to compare results from and understand if there is any benefit of sports facilities or interventions on a locality.

It is thought that SMSAs as an area of study may be too large to demonstrate effects of franchises or stadia. The effects of any intervention may not always be felt across a city or city-region and it is therefore possible that only the immediate area is affected by an intervention.

3.7.2.1 Availability of comparable data in the UK

To understand the relationship between an area's sports environment and its economy the study exclusively used secondary data. The data largely included economic and demographic data from federal or national government, with sports franchise and stadia data from academic and other sources. Specifically: the income and population data was from the regional economic information system (distributed by the U.S Department of Commerce, Bureau of Economic Analysis) and data on sports franchises and stadia comes from Noll and Zimbalist (1997), Quirk and Fort (1992) and the Information Please Sports Almanac (Houghton Mifflin Co. 1996). The per capita income and population data was derived from the Regional Economic Information System. Franchise entries, exits and stadia construction and openings were also derived from the Noll and Zimbalist (1997), Quirk and Fort (1992) and the Information Please Sports Almanac (Houghton Mifflin Co. 1996).

Table 9 below summarises the main points in finding equivalent data to use in the UK and any additional information that is useful to note in considering how the data may be used in a comparable study.

The study also has results and features, which relate to the unique characteristics of the American sports environment and city composition in America. Replicating this study in the UK would require consideration about how these characteristics might affect the variables and methods used. For example it would be difficult to use the arrival or loss of a sports franchise as a control factor in the study when this American sporting custom does not really occur in the UK.

It is possible that this study could be replicated for sporting stadia or other large scale C&S investments but in order to do so, issues with the identified equivalent data sources in the UK need to be overcome. Census collection in the UK is not regular enough to provide detailed information about income or demographic levels, whilst it would also only show overall changes within a ten year time period, smaller and potentially more indicative changes would not be observed. Mid year population estimates may not be accurate enough to provide dependable data for use.

Table 9: Data sources used in 'The growth effects of sports franchises'

Data Type	Source	Additional Information	UK Equivalent
Sports Franchise and Stadia	Noll and Zimbalist (1997) Quirk and Fort (1992)	The data here is from Academic resources and the UK equivalent data is more definite.	Sources such as Active Places, Cornucopia, and MAGIC could be used to identify the presence of C&S assets. However, other C&S assets may not have one central data source: cinemas, theatres etc. Experian and TCR could be used to identify business using the line of business description and can monitor entry and exit of these businesses. Capacity of the venue might require primary research.
Demographic Data	U.S Department of Commerce, Bureau of Economic Analysis.	Drawing upon census data is problematic in that changes in income and demographics are more recent. As such these sources are not as appropriate as one might imagine especially in comparing levels longitudinally.	UK Census, Neighbourhood Statistics. UK Census, but information is only gathered every 10 years and therefore will not closely track changes in a local area. Estimates might be required, UK mid year population estimates could be used, these are robust to local authority level.
Per capita income	U.S Department of Commerce, Bureau of Economic Analysis.	Income per capita can be a difficult subject to investigate through research. Whilst data sources exist to investigate income, they are not recent alternative sources are not always available at a detailed geographic level.	UK Census, Neighbourhood Statistics. A number of sources have additional data on income including: Households Below Average Income, Gross disposable household income (GDHI) and General Lifestyle Survey (GLF)

The approach could be replicated, since similar data sources exist in the UK. However, there are outstanding questions about such data. For example, it may need to be collected from disparate sources (sports stadia), be based on estimates (demographic data) or exist at a sufficiently detailed spatial level (per capita income). So whilst data exists, there are issues with using broadly comparable data, when the context is not the same and the data is not always available, detailed enough or consistent.

3.7.3 Conclusions regarding case study as a candidate for C&S impact assessment

The regression models used by the study (the panel date and the event study approach) provide a functional tool in which to examine the effect of sporting intervention on income per capita. The study primarily draws upon two data sources (demographic and income per capita) and does not provide scope on the effect of sporting facilities on many of the variables of interest in a culture context (as part of C&S projects) or the wider impact of major investment projects.

Coates and Humphreys have has some success establishing a relationship (albeit in the opposite direction to that expected) between the sports facilities environment and levels of income with both models investigated. Due to the lack of detail in the variables, other than those describing the sporting environment, it is difficult to know whether it would be possible to replicate this work in the UK. It is also possible that the singular nature of the funding approach in the US (the authors note the possible substitution of spending leading to poorer public services) impact in ways that would not be replicated in the UK. In addition, from the discussion above, it is apparent that it would be difficult to replicate this study using the methodology to investigate C&S data sources and key variables (i.e. reliable income data at high spatial detail).

3.8 Additional studies of relevance

3.8.1 Impact of sports arenas in Berlin

Ahlfeldt & Maennig (2008) used a 'difference in difference' approach to examine the impact on land values of two sports arenas - the Max-Schmeling Arena (completed in 1997) and the Velodrom/Swimming Arena (completed in 1999) - with award winning architecture in the Prenzlauer-Berg area of Berlin, which was identified as in need of revitalisation. The impact of the Velodrom on land values was found to be positive and persistent.

The authors divided the Prenzlauer-Berg location into three areas; that containing the Max-Schmeling Arena, that containing the Velodrom and a control area. The analysis concluded that the impact of the Max-Schmeling Arena on land values was less significant than for the Velodrom/Swimming Arena with the key finding being that 'no persistent growth trend after inauguration'. The authors commented on this result with reference to three issues:

1. Prior to the development, the Max-Schmeling study area performed more in line with the control area than the Velodrom area did
2. The Max Schmeling study area already had two sports facilities of national importance, and
3. Parking was limited in this area (due to reduced development once an unsuccessful Olympics bid had been concluded) and this reduced the attractiveness and accessibility of the location.

This study provides an example of a sports stadium impact study that is not located within the US. In addition, the study appears to consider a greater range of control factors than equivalent studies in the US, although the paper is not entirely clear on which factors (e.g. the model detailed in the October 2009 paper controls for environment, location and neighbourhood characteristics). It is therefore not clear that the study attempts to separate out the impact of the arenas from other environmental factors, such as the parks that sit on top of them and are an integral part of the regeneration project. For example, the authors specifically state that "*the results do not allow for a precise separation of effects associated to the original functions of sport facilities and those related to the sophisticated architecture and urban design*" (page 19). One feature of this is the green space that both projects have provided and the awards that they have achieved.

The extent that transferability can occur is clear within Ahlfeldt & Maennig (2009). They suggest that their model cannot be transferred to rural areas because of the different determinants of land value and non-homogeneous nature of land values. This has implications on assessments that may require C&S projects within towns or rural locations to be assessed, or urban areas that have distinctive land value characteristics. Housing in particular is not homogenous. Small cities and small towns in the UK have particular characteristics associated with their value, which make the transfer of a model challenging. A number of studies (Can and Megbolugbe (1997), Ahlfeldt & Maennig (2008), Tu (2005))[43] use a radius of up to 2.4 to 3 km around a property to calculate the spatial lag term, the former two taking the three closest properties. Other studies on open/green space use an even smaller impact area (500m, or overlooking/adjoining streets, Powe et al 1995; CABE 2005). The UK housing market is very much more compact and for most towns this sort of radius

[43] Ahlfeldt, Gabriel M. and Maennig, Wolfgang (2008) Impact of sports arenas on land values: evidence from Berlin. Annals of regional science . ISSN 1432-0592 (Submitted) Can A and I Megbolugbe (1997) Spatial Dependence and House Price Index Construction. J Real Est Fin Econ 14:203-222

Tu CC (2005) How Does a New Sports Stadium Affect Housing Values? The Case of FedEx Field. Land Econ 81:379-395

would encompass the whole town and in some cases the next town too. Realistically the spatial lag variable would need to be calculated using a much smaller area, even a restricted area (particularly in the current climate) may lead to limited samples on which to calculate and may necessitate including prices from very different areas.

3.8.2 Impact of stadium announcements

Dehring, Depken & Ward (2006) examined, using a difference in difference methodology, the impact of announcements concerning the building of a new football stadium for the Dallas Cowboys on house prices. It was initially announced that a new stadium would be built in Dallas City. However, the city itself could not contribute to the cost of the stadium, meaning that the cost would fall to the wider area of Dallas County. This proposal was rejected by Dallas County leading to the plan being rejected. The Dallas Cowboys team then negotiated with Arlington in Texas for the stadium to be built there. The study built two models: one for Dallas and another for Arlington. The analysis was based on data on 42,351 house sales within the Dallas model and 32,061 within the Arlington model.

The study concluded that the initial announcement that the stadium would be built in Dallas City (but paid for by Dallas County) lead to an increase in property prices in Dallas City but a reduction in Dallas County. News of the cancellation of the plan reversed this, i.e. property prices went down in Dallas City and back up in Dallas County. The announcement of the move to Arlington raised prices in that area, but the news of the tax increase to pay for them lowered them again. Then, finally, the ultimate announcement that the project had been approved in Arlington had the effect of raising property prices again. However, the authors conclude that the amenities effect (the perceived benefit of having such a facility in your local area) is not distinguishable from zero. The average family would be paying $2,000 more in taxes to live in Arlington due to the cost of funding the stadium and house prices fell by an average of $1,742.

The authors draw attention to the fact that voters supported the project despite the negative effect on house prices. They note that it would be valuable to revisit the area once the stadium is operational to examine what the impact actually has been.

4. Conclusions

This study has considered the feasibility of assessing, through secondary data, whether cultural and sporting investment have a measurable effect on key economic and social outcomes. The literature on the impact of such investments is primarily qualitative and dependent on primary data. Where economic impact has been assessed this has been mainly through techniques like multiplier analysis where aspects of the impact are assumed rather than empirically derived. The relatively small number of quantitative studies that have used secondary data have therefore been the main focus of this work.

4.1 Potential impacts

Existing research and literature has identified a number of ways in which cultural or sporting investment can create positive impacts on our economy and society. The key potential impacts are shown in
Table 10, which identifies the ways these investments are thought to have impacts and indicators that could be used to analyse this subject to data availability. The Table is used to examine whether such indicators could indeed be analysed, based on the availability of relevant data and the existence of suitable techniques by which to assess whether they have been influenced by investment.

Table 10: Range of impacts

Potential impact	Basis for hypothesis	Possible manifestations
Culture and sport investment increases the value of property in an area	Investment leads to an increase in the attractiveness of an area, and this can lead to demand for housing and premises in that area increasing. This lifts prices.	Increases in property prices, rental values.
Culture and sport investment attracts businesses to an area.	Investment can often lead to a significant uplift in the attractiveness of a location, meaning it can attract new business to that location.	More business moving to/starting up in an area. Change in the business mix.
Culture and sport investment encourages and enables the bringing back into use of redundant buildings	As above, investment that makes an area attractive is more likely to bring in other investment and this may be focused on regenerating buildings or locations which are adjacent to or within other investment areas.	Reduction in empty buildings/ occupancy rates of commercial stock. Reduction in the numbers of empty homes. Changes in land use.
Sport and culture investment creates an environment which is safer	By attracting more people to live and work in an area, as well as to participate in sport or cultural activities, this increases real and perceived security as well as improving the quality and cleanliness of an environment.	Environmental statistics (air quality, species diversity), reduced crime rates
Culture and sport investment improves the businesses performance and productivity within an area	More attractive locations attract growth businesses because they have the capacity to pay high rents. Also, an attractive work location can influence motivation and commitment and can lead to increased worker productivity, lower staff turnover and so on.	Increases in profit, GVA and turnover of business. Increases in wages.

Culture and sport investment improves the health and well being of people in an area.	Sports facilities (and performing arts) provide opportunities for participation, and such participation has positive impacts on mental and physical well being.	Improvements in health indicators, especially those associated with a lack of exercise in the catchment area for sports/cultural facility and/or mental health more generally.
Culture and sport investment encourages personal development and advancement.	Participation influences self-confidence and delivers experiences and new skills which can be implemented in other areas of participants' lives.	Increased attendance at related evening classes. Improvements in transferable skills and employability – reduction in levels and duration of unemployment.

The main challenge for assessing the impact of these investments using secondary data is the availability of the necessary data by which to measure the possible manifestations of impact given above at an appropriate spatial level. Table 11 lists the key variables that could be measured in light of the current understanding of impacts (as shown above). Listed against these variables are possible sources of information that are available at high level of spatial detail. Other issues of availability and robustness are discussed later in section 4.3.

Table 11: Key Variables from the Literature Review

Category	Key Variables	Possible Source
Economic	Personal income	The primary source for this in the UK is the Annual Survey of Hours and Earnings (ASHE). Statistics are produced from this down to local authority level. However, at this scale the small sample sizes make it difficult to use for analysis, and primary data collection might be required.
	Employment	TBR, IDBR/BSD, Experian, ABI (with estimation to very local level)
	Sales Revenue	N/A - would require primary data collection
	Expenditure	Some information on areas of expenditure is available from Acorn and Mosaic.
	Output (GDP/GVA)	Information on GDP/GVA is available at regional and sub-regional levels, however the sample sizes this is based on when evaluated on a local area level is likely to be too small for analytical purposes.
	Contingent Valuation of facility	N/A - would require primary data collection
	Property Prices	Land Registry and Regulated Mortgage Survey
Social	Population Demographics	Neighbourhood statistics. Acorn. Mosaic
	Ethnic Diversity	Acorn. Mosaic
	Skills Levels/Education	ILR. School statistics.
	Accessibility	Accessibility Indices, Accession.
	Participation/ Engagement	Likely to be greater coverage for sports investments through Active People. Some venues will have visitor/participant information (e.g. RFOs) put this is likely to be inconsistent. Mosaic also contains information on cultural participation as part of its life style data.
	Housing	The Census provides information about the nature of tenancy and housing stock. Local information on significant housing developments could supplement this, but this would require a data

		gathering exercise. Local councils should be able to provide some guide from Council Tax data, but this would require negotiation for use in this way.
	Local Community Change	Longitudinal consideration of demographic data.
	Social Environment	Neighbourhood statistics. Acorn. Mosaic
	Crime	Local Crime Mapping data.
	Neighbourhood Character	Combination of housing, business and demographic data.
Physical Impacts	Design	Individual project data. Design awards data.
	Amenity	Point X, TBR, Experian
	Environment	Index of Multiple Deprivation
	Local Taxes	Not as relevant to the UK

Source: TBR/Cities Institute

We return to what can be done to measure impact on indicators such as those indicated in the table above once we have reviewed what has been achieved with existing studies and the broader challenge of evaluating impact of culture and sport investment.

4.2 Evaluation issues

There were a number of evaluation issues raised in the brief and our work has confirmed their relevance to assessing the feasibility of identifying impact. In this section we discuss these issues in the context of how or whether they were addressed in previous studies.

4.2.1 Causality

Without a longitudinal aspect to the data it is harder to assess causality. Being able to show that a step change in the outcome variable occurred at the same time/after an investment took place greatly strengthens the case. For this performance data before, during and after the investment is needed. Even having two data points a few years apart may not be enough, since it may not be clear that the change in the outcome variable is due to the investment, as opposed to another event.

Understanding causality is also assisted by primary research (as several studies recommend). For example, to understand why people pay more for a house near a C&S facility, primary research can help understand why the C&S facility is a factor.

A difficulty in assessing the impact of any investment is the counterfactual i.e. what would have happened in the absence of the investment. There is limited use of explicit control groups in the studies, with various forms of regression analysis being used to deal with this issue. In this regard the increasingly common evaluation technique of difference in difference analysis, used by Dehring, Depken & Ward (2006), is worth considering.

4.2.2 Displacement/leakage

There appears to be limited work in the research literature on the assessment of displacement. None of the studies considered in detail attempted to measure displacement or leakage. To address this issue it would probably be necessary to consider the study areas together with their surrounding neighbours. In terms of the outcome variables discussed it might be useful to look at birth and death rates of different types of business within the study area, in surrounding areas as well as within the wider area to investigate whether there has been a genuine change in rates (we would hope for a rise in firm births and a reduction in deaths) or whether the location of activity has simply been shifted by the investment. Related to this would be firm migration, are the new firms in the area simply existing firms moving in bringing with them jobs and spending that was previously occurring elsewhere.

General spending data would also be useful in understanding displacement. However, we have not identified a source of information that would provide sufficient detail in an appropriate time series and spatial level.

If reliable visitor/user data were available for a collection of C&S facilities within a similar catchment area it might be possible to consider whether numbers have reduced and similarly whether funding/income has reduced.

It would be useful to collect primary data gathering to understand what people would do if they didn't have a particular facility. Secondary data is unlikely to tell us whether the users who have abandoned one facility are the same people using the new one.

4.2.3 The effects of project scale

Those studies which have assessed impact with secondary data have tended to focus on large scale investments, or in the case of Stern and Seifert (2010) clusters of investments. This suggests that it is easier to examine the impact of large scale facilities using these approaches. This is not to say that smaller facilities have no impact. Their impacts are just less likely to be detected with the techniques that have been reviewed.

A smaller, locally focused project may in fact have a bigger impact at the local level, however since none of the cases studies considered smaller investment further work would be required to investigate this. The impact of bigger venues aimed at the wider audience may be dissipated and therefore not discernable at the local level. This might suggest that consideration of a wider area is relevant. However, this increases the factors and other investments/activities that need to be considered within a model, which may not be practical in assessing the impact of an individual investment.

4.2.4 Understanding the effects of different investment characteristics

Most of the studies considered did not analyse the effects of the characteristics, size or quality of investment. A challenge in including these in any analysis is that this would require information across a range of cultural and sporting facilities which, this study indicates is probably hard to get consistent information on (an exception may be large scale sports stadia). For this reason it is probably most practical to focus on the impact of specific cultural and sporting facilities (or clusters)

4.3 Availability of data

The main challenge for assessing the impact of these investments using secondary data is the availability of the necessary data by which to measure the possible manifestations of impact given above at an appropriate spatial level. Table 12 provides more information on the suitability of sources available at a high level of spatial detail. These raise the following key restraints:

- Most sources listed are available from only 2000 or later.
- Access to some sources would require negotiation with the provider as license costs and terms are not transparent – for example, the RMS from the Council of Mortgage Lenders.
- The samples lying behind the statistics may not be large enough to discern differences at the level of sensitivity required.
- A number of sources (marked as 'Commercial dataset') will have a charge attached to them. This is variable but it likely to be minimised if the provider can output analysis rather than having to provide individual records, which would be more flexible and allow a greater range of spatial analysis.

All sources are available on a consistent basis at least across England and therefore if the area itself can be studied we can also identify and construct data for control areas (to investigate the counterfactual) and look for signs of displacement from the surrounding areas.

In terms of project data key information for an initial investigate appears to be the type of investment and the expected catchment to allow trends in outcome data to be compared against the differing investments. In principle this level of data should not be difficult to construct, however we did find that almost half of projects (46%) did not indicate their catchment (see Table 23); these data would therefore require collection.

Although requests were made to some main cultural and sporting NDPB funders, limited resources meant that their responses were not received within the time period identified for collecting project data. For this reason, the many of projects were initially identified through the Heritage Lottery Fund, Arts Council England and CABE websites or suggested by contacts at English Heritage.

If this data collection exercise was to be repeated and time could be allowed for slow response rates then it is feasible that the number of projects included in the database could be significantly increased. It should be noted that the larger the sample, the greater the variety of projects will be in terms of funding scale - this study concentrated on 'large' projects where total funding was greater than £1 million. Extending the sample would probably mean that smaller projects would be included.

Speaking directly to project managers was a much more efficient method of collecting data once contact was made, in that they tended to be able to provide the majority of information required within one phone call. However, it was extremely difficult to get direct contact with the right person and often calls were not returned. Although more time consuming in one respect, due to the limited timeframe it was therefore more rewarding to focus on online research for data collection. If a longer timeframe was possible, it would be recommended that research was focused on targeting and following up on project managers more closely, i.e. lots of short calls rather than extended periods of online research. More details are provided in Annex 4.

Table 12: Characteristics of data sources available at high spatial resolution

Data Source	Most detailed Geographic level available	Regularity of update	Variables	Extent to which data set is modelled or sampled	Historical availability	Comment
British Household Panel Survey	Lower Super Output Area (LSOA)	Annual	The BHPS provides information on household organisation, employment, accommodation, tenancy, income and wealth, housing, health, socio-economic values, residential mobility, marital and relationship history, social support, and individual and household demographics.	Sample from representative of about 5,500 households recruited in 1991	Available from 1991	Special licence required to access LSOA level data, sample size is likely to be insufficient to measure local change at the level of accuracy required for assessment of investment. Provides socio-economic profile information including income and health indicators, which may indicate the improvement in quality of life of local residents.
TCR (Trends Central Resource) from TBR	Full address and Postcode	6 months	TCR contains details of business activity, diversity, performance, turnover, inward investment, GVA, enterprise, business stock and demographics.	Actual information from Companies House and other Dun and Bradstreet Data	Some data available from 1972. Sample becomes larger from early 1990s	Commercial dataset. Represents a sample of the UK business population, albeit a very large one (a near census of activity in firms employing over 5 people and a very large sample of those below). Although financial performance data is drawn from a smaller sample
ILR (Individualised Learner Record)	Postcode and LSOA	Each academic year	The ILR contains details of educational attainment (qualification) and age, disability, socio economic group, neighbourhood, gender, ethnicity.	Information supplied by FE colleges	2002	Only looks at courses funded by the Skills Funding Agency (formerly the LSC). This is usually FE level courses. Used longitudinally this provides trend data on attendance in post 16 education, and changing profile of participants. This may indicate where there is increased participation in education related to the investment and whether those undertaking this education are from socially excluded groups.
Neighbourhood Statistics	LSOA	Annual	Employment, education, health, neighbourhood, deprivation, demographics, benefit claimants, occupations, labour market, educational attainment, empty homes, dwellings, property sales,	Contains over 300 datasets and is largely based on census and Local Authority	Depends on data set primarily from 2001.	Can also provide data at Local authority, Ward, New Deal for Communities area, Middle Layer OA, Primary Care Trust, Health Authority, Education Authority, Parliamentary Constituency, Parish levels. Some dataset are only presented for a short period (1 or 2 years), Census data is from 2001 and other sets

Data Source	Most detailed Geographic level available	Regularity of update	Variables	Extent to which data set is modelled or sampled	Historical availability	Comment
			recorded crimes, physical environment, access to services, lifestyles	data.		have significant lags (e.g. 3 years) This source holds a wide variety of information on outcome variables relating to the quality of an area as well as variables indicating alternative explanations for local change.
GLUD (Generalised Land Use Database)	LSOA	Periodic (Subject to change)	The Generalised Land Use Database (GLUD) provides new experimental statistics showing land type for all of England.	The figures are based on an enhanced base map and statistics calculated from the OS MasterMap	2005	Experimental Statistics developed in accordance with National Statistics Code of Practice but yet to be fully accredited as a National Statistic. Pilot 2001 data but not comparable to Enhanced 2005 data. Provided under Planning Statistics of DCLG for monitoring and policy Land Use Statistics Division of the DCLG Change in the use of land which may indicate the reuse/revitalisation of land through C&S investments .
Index of Multiple Deprivation (IMD)	LSOA (only back to 2004)	Every 3 or 4 Years	Provide scores and ranks of Deprivation for a range of social, economic and environmental indicators to facilitate service planning and policy intervention. Key variables include: employment, income, education, health, barriers to housing, crime, living environment.	Figures based on individual counts, but also proportions, points and scales	2000	The IMD is a tool for identifying the most disadvantaged areas in England. Significant changes were made to the IMD in 2004 to allow measurement of deprivation at a smaller spatial scale. Brings together a wide variety of information on outcome variables relating to the quality of an area as well as variables indicating alternative explanations for local change.
Point X	Postcode or better	Quarterly	Points of Interest is a dataset of geographic and commercial features across	Points of Interest is a dataset of around 3.9 million geographic and commercial features across Great Britain	The availability of historical data is unknown	Commercial dataset. Ability to map some features relevant to cultural sector is difficult. Not 100% coverage, overall 81%-100% (Culture and Heritage 61-80% complete). The points highlight location and function information, (classified into more than 600 individual classifications from more than 150 different suppliers) and with a postal address for all postally addressable Points. This source would allow calculations of distances to and from different facilities to look at both the area of impact of a C&S investment and the other facilities that need to be controlled for.

Data Source	Most detailed Geographic level available	Regularity of update	Variables	Extent to which data set is modelled or sampled	Historical availability	Comment
Acorn	Postcode	Every 10 years and every year for commercial	ACORN is a geodemographic tool used to identify and understand the UK population and the demand for products and services. People are broken down into Acorn groups.	Modelled using 2001 census, lifestyle surveys and land registry data	2001	Commercial dataset. Increasingly used mechanism for classifying areas and people by consumption and lifestyle. There is the potential for comparable data back to the 1990s, although 2001 indicates the last methodological change. General population profile information to enable social conditions to be built into any model.
Mosaic	LSOA	Annual updates of non census components	Experian's geodemographic used to classify, categorise and segment the UK population into lifestyle segments: classifies 24 million UK households into 11 groups, 61 types and 243 segments.	Modelled through Census and Experian Consumer Segmentation database.	2004	Commercial dataset. Classifies 24 million UK households into 11 groups, 61 types and 243 segments. Updated each year. Alternative source to Acorn for general population profile information to enable social conditions to be built into any model.
Inter-Departmental Business Register (IDBR)/Business Structures Database (BSD)	Postcode	Updated from VAT, PAYE, National Stats Survey and Company Registrations.	The IDBR contains information on: name, address including postcode, Standard Industrial Classification, employment and employees, turnover, legal status (company, sole proprietor, partnership, public corporation/nationalised body, local authority or non-profit body), enterprise group links, country of ownership, company number, intrastat marker for goods and services traded (imports & exports) between the EU member states and the UK. The BSD joins individual years of IDBR to provide a profile of start-	Based on information provided by companies and government statistics	1995 The current version of the BSD covers the period from 1997 to 2005	The IDBR covers businesses in all parts of the economy, missing some very small businesses operating without VAT or PAYE schemes (self employed and those with low turnover and without employees) and some non-profit organisations. It represents nearly 99 per cent of UK economic activity. This would provide information on business mix and performance, although the activity information is based on Standard Industrial Classifications (SIC). There are restrictions on use and data must not be disclosive.

Data Source	Most detailed Geographic level available	Regularity of update	Variables	Extent to which data set is modelled or sampled	Historical availability	Comment
			up, closure and growth in the business population.			
Local Crime Mapping	Ward	Monthly	Number of and rates (number per 1000 people) for burglary, robbery, vehicle crime, violence and anti-social behaviour	Based on information provided by individual police forces	Site provides data for the last year on a monthly basis	It was not possible to collect information about this data source from the provider. It would therefore require further investigation if it is to be considered for future use.
Local Data Company	LSOA (high streets)	6 months	LDC has a detailed and up-to-date database of shops, bars, restaurants, venues and tourist attractions - all the information needed to get the most out of a city centre. The LDC provides analysis of vacancy, churn, mix and floor space and high res imagery for the UK retail market.	Based upon live data collected by researchers	2000	Commercial dataset. This data source is based on extensive fieldwork to collect data from high streets on a bi-annual basis. The data relates to retail vacancies, churn and retail mix.
Land Registry data	Full address	Monthly	Purchase price history of individual properties with information on property type and whether it is new build, leasehold or freehold.	Submissions to the registry when a property is sold.	Available in electronic form from 2000	Commercial dataset. This information is provided through a range of media from different providers. There are weaknesses in the accuracy and completeness of Land Registry data[44] To build a regression model without this data is likely to result in less accurate and reliable results than if the data were available, although it is not known how much impact on the results this would have.
Regulated Mortgage Survey	Postcode	Monthly	The RMS contains housing, property transfers, conveyances, assignments, leases, house prices, dwelling, age of property and number of bedroom.	The Regional figures that are released monthly are based upon a sample. Detailed data is based on	2005 (Survey of Mortgage Lenders 1968)	Commercial dataset. Due to contractual issues and parameters of those who issue the data, this data is not generally available, although public sector organisations may be in a better position to negotiate access DCLG already have some level of access. Provides information on property characteristics that it is important to control for when assessing the impact of

[44] Bowie, D. and Atkins, J. (2010) Measuring housing design and value. CABE

Data Source	Most detailed Geographic level available	Regularity of update	Variables	Extent to which data set is modelled or sampled	Historical availability	Comment
				actual data		other variables such as C&S investments on house prices in an area.

4.4 Moving forward

The availability of data regarding catchment and target audience is probably the main constraining factor. If an investment is targeted at small and specific groups within the population, or if the impact is likely to have little geographic spread (i.e. highly localised within a neighbourhood) then it is likely that any attempt to evaluate impact using secondary data would fail. So a process to assess these characteristics should be established in order to target additional research on projects where the techniques are likely to be valuable. The other key restriction is timing of investment. A number of data sources have become available through the use of digital technology, but providers of such data have not put their historical data into this format, therefore a number of possible datasets only go back over the last 10 years (a good example would be The Land Registry).

Outcomes that could be analysed

Of the possible outcome variables those that have the highest potential for analysis are:

- **House prices** – these are available at a high level of spatial detail and could be considered in conjunction with other data. Although access to key explanatory variables (characteristics of a property) is limited in this country.

- **Business mix, start-up and closure** - Use of longitudinal business datasets will allow an understanding the dynamics of a local area at a high level of spatial detail. Since they cover the whole economy they can also be used to identify significant non-C&S activity within an area (e.g. a major foreign investor starting up in the area). Of the commercial datasets TCR is specifically set up for this type of analysis (see Annex 1 for some examples of simple outputs from this source), our understanding is that other providers could construct information but discussions would be required as to the cost of doing this and the time series available. In terms of costs, these would depend on the work involved, although it is always most cost effective to go direct to the provider for analysis since the value in these data is perceived to be individual records and therefore to access these to carry out your own analysis can be expensive. The Business Structures database is a public sector equivalent, but currently only covers 1997 to 2005 and has restricted access.

Other outcomes that it may be possible to assess are:

- **Social profiles** – combinations of information held on Neighbourhood statistics and sources such as Acorn and Mosaic, which update Census data (albeit through some level of modelling) could be investigated as to their usefulness in profiling the social make up of areas over time. There are however restrictions, since the latter commercial sources are based on the Census there methodologies tend to be reviewed every 10 years and the extent to which time series are reliable across census periods is unknown. Charges will apply to commercial datasets.

- **Education** – ILR should provide interesting information on post 16 education and school statistics provide information on statutory education at a school level. These data are available without charge.

The key determining factors for an investment project to be included in future study of impact are that it;

1. Has a potential impact that is supported by available data
2. Is likely to have a geographic impact that is at least as great as the lowest geographic level at which the relevant data is available – in this report we have focused on data which is available at a neighbourhood level (at least ward). More data are available at Local Authority District level so that a greater range of analysis may be possible for project with a wider impact area.

3. Was started between 3 and 8 years ago, since a greater range of data is available for the last 10 years.

Possible research studies

The evidence in this study indicates that possible future work should consider addressing the following options.

- Impact on property prices of an investment can be tested where the investment is large. Case studies show this to be possible for sport stadia. However, other cultural, artistic and heritage investments could be identified and targeted for such studies, such as the large scale investment made in the De la Warr Pavilion in recent years or the New Art Gallery, Walsall. In fact, there is a gap in the literature in this area so such a study could prove highly instructive and of great interest to a wide audience. An example of an investment that is relevant to this approach would be the Emirates Stadium[45] or East Manchester Stadium. Regression techniques could be employed and their efficacy would be improved through the use of cross-sectional as well as panel data in order to establish causality and control for area characteristics.

- The impact on property prices could also be examined spatially, using the spatial-lag regression techniques examined in this study. This could be in terms of assessing the impact of a large cultural facility, or sporting stadia, on property prices according to how close houses are located to this. GIS-based spatial analysis could also be developed to synthesise data, including other C&S and environmental amenities and thereby better estimate and model distance relationships and area effects.

- As the empirical techniques for analysing the impact of cultural and sporting facilities secondary data have primarily focussed on larger investments (e.g. the Guggenheim, Sports stadia). It may be worth prioritising the assessments of larger investments with these techniques while smaller projects are examined in other ways, such as through an initial descriptive exercise and within the context of cultural or sporting 'clusters'. For example, projects where investment is made in multiple sites such as in the regeneration of the Sheffield Cultural Industries Quarter or Hull Old Town might be examined in this way. A system of assessing the aggregation of cultural or sporting activity may need to be devised, such as the Cultural Asset Index in the Stern and Seifert paper. Such indices could also be used to undertake a regression analysis examining how social and economic indicators are influenced by levels of cultural activity (or sporting activity, potentially).

- Where clusters or aggregated C&S activity exists, descriptive statistics should be used to explore the existence of relationships between such clusters and economic, social and property price impacts. This is a low risk strategy which could, if it identifies potential relationships, then be scaled up to include a regression analysis which focuses on specific impacts. For example, Ropewalks and the Merchant City Initiative could be also examined in this way. Such an approach could also test whether the sporting elements of any C&S cluster need to be dealt with separately from the cultural, artistic and heritage elements.

- Impact on visitor numbers to an area could be assessed through time series analysis where a project plays a significant role in a 'destination', such as a large visitor attraction in a city centre or, if sufficiently scaled, standing alone. Examples would include Tate St Ives, Tate Liverpool, the redeveloped Arnolfini in Bristol and the Eden Project. This kind of analysis would not be as effective where an investment attracted primarily intermittent day visits (e.g. a football stadium such as Wembley or a theatre like the Live Theatre in Newcastle's quayside area). Such an approach could also be modified to assess the Impact on employment numbers, business mix, start-ups and business performance.

[45] As this report was being completed, a new working paper by Ahlfeldt was published which examined the impact on property prices by Wembley and the Emirates stadia using secondary data. See Ahlfeldt & Kavetsos (2010), *Form or Function; The Impact of New Football Stadia on Property Prices in London*

- It should be possible to undertake an analysis of how varying levels of cultural and sporting assets across local areas may affect their average house prices. This kind of analysis would face a difficulty in disentangling the causality between what drives the level of cultural and sporting investment in an area, and the effect of cultural and sporting investments themselves. The data that is currently available from the CASE asset database is only 1 year old so it is not yet possible to look at the effect of varying levels of cultural and sporting investment over time.

- Generally, impacts on a significant range of indicators across the business/economic, property and social spheres can be examined by the candidate approaches. For example, these could include business and human demographics (levels and composition), business growth, start-ups, employment, health, incomes, crime, amenity, environment, quality of life and area perceptions. Such impacts can be examined across the heritage, sport, cultural and artistic sectors; although clearly different types of investments are likely to have different impacts so studies should be designed on the basis of a specific impact hypothesis.

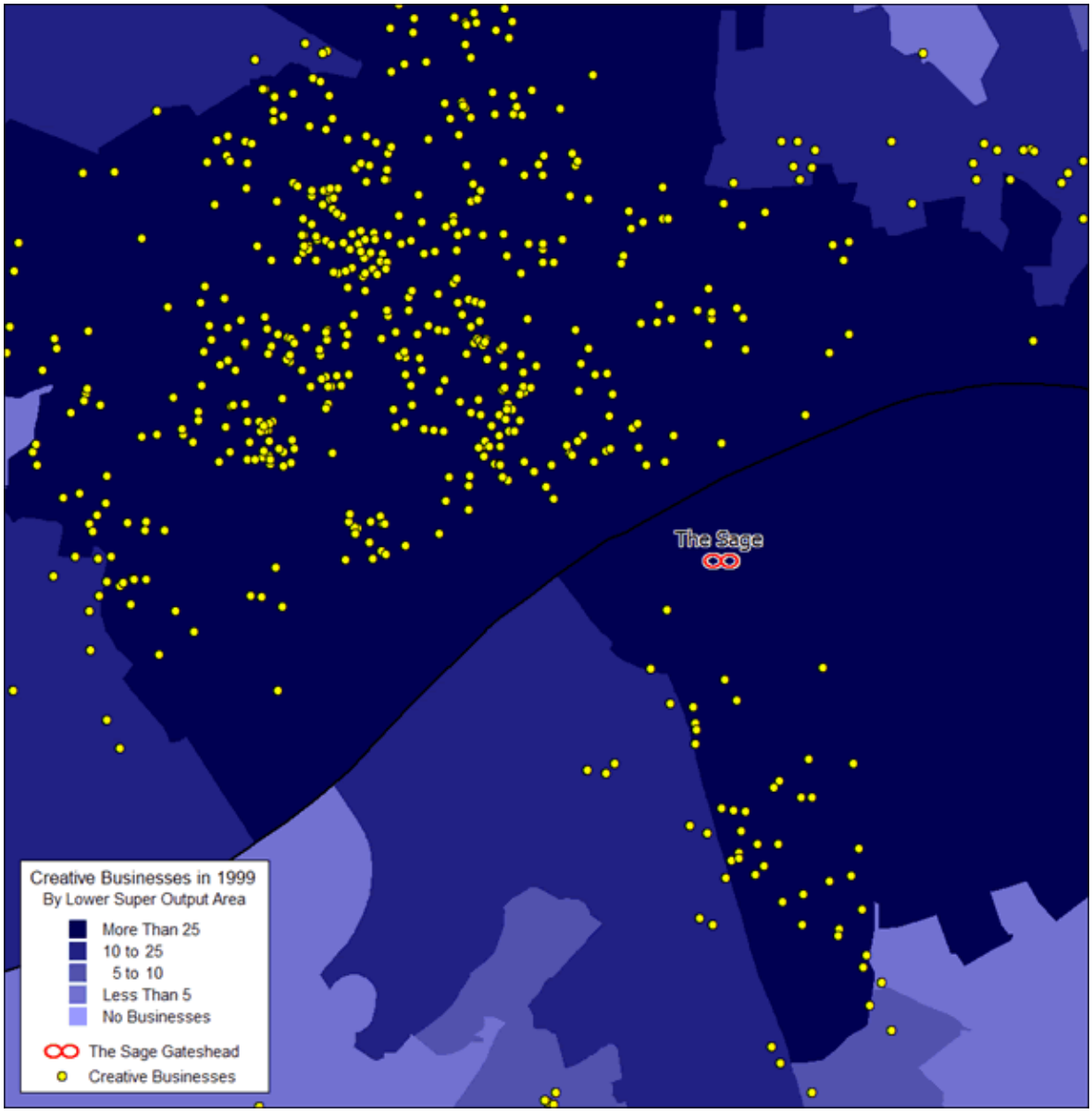
- The focus of this work has been the impact of individual investments. It may be that a cluster/area model (as opposed to attempting to quantify the effect of a single facility) is more realistic particularly when considering likely area-based revitalisation scenarios. It is in this area that most mainstream regeneration impact assessment has been undertaken including longitudinal programme evaluations[46]. For example, CABE's Sea Change programme is aimed at whole area regeneration with a range of individual projects. This is not usual, and in a political climate that is likely to increasingly demand cross department working and co-ordinated use of resources might be expected to become increasingly prevalent.

[46] DCLG (2010) New Deal for Communities Programme: Assessing Impact and Value for money, Final Report Vol.6; Evans, G.L. & Shaw, P. (2004) The contribution of culture to regeneration in the UK: a review of evidence, DCMS

5. Annex 1 – Example of mapping business activity: The Sage Gateshead

TBR's own data source, Trends Central Resource (TCR), can map changes in business activity over time to a high spatial resolution. The effect of a particular large scale development can be assessed through the identification of individual businesses (at the postcode level) and new firms coming in to the area. An example, produced for this report, is displayed below showing the effect of The Sage in Gateshead on the local Creative & Cultural business base since its completion in December 2004. TCR has been used to identify the creative & cultural business base 5 years prior to the opening of The Sage (i.e. 1999) and the current business base, to understand whether the development has had an effect.

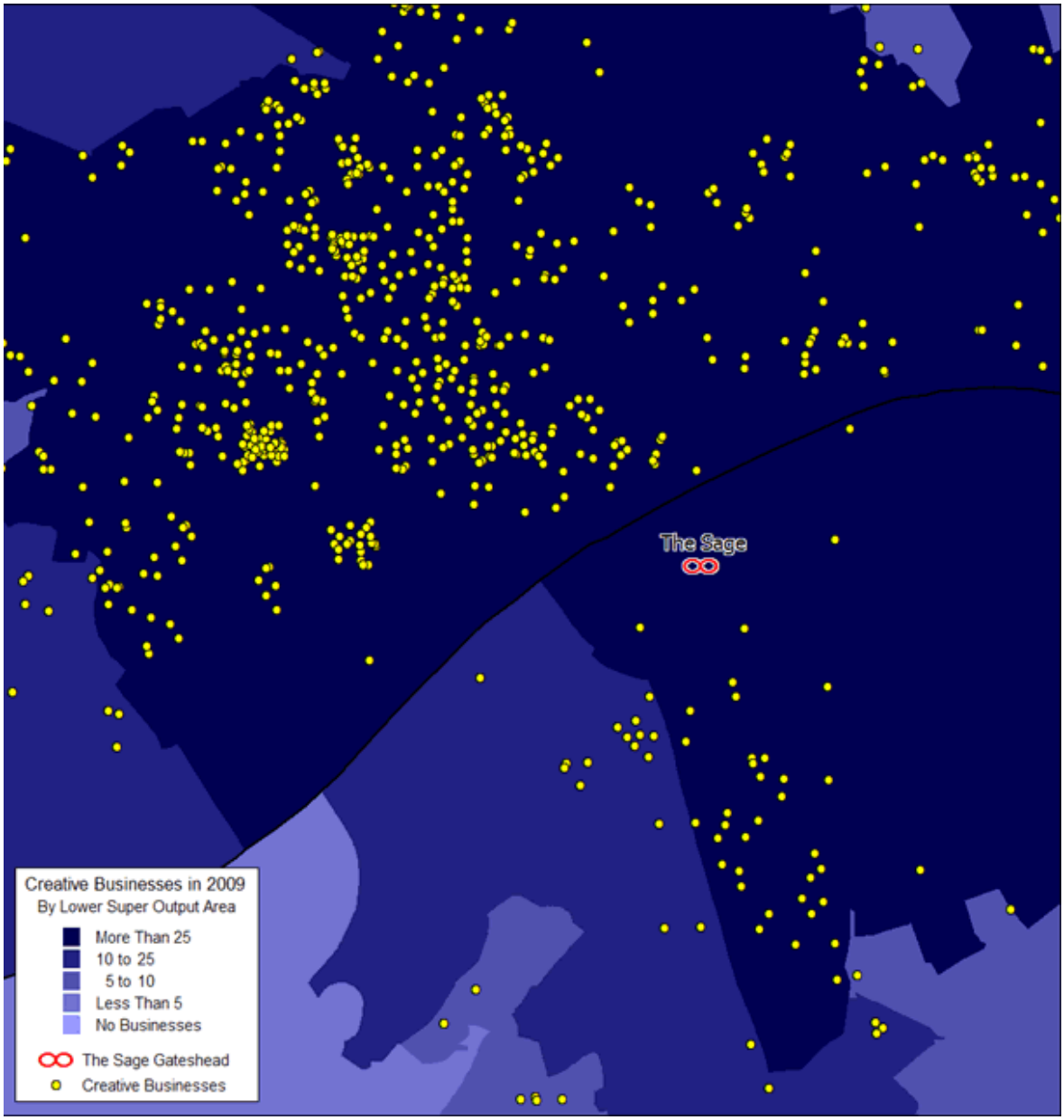
Figure 13: The creative & cultural business base before completion of The Sage - 1999



Source: TCR 2010

It is clear from the above that there was a large amount of creative & cultural activity within Newcastle (North of the map) before The Sage was completed. The following map displays the current level of creative & cultural business activity.

Figure 14: The creative & cultural business base after the completion of The Sage - 2009



Source: TCR 2010

Whilst there has been a small increase in activity on the Gateshead side of the river (south of the map) this is mainly due to the nature of the site around The Sage, in that there is not much additional space. It is clear though that The Sage has had an impact on the Newcastle side of the river, with much larger concentrations of creative businesses in 2009 than previously seen in 1999.

However if one looks at the total increase in creative & cultural businesses in Gateshead as a whole compared to Newcastle, it is clear that Gateshead has seen a much more positive increase overall, with an increase of 86% as opposed to 60% in Newcastle. In fact creative & cultural businesses in Gateshead have increased over the last 10 years at a rate much higher than the average UK rate (86% opposed to 79% - See Table 13).

Table 13: Change in creative & cultural businesses between 2006 & 2009 in North East and North West local authorities

District	1999	2009	Change	% Change	% Change relative to Gateshead
Gateshead	570	1,060	490	86%	
Newcastle	1,120	1,790	670	60%	-26%
Sunderland	640	1,160	520	80%	-6%
Redcar & Cleveland	340	640	300	88%	+2%
County Durham	1,240	2,410	1,170	95%	+9%
Bolton	900	1,640	740	82%	-4%
Bury	620	1,230	610	98%	+12%
Manchester	2,260	3,650	1,390	62%	-24%
Stockport	1,400	2,600	1,190	85%	-1%
Liverpool	1,380	2,310	940	68%	-18%
North East	7,190	13,350	6,150	86%	0%
North West	26,120	46,480	20,360	78%	-8%
UK	**268,350**	**479,690**	**211,340**	**79%**	**-7%**

Source: TCR 2010

Other areas of note include Sunderland, which has seen a similar level of increase in its creative & cultural businesses over the past 10 years, albeit below the regional average of 86%. From the table results above it appears that larger cities such as Newcastle, Sunderland, Liverpool and Manchester have seen increases in creative activity over the past 10 years that are much lower than the regional average. Where as smaller towns and cities such as Durham, Redcar and Bury have seen increases in activity that are much higher than the regional and national averages. This may suggest that it is easier for creative businesses to start up in smaller towns & cities rather than in larger cities where factors such as space and cost may be barriers.

6. Annex 2 – A Review of Impact Research

The following outlines the key types of impact measurement drawn from the literature reviewed here (see 3. A Review of Impact of Research), and from government guidance - for instance, on evaluating regeneration, renewal and regional development (3 'Rs'). Examples are then noted of how these methods and techniques have been applied in selected C&S cases.

6.1 Economic impact

Most studies in this field use a general economic impact approach. These are applied at both macro (regional or national economy) and micro (area, facility) scales. Research in this area is dominated by sports and event impact studies - particularly of sports events (e.g. Olympics), arts events and festivals, including tourism (e.g., cultural, heritage, events). Methods rely heavily on user or visitor surveys and derived (rather than original) income and employment multipliers. In a few cases, secondary time series data on business and firm change, the effects on house prices, and employment in construction-related activity associated with venue development are used. US studies predominate in the sports/event field reflecting higher investment and commercial funding (and sponsorship), and the footloose nature of major sports facilities and teams (franchises)[47]. Specific techniques commonly used include the following:

6.1.1 Multipliers

Output measurement is an important aspect of assessing economic impact. The predominant technique used to measure local and regional economic impact at a project (venue, event) level is multiplier analysis. In Economics, a multiplier is a measurement of the factor by which change in a variable occurs in response to the change in another variable. In using multiplier analysis to assess economic impact, employment is commonly used: the ratio of the net change in direct and indirect employment following an investment. Direct employment covers those working at the facility or employed during the construction phase. Indirect employment is that which arises as a 'knock-on effect' – for example, those who are employed directly by the project spend additional money in the local economy, allowing other businesses to employ more people who then spend more in the local economy, and so on.

Collecting the data required for multiplier analysis normally entails primary research of visitor activity (spending, distribution) surveys or less commonly surveys of local firms[48]. Often pre-existing multipliers (regional, Input-Output, sectoral, e.g. performing arts, museums) are applied to a project's visitor/user throughput data and project income and expenditure. This method is most commonly applied in sports (stadia, event), tourism and in other venue-based events and festivals. Impacts from events and venues are also measured through changes in employment and expenditure within a local area. Ruiz (2004) advocates the use of economic appraisal, which considers all costs and benefits resulting from the event or investment.

[47] In the USA, by 2006, 89 of the 120 major league teams in the big four sports (football, baseball, basketball and hockey) played in facilities built or significantly refurbished since 1990 at a cost of $17 billion, $12billion of which was provided by public sources (Baade et al, 2006: 2). Germany spent over 1.4bn Euros on 12 stadiums for the 2006 World Cup, over 35% of which was public funded.

[48] See Myerscough (1988); Dunlop and Galloway (2004):

Capital expenditure impacts also use multipliers to estimate employment FTEs, but these may either ignore displacement (deadweight) effects, or where these effects are included, no additional (positive) impacts are found (Evans & Shaw, 2004; Evans, 2005; HM Treasury, 2003). Attempts to attribute the effects of expenditure in the local economy arising from a project have also involved undertaking a detailed spatial analysis of a project's financial transactions (e.g. within and outside a 5 to 10-mile radius or travel time, e.g. 1 hour drive time), but this requires exhaustive primary research, rather than secondary data analysis. It would assist future evaluation if projects were required to record this information as a matter of course.

More 'full blown' economic impact studies consider wider effects and opportunity costs arising from investment projects. In these models increased output, expenditure or number of employees in a given target area/locality is also assessed in terms of 'additionality' – net, rather than gross impact. Assessment is then made of 'leakage' (benefits to those outside of the intended spatial area or group, or in the wider economy, e.g. jobs taken by outside commuters), 'deadweight' (outcomes which would have occurred anyway without the intervention), and 'displacement' or 'substitution' (the extent to which the benefits of a project are offset by reductions of output or employment elsewhere).

Conventional economic impact studies and their findings have however been criticised. There is the 'counterfactual' case that is not often considered, of whether, in the event of a cultural/sporting facility disappearing, all associated spending would stop? For example, if a museum were to suddenly close, only a small number of foreign visitors would be dissuaded from visiting major regional or national cities and those employed by the museum would eventually relocate elsewhere and only temporarily curtail their spending. Many impact studies therefore exaggerate economic impacts because they look at gross consumption and employment change rather than any additional consumption or jobs.

The use of multipliers in sporting impact studies has in particular been criticised. Crompton (1995) in an assessment of 20 economic impact studies of sporting projects in the USA concluded that they report inaccurate results due to invalid use of multipliers and ill-defined impact areas, claiming total rather than marginal economic benefits and omitting opportunity and other costs. A subsequent review on the event/tourism field based on 10 consultant-based impact studies reached the same conclusion: 'most economic impact studies are commissioned to legitimize a political position rather than search for economic truth' (Crompton, 2006: 67).

6.1.2 Economic impact of events and regeneration

The most recent review of sport and economic regeneration in the UK was carried out by Gratton et al. (2005), who note that several UK cities (Sheffield, Glasgow, Birmingham) used sport as a lead sector in promoting urban regeneration. The economic impact of 16 major sports events is cited (UK Sport 2004) using similar methodologies, (see UK Sport 1999) and serves as a comparative data set. Data is largely derived from user/visitor surveys, expenditure analysis[49] (including hotels, businesses) and consequent income multiplier analysis in order to estimate impacts. Larger events (number of spectators) not surprisingly determines the level of economic impacts (from a total of £0.16m to £25m per event day), with typical spectators spending £55-£60 a day at an event. This is similar to the level of additional spending attributed to London's West End theatres (a sample size of 49) where audiences spent £54 in addition to the ticket price (Travers 1998). Outside of London this figure per audience member was only £8 (Shellard 2004).

A more comprehensive study of the 2002 Commonwealth Games in Manchester (Faber, Maunsell 2004) measured employment change in the three years prior to the Games (a similar exercise is being conducted for the London 2012 Olympics - LDA 2009) using ABI (annual survey sample) data, showing a 4% increase over this period (1490 jobs, full and part time), mainly in construction, hotels, restaurants, distribution and other services (this contrasts with the pre-Games estimates of 4900 FTE jobs - Cambridge Policy Consultants 2003). No visitor survey was conducted during the

[49] For example, an Economic Impact of the Six Nations Rugby Tournament on Edinburgh and Scotland undertook 2,500 face to face questionnaire based interviews with spectators at 2 matches and surveyed 53 hotels and pubs s the basis for aggregating economic impact arising from the event.

Games, instead secondary annual tourism data (UKTS, IPS) was modelled at a regional (Greater Manchester) level. This indicated a 7.4% increase in overseas-resident visitors in 2002 compared with 2000, but a 6.4% decrease in UK-resident visitors over the same period, whilst expenditure was up 21%-29% from both visitor groups. Gratton et al. (2005) note the lack of hard evidence (and the 'scarcity of evidence on long term regeneration benefits'), but draw positive conclusions on the regenerative effects of stadium development. Long-term effects are also observed in the case of very large events such as the Barcelona Olympics, measuring increased hotel capacity, occupancy, and tourists - but again, attribution to specific facilities and events has not been feasible. They also conclude that 'many of the economic benefits to the local community have been poorly researched' whilst acknowledging that 'serious gaps in knowledge can be filled at the local level' (p.997).

6.1.3 Economic impact of sports and cultural facilities

Santo (2005) reassesses two sports stadia case studies using a cross-sectional time series (panel) methodology based upon current time series data (1984-2001). The study looks at 10 metropolitan statistical areas (MSA) representing every US city that gained or lost an NFL or MBL team or had a stadium construction of renovation during this time period. These results found that the presence of a new baseball stadium did have a significant positive impact of regional income share. Contextual issues were also an important factor, notably location (central or suburb) and place image and other attractors. This aspect is consistent with another comparative study (Baade et al, 2006) of two stadiums in the same city (Chicago). Here two locations produced quite different impacts on the neighbourhoods and local economies, one well integrated, one not so. The author used analysis of aerial views of each facility and surrounding area to identify other amenities (bars, restaurants, hotels, shops etc) in the vicinity and their position on routes to and from each venue (in the UK this could have been done using GIS and firm/land use data). The integrated stadium locality had a complementary set of businesses and outlets conveniently located and servicing the visitors at key times. Other businesses including ethnic restaurants, art galleries, professional services and other retail outlets reported a decline in trade and some had moved away as a result. Proximity in itself was not the prime factor, location *en route* and provision of complementary goods and services was the key to economic synergy, with clustering effects also evident (e.g. bars).

Establishing the economic impact of a specific building can require analysis of quantifiable financial information, supplemented with more qualitative information from staff, senior representatives of supporting organisations, local institutions and businesses. Evaluation of the Dundee Centre for Contemporary Arts[50] for example, tracked expenditure and income and included interviews with arts trainees, print studio users, exhibitors, cinema users and a sample of exhibition visitors to gauge the local spend (where and on what they spent in addition to using the arts centre). Analysis of the economic impact of West End theatres[51] was based on collated data from 49 theatres and involved an additional survey of audiences – this used a 'financial survey model' to analyse the data. However, problems with sampling (lack of sampling information and response rates) limited the study's ability to assess how representative the sample was.

More recently GHK (2007) have developed a methodology for assessing the impact of Heritage Lottery funded projects. This was based on individual case studies and includes the examination of invoices and financial reports, analysis of expenditure data (including detailed supplier location data), visitor survey, stakeholder interviews and local economic area profiling. GHK developed and applied a spreadsheet-based model to assess the impact of recorded project and visitor expenditures of local and regional employment and GVA.

6.2 Contingent valuation

The Contingent Valuation Method (CVM) developed from environmental economics in the late-1940s, and is now applied to a range of amenities including 'culture' and sport, as well as attitudinal surveys of public spending (on the arts generally and specific projects). CVM is therefore an economic, non-market based valuation method typically used to infer individual's preferences for

[50] 'Economic Impact Evaluation of Dundee Contemporary Arts', Steve Westbrook, 2003, cited by Ruiz 2004.
[51] The Wyndham Report, The Economic Impact of London's West End Theatre, T Travers, The GreaterLondon Group, London School of Economics & MORI, 1998, cited by Ruiz 2004.

public goods. CVM uses either a 'stated' or 'revealed preference' method examining people's behaviour and inferring their 'willingness to pay' (WTP) for public (free) or merit (charged for, but subsidised) goods. Revealed preference includes values attributed to residents by house prices in an area (e.g. hedonic pricing), or actual travel costs paid to reach to a destination. Stated preference uses questionnaire surveys to ask a sample of people how much they would be 'willing to pay' for a specified change in the supply or provision of a particular public good, e.g. park, museum, theatre. As well as direct price, the travel costs method also captures the cost of travel to a venue as a proxy for 'entry price' or 'value'. The result calculates a mean monetary value which is then multiplied up (by the number of users, visitors or population etc.) and is used particularly in environmental quality, amenity and historic conservation scenarios in cost benefit analysis exercises (CBA), in order to put a value on intangible or 'non-traded' benefits such as access to a free park.

Contingent Valuation methods have been applied to public libraries for example, using a 'Willingness-to-Accept' concept regarding the closure of libraries. This study found that 88% of respondents put an exceptionally high value on maintain the existence of libraries ($136m); whilst 'Willingness-to-Pay' to prevent closure through increased local taxes or fee was valued at $15m. ('Placing a Value on Public Library Services', St Louis USA, *Public Libraries* 38(2): 2001 in Noonan, 2002). From a meta-analysis conducted in 2003 (Noonan 2003, 2002) over 70 CV/WTP studies were reviewed, mostly in the historic and heritage fields - the UK studies were all based on historical sites – but also in other cultural fields[52].

This method using the stated preference survey technique requires primary research surveys to be carried out, however WTP monetary rates, like pre-calculated multipliers, are used as a proxy in the absence of primary survey data (with the same limitation and caution required regarding like-for-like transferability). This method is primarily hypothetical in that actual willingness to pay is seldom tested in reality, which potentially raises questions about its validity in practice. CVM using revealed preferences, particularly through house prices, is used - where price data is available - in attributing the value of particular amenities as demonstrated in several of our case studies (see section 4, An assessment of approaches).

6.3 Design quality and amenity

An ongoing study commissioned by CABE (Bowie et al. 2010) is seeking to establish the economic impact of the design quality of housing schemes which have been the subject of Building for Life (BfL) assessments to determine the value of investing in higher design quality. Land registry sales and address information purchased by CABE, is the prime data source.

In Roberts & Marsh (1995), the relationship between property values and public art was assessed. By surveying landowners/occupiers, they found 'the image or attractiveness of a development was a significant factor in occupiers' choice of building,' although rental cost, location and quality were more important. Some 62% of occupiers surveyed 'recognised that the contribution which public art made to their building was significant' and '64% of occupiers 'agreed' or 'agreed strongly' that public art made their building distinctive'. The findings applied across different types of company, but 'most investors confirmed that public art features did have an important role to play in distinguishing competing buildings and that this facilitated letting and reduced risk.'

Myerscough (1988) also sought to measure the importance of cultural and other amenities in firm location and retention. This revealed the value of cultural and sporting facilities in location decisions and amenity enjoyment value of these living and working in an area; see

[52] CV/WTP Sites by Domain/Facility

Table 14: Factors affecting the selection of a region in which to live & work by middle managers

	Glasgow	Merseyside	Ipswich	All
Factor	**%**	**%**	**%**	**%**
Pleasant environment and architecture	100	-	97	98
Good road, rail and air	88		80	84
Outdoor recreation and sporting facilities	84	80	78	81
Choice of housing	82	80	87	80
Choice of schools	77	80	72	76
Cultural facilities: museums , theatres, concert halls etc.	77	80	65	74

Myerscough et al. 1988

Table 15: Reasons for enjoying and working in three regions by middle managers

	Glasgow	Merseyside	Ipswich	All
Factor	**%**	**%**	**%**	**%**
Access to pleasant countryside	93	91	94	
Cultural facilities: museums , theatres, concert halls etc.	79	68	60	69
Parks and public gardens	74	73	40	62
Fine old buildings	60	51	96	69
Participation in sporting activities	51	56	56	54
Pubs, clubs nightlife	32	37	80	50

Myerscough et al. 1988

This is consistent with a recent study of Dutch cities (Marlet 2005) which found that access to historic, heritage and/or natural environments coupled with job opportunities and urban amenities were the main factors in attracting and retaining the 'creative class', more so than the indices developed by Florida (2002) of bohemian, diversity and late night economy. This study mapped creative class occupations, growth and Florida's indices against other urban amenity provision including data on heritage buildings, open space, live performances (theatres, clubs etc.), and control variables such as housing, tenure, students and crime.

6.4 Social impact

Social impact measurement in existing research is predominantly qualitative, using process-based evaluation and supported by stated data on (often short term) changes in behaviour and participation. This is sometimes supplemented by secondary data analysis to demonstrate a change in participation or local effects/personal impacts (Evans and Shaw 2001). Secondary data is also used for socio-economic and demographic community profiles, change data on employment/economic activity, skills and various quality of life indicators – notably crime, access to services and Best Value 'Satisfaction' Indicators (BVPIs, including libraries, museums, theatres, parks and sports). Impacts are largely derived from participant and household (area-based) surveys (Torjman, 2004; Nichols and Taylor, 1996).

Positive effects of participation and involvement have been demonstrated through primary qualitative and quantitative research. Sport England used indicators such as membership numbers, average nightly attendance and volunteer numbers to understand the extent to which the investment in a sports club had been a catalyst for change in teenage aspirations and behaviour[53]. Matarasso's (1997) study used interviews/ discussions and questionnaires completed by stakeholders and arts participants (sample size n >1500) to demonstrate the positive impact of arts investment on participation. General levels of participation in cultural and arts and in sport are measured either by large scale surveys of the population with stratified or random sampling (*ONS Omnibus, Taking Part, Active People*) or specific smaller targeted surveys commissioned by particular cultural or sports providers (e.g. museums and galleries, sports venues) or at specific

[53] Bolton Lads and Girls Club Case Study - Sport England

social groups (young people, minority ethnic) with a view to identifying under representation in participation, levels/patterns of existing participation and barriers to participation.

Ruiz (2004) notes that focus groups and interviews with past participants and attendees have been used to deepen understanding of barriers to use. Specific project and programme evaluations tend to rely on stakeholder and beneficiary interviews. Reported crime figures or British Crime Survey data have been used to ascertain local effects/personal impacts. Ruiz (2004) identifies that although reduction in crime is associated with arts and sports programmes, a causal relationship between the two cannot be assumed. Instead, an association is described where: culture and sports programmes may result in positive personal and social outcomes, which in turn may improve offending behaviour. Reeves (2002), notes the wide use of *social auditing* to assess the impact of arts projects. This approach includes audience surveys, stakeholder interviews, user and performer discussion groups and monitoring of measured outcomes against internally defined indicators (number of performances/events; audience ratings; critical assessment by arts professionals; number and quality of partnerships with external agencies; impact on personal development; audience profile; accessibility etc).

Whilst it is clear that primary data is important for measuring social impact, secondary data can be used as part of an impact measurement model. EPPI/Matrix (2009) undertook a systematic review of the literature on measuring participation in sports and culture (under CASE). They propose inclusion of secondary data analysis (*Taking Part, British Household Panel Survey*) to ascertain the *value* (non-economic and economic) of engagement. Likewise, Brook (2007) reworks Census commuting data, and geodemographic data alongside box office data to analyse audience penetration (cf. CultureMap/Audience London[54]) and applies regression analysis to establish the relationships between participation and key social variables (education, socio-economic group, income. ethnicity etc).

Social impact is complex. The impact of an intervention can require data on a number of socio-economic factors including quality of life, participation or deprivation. Where quantification goes further, impact measurements have involved cost benefit analysis, contingent valuation and placing values on social benefits and costs, which relies on case study and participant data. Whilst this shows the preference for primary research in impact measurement, clearly defined indicators and relevant secondary data are also considered important as tools in measuring impact.

Use of secondary data (e.g. crime, education/skills, health, cohesion) to measure social effects arising from a single culture or sport facility (as opposed to area based interventions or programmes) may require primary research to help understand the underlying processes, both to identify the nature of impacts and effects arising and in order to quantify and aggregate such data.

Extensive use of secondary data would help, however, in validating and contextualising primary research data on outcomes, particular when measuring change effects over time, and in control area comparisons. Existing comparative area indicators that help in this include ‘Near Neighbour’ (CIPFA) and ONS neighbourhood classifications, are convenient sources of comparative performance and provision information.

6.5 Area-based regeneration

Over the past thirty years, regeneration programmes have increasingly used area based initiatives (ABIs) as a strategy to target development, deprivation and to achieve policy goals. Successive government (and European Union, i.e. ERDF) interventions have therefore delineated areas according to their social, economic and physical situation and relative decline (e.g. compared with national or EU averages) using targeted investment - including C&S facilities – in order to help generate improvement in a local economy, physical environment, employment and quality of life. Typically, Index of Multiple Deprivation (IMD) indices and national ranking has provided the basis for area designation which might be defined in terms of output area (lower SOA census level), or even specific housing estate or neighbourhood, in collaboration with local authorities.

[54] http://www.culturemaplondon.org/

In the 1980s Area based initiatives (ABIs) included Task Forces, UDCs (e.g. London Docklands and Merseyside UDC) and Enterprise Zones. These policies were targeted on tightly defined geographical areas and the hope was that the socially disadvantaged in and around these areas would benefit. In the 1990s ABI's began to focus more closely on the needs of particular disadvantaged groups and individuals at the local level and this was a feature of City Challenge and then the Single Regeneration Budget approach to local area regeneration. These programmes have attempted to bring about holistic, multi-faceted, economic and social regeneration in often relatively small neighbourhood areas. In the 1990s the emphasis was on getting local stakeholders to work in partnership to address the problems of their locality. In the past decade there have been further area based programmes with the New Deal for Communities (NDC) and the implementation of the Neighbourhood Renewal Fund. Alongside Area Based Initiatives there have emerged initiatives operated by individual mainstream Departments like Education Zones, Sure Start, Health Action Zones and Employment Zones (Duffy et al., 2002).

Measurement of the effects of regeneration intervention has been driven by a focus on key domains: crime, health, education/skills, housing and employment. Project and programme evaluation has therefore measured outputs and change over time against these targets. For major programmes (e.g. New Deal for Communities, sample size n=39, Neighbourhood Renewal areas, sample size n=88, Single Regeneration Budget: SRB) outcomes have also been measured longitudinally using household surveys (e.g. IpsosMORI) and baseline indicators. Generally, local government also measures satisfaction with services and 'performance' periodically (e.g. 3 yearly) through Best Value (BVPI) Performance and National Indicators[55] (NI: n=199) (now the 'Place Survey'), again household survey based. This includes satisfaction with libraries, museums, arts & leisure facilities. 'Usage' is captured in annual CIPFA leisure & recreation statistics, but reported only in aggregate by local borough/district authorities on a voluntary basis, i.e. some local authorities do not submit annual returns.

Local regeneration impact implies the wider social and economic benefits from investment that transform a local place. This includes community confidence, local empowerment and sense of place. Regeneration has thus been defined as the transformation of a place (residential, commercial or open space) that has displayed the symptoms of environmental (physical), social and/or economic decline: *breathing new life and vitality into an ailing community, industry and area [bringing] sustainable, long term improvements to local quality of life, including economic, social and environmental needs* (Evans & Shaw, 2004: 4).

6.6 Cultural vitality

The concept of 'Natural Cultural District's has been developed in Philadelphia, in areas suffering multiple deprivation, population and economic decline (Stern and Seifert, 2007). This approach builds on the idea that urban neighbourhoods often germinate clusters of community, commercial and informal cultural assets linked by artists and creatives as producers, and participants as consumers or practitioners. The Social Impact of the Arts Programme (SIAP) uses four indicators of the intensity of the cultural scene in a neighbourhood: cultural participations; non-profit cultural providers, including community associations; commercial cultural firms; and independent artists/creative workers. Taken together, these features represent an area's cultural assets. Four data sources were used: a regional inventory of non-profit cultural resources, a database of commercial cultural firms in the metropolitan area, a listing of artists, and SIAP's small-area estimates of regional cultural participation based on data provided by over 75 cultural organizations. All four of these indicators were calculated for every census block group (approximately 6-8 city blocks) in metropolitan Philadelphia.

The identification of natural cultural districts used factor analysis[56], to create a single scale capturing variation of all four of these indicators across the metropolitan area. The analysis

[55] National Indicators (Nis) for Local Authorities and Local Authority Partnerships: Handbook of Definitions, DCLG, 2008
[56] Factor analysis is a statistical approach that investigates the relationships between possible explanatory variables, and combines sub-sets of related variables into single explanatory factors to reflect the nature of the underlying processes being

determined that the four indicators had very similar patterns of variation (a single scale accounted for 81% of the variation – of the cultural assets index). The second stage identified neighbourhoods with a cultural assets index score higher than expected when corrected for these variables such as socio-economic profile, diversity, distance from centre etc. Essentially, these are districts that were "exceeding expectations" in their concentration of cultural assets. Both the cultural assets index and the corrected index are correlated with the chances that a neighbourhood would improve over time. In order to test the role of cultural assets in neighbourhood revitalization, the model combined SIAP's cultural assets index with data on neighbourhood change. The results were that: 83% of all block groups that improved by two or more MVA categories between 2001 and 2003 were natural cultural districts.

A similar multi-criteria approach to developing a Cultural Vitality Index has also been developed in the USA. This uses a tiered system of data collection and analysis; see Table 16 below.

Table 16: Cultural Vitality Indicator – Data types

Data type	Data examples	Sources
1. Publicly available, recurrent, nationally comparable data	*Arts establishments (commercial/not for profit) per 1000 population; % of employment in arts establishments as proportion of total employed; Not-for-profit arts organisations per 1000 population; Not-for-profit community celebrations, festivals, fairs and parades per 1000 population; Not-for-profit arts expenses per capita; Not-for-profit arts contributions Public funding) per capita; % of arts jobs relative to all jobs*	*County Business Patterns; Occupational Employment Survey (OES); Non-Employer Statistics (NES - self-employed), Bureau of Labour Statistics (BLS)* *National Center for Charitable Statistics (NCCS)*
2. Publicly available, recurrent, locally generated data	*Administrative Data; Survey data; Directory and List data*	*Schools, Libraries, Parks, Local Authorities, Visitor surveys, Market research data*

Rosario-Jackson et al 2006

Secondary data was also supplemented with qualitative documentation, including ethnographic data (observation etc). Calculated at Metropolitan Area (MSA) level to rank and compare cities using this Cultural Vitality index.

This study demonstrates that there appears to be little evidence that participation in cultural or art activities directly influences local employment potential. However, there is widespread belief that participation (in drama, music, performance and in sports) facilitates transferable skills development (such as team working and personal confidence). Case studies of community arts projects in regeneration areas have noted the move from community art projects to community businesses providing training and employment opportunities for local people. Recorded crime and monitored contact with the police are used as indicators to show short-term impacts of cultural and sporting programmes on anti-social or criminal behaviour. Evidence from a West Yorkshire Sports Counselling project found reduced recidivism from participants (Taylor, 1999) compared to a control group. However, there is a generally acknowledged difficulty in assessing causality from outcomes resulting from participation in diversionary arts and sports programmes' in regeneration areas aimed at reducing crime.

6.7 Quality of place

A detailed set of key impact indicators, derived mainly from Florida and Gertler's work[57] on change in socio economic composition, social environment, economic conditions, social and business environments (creativity, vitality, hardship, 'churn') includes:

studied. The key advantage is to make operational, models with potentially a large number of factors, by reducing the number of observed variables to a smaller number of factors.

[57] Gertler M, Florida R, Gates G and Vinodrai T (2002) *Competing on Creativity: Placing Ontario's Cities in Continental Contex, Toronto*: Institute Toronto, Program on Globalization and Regional Innovation Systems, University of Toronto.

- Change in the local community (including age structure, family composition, household income, education levels,
- Ethnic diversity,
- Years of residence[58],
- Change in the social environment (including community engagement, neighbourhood improvement, crime reduction, local arts "buzz", knowledge and appreciation of arts activities, arts driving neighbourhood improvement),
- Change in neighbourhood character (including diversity of business, loss/gain in local service amenities, diversity of artistic community, investment in streetscape improvements, heritage preservation, use of public facilities),
- Change in local economic conditions (including property values, employment, income, retail sales, vacancy rates, new business creation, building permits).

Furthermore, Jones et al. (2003) suggests that the artistic and cultural component of the area is strongly associated with growth, development, gentrification, investment etc. although the authors are wary of drawing conclusions of causation. This is a useful model for assessing the impacts of physical regeneration projects, primarily using secondary data. It suggests that it is possible to use a wide range of data to identify a relationship between a single regeneration project and its demographic, social and economic impact.

Negative impacts or externalities - noise, overcrowding, unused facilities, increased council tax and increased crime – are rarely modelled in impact assessments however. One reason is that many impact assessments are commissioned by advocacy agencies.

Molotch and Trekson (2009) suggest that the relocation of arts venues (private art galleries) is determined by the fluctuations in the international art market (and see Plaza's 2009 Guggenheim study, Section 3. above). Price levels commanded by a limited number of artists and a few clients as well as the nature of the art on sale can influence the location patterns of galleries and the location of spin-off effects in terms of other retail, cafes, bars etc. Markusen (2006) and Mommass (2004) likewise identify the production and location requirements of arts and cultural producers within the urban infrastructure/morphology to explain the formation of cultural and creative economic clusters. Here the local social networks and urban morphology often combine to enhance the spillover effects from public/private investment in anchor institutions and facilities.

Area regeneration can be problematic as the impact area needs to be defined, in doing so it is thought that this definition needs to be 'people centred' and therefore capable of capturing the impacts of the people within an area. Whilst area regeneration projects are not consistent in the measurements of outcomes, an established measurement of outcomes includes participation.

[58] In the UK such data may come from the Census or to an extent the Annual Population Survey.

7. Annex 3 – Methodology

TBR and Cities Institute undertook the following four-stage methodology in order to meet the objectives (detailed in the introduction) of the project.

- Desk research and Literature review
- Fieldwork
- Data analysis
- Report writing and recommendations development

7.1.1 Desk Research and Literature Review

The desk research and literature review investigated the data sources, regeneration projects and past evaluation studies that had important features associated with evaluating C&S investment impacts. The desk research identified projects and data that could be examined to understand their use within an evaluation study. This required the identification of appropriate data sources that could be used in an evaluation study and regeneration evaluation studies involving relevant data sources and evaluation techniques.

The literature review investigated policy documents and academic research that has examined C&S investments and its effects. To do so, a number of discourses were investigated, including:

- The effects of C&S regeneration
- Regeneration evaluation models
- Assessing the impacts of interventions within a locality

The literature review contains a broad assessment of the methods used to assess the economic, social and regeneration impacts of investment in C&S infrastructure. The review informs the wider context of the feasibility study and identifies a selection of studies of relevance for the study. These studies examine and analyse the statistical estimation techniques, data used to address the research question and provide detail on the attempts to tackle evaluation-related issues such as the counterfactual and self-selection. The literature review draws conclusions on these central factors, and their implications for the feasibility study.

7.1.2 Fieldwork

To develop the desk research and literature review, the fieldwork investigated the data, projects and statistical methods and techniques in more detail. Fieldwork consisted largely of communication with regeneration data holders/providers and stakeholders. The fieldwork contributed to the data and project assessment and is therefore discussed in connection with these two areas:

- The regeneration project assessment required information on regeneration projects which had attempted to evaluate the impact resulting from the intervention. Details pertaining to projects' size, aims, cost and evaluation methods are important in understanding how evaluation is undertaken and the data that's used in doing so. In particular, the evaluation methods used were assessed and the information regarding outcomes and data sources used to inform the data analysis. Analysis of the results of this exercise is located in Annex 4, page 87.
- The impact/outcome data assessment requires detailed information on the available data sources and as a consequence, each data source uncovered in the desk research was assessed individually for its characteristics including: sample size, iteration date, accessibility, geographic coverage, etc. The data assessment provides feedback on the key challenges that arise when accessing data under these headings. In doing so,

characteristics like availability, currency and geographic detail are understood and their use in an evaluation study can be measured. Analysis of the results of this is located in Annex 5, page 94.

7.1.3 Data Analysis

In determining whether secondary data can be used, the available data has been assessed to understand its suitability in evaluating C&S investments. In particular, available longitudinal datasets on businesses, and data on property transactions (commercial and domestic), were examined to assess whether these datasets are robust enough and sufficient in their coverage to estimate the investment impacts.

The limitations of the models and data sources used by the studies were assessed in the context of replicating them in a C&S context. The analysis investigates what comparable sources are available in the UK and whether available data on an alternative variable may be used as a proxy.

7.1.4 Report Writing and Recommendations

In collating the desk research, literature review and fieldwork, the report writing provides a full exploration of the methodology that is proposed including statistical and analytical techniques to be employed. In determining this, the report writing and recommendations develop our understanding of the data sources and statistical methodologies that can be used to evaluate C&S regeneration.

Drawing upon the literature review, data and project analysis and research that has supported this study, the study's content discusses whether it is feasible to use existing quantitative data to assess the impact of C&S regeneration projects and how an evaluation project be designed, taking into account the existing material, views of the evaluation research community and existing knowledge, theories and frameworks. Specifically this part of the methodology explores the role that business and property data play and what are the limitations of such data. Finally, it is necessary to go beyond the practical feasibility of any sensible approach and understand what other factors must be considered (e.g. cost, availability, skills required to employ the methodology). These support the recommendations which address the objectives by providing evidence on a proposed methodology for assessing the impact of C&S regeneration projects, with supporting information on likely costs and other factors.

The recommendations take the detail and resulting conclusions from an examination into existing approaches, theories and hypotheses, methodologies and experiences of regeneration projects that attempt to measure impact. Using this an investigation into the use of secondary data sources provides detail for an in-depth exploration of the methodology that has been proposed, taking into account statistical and analytical techniques to be employed.

8. Annex 4 –Investment Projects Data Assessment

There are 82 projects in the database. Table 17 below indicates the spread of projects by type (e.g. library, museum etc.). Each project is classified by its main purpose or type of facility. Projects with more than one cultural facility, such as a building considered to be 'built heritage' containing both a museum and gallery, are termed 'Multiple cultural facilities'. This type of project is often of very large scale and can also have the aim of regenerating a particular 'quarter' or area of town. The category of 'Other' contains projects that do not fit within the distinct types or are not classified[59].

Table 17: Projects by type

Sector	Number of projects
Art Gallery	5
Built Heritage	8
Concert Hall	3
Library	4
Museum	6
Performance space	1
Sports Centre	4
Sports facilities	2
Sports stadium	1
Theatre	1
Multiple Cultural Facilities	39
Other	8
Total projects	**82**

TBR Ref: W1/S1

[59] For example, some projects suggested for inclusion funded under the English Heritage Conservation Area Project Scheme (CAPS) did not contain enough detail to identify the project and classify it.

Table 18 shows the fill rates for key variables. Where some, but not all information is known on a variable for a project, it is classified as incomplete. Postcode and year opened information has been relatively straightforward to identify. Where a project may cover a wide area, the postcode used in the database is for a building that has been identified as being within the area. Full information on funding has been relatively difficult to obtain. Major sources and the amount awarded can be found easily but a full breakdown has been much more difficult to obtain. This is the reason for the majority of projects having incomplete information on total funding.

Table 18: Fill rates on key variables

Variable name	Projects with information	Projects with incomplete information	Projects with no information
Postcode	51	N/a[60]	31
Year opened	57	N/a	25
Catchment (of visitors/users)	44	N/a	38
Part of a wider project	82[61]	N/a	0
Total funding amount/ project cost	24	58	0
Objectives	36	N/a	46

TBR Ref: W1/S5

A wide range of funding sources has been identified, as shown in **Table 19** below. Funding distributors such as Heritage Lottery Fund and Lottery Good causes are the most common source of funding, and are often the largest single contributor to a project. The City or Borough Council is a frequent source of project funding, often being one of the partner organisations implementing the project itself. Central government or European Union funding (ERDF) is also cited for large projects. Charitable trusts and regional development agencies are also frequent funders of sporting or cultural regeneration projects.

All projects have several sources of funding, and commonly include a lottery funding distributor and city council as the main contributors.

Table 19: Funding sources

Funder	Total
Advantage West Midlands	1
Arts Council England	15
Arts Lottery Fund	1
Barclays Spaces for Sport	2
Berkshire County Council	1
Birmingham City Council	1
Brighton Council	1
Canterbury City Councils	1
Cityside Regeneration	1
Coventry City Council	1
DCL	1
DCMS	2
DCMS/Wolfson Foundation Museums & Galleries Improvement Fund	1
Donations	1

[60] Please note that 'N/a' indicates that this field is not applicable to the variable. 'N/a' is written in the 'incomplete' column for variables for which there is only a yes/no type answer. For example, there is either postcode information for a project or not.
[61] Information is held for all 82 projects as to whether they are part of a wider project. The number of projects that are part of a wider project is 25.

Funder	Total
English Heritage	38
English Heritage and Cowdray Estate	1
English Partnerships	3
European Commission Heritage Division	1
European Regional Development Fund	9
European Union (INTERREG programmes)	1
From 5 boroughs of Merseyside	1
Futurebuilders Scotland	1
Glasgow City Council	1
Glasgow Development Agency	1
Central government	2
Gravesham BC	1
Harrogate Borough Council	1
Henry Moore Foundation	1
Heritage Lottery Fund	33
Highland 2007	1
Highlands & Islands Enterprise	1
Highpeak Borough Council	1
Hull City Council	1
Hull URC (Citybuild)	1
Inverness Common Good Fund	1
Kent County Council	2
London Development Agency	2
Leaside Regeneration	1
Linbury Trust	1
Liverpool City Council	1
Lloyds of London Charities Trust	1
London Borough of Southwark	2
London Borough of Tower Hamlets	2
Lottery Good Causes	4
Manifold Trust	1
Medway Council	1
Millenium Commission	4
National Heritage Memorial Fund	1
Newcastle City Council	1
Non-cash contributions and volunteer labour	1
North Kesteven District Council	1
Other	11
Other trusts	1
Portsmouth County Council	1
Private Finance Initiative	1
Private investment	1
Private sector	1
Private sector funding	1
Private sector investment	2
Roger de Hann Charitable trust	1
Royal Hall Restoration Trust	1
Sainsburys Families Charitable Trusts	1
Scottish Football Partnership	1
Sheffield City Council	1
Single Regeneration Budget	4

Funder	Total
South East England Development Agency (SEEDA)	3
Sport England	4
Sport Scotland Lottery Fund	1
Sunderland City Council/TWM	1
Sure Start Partnership	1
SWERDA	1
Tate St Ives Action Group (STAG)	2
The Founding Corporate Partner Scheme	1
The Friends of Sunderland Museums	1
The Highland Council	1
The Northern Rock Foundation	1
The Robertson Trust	1
The Royal Parks Charitable Foundation	1
Tower Hamlets College	1
Trust for Oxfordshire's Environment	1
Tyne & Wear Museums Business Partners Fund	1
Tyne and Wear Partnership (Single Programme)	1
UK Online	2
Visitor revenue	1
Vodafone	1
Walsall City Challenge	1
Walsall Council	1
Wolverhampton City Council	1
Wolverhampton Development Company	1

TBR Ref: W1/S2

On other aspects of size, notably scale of project, we have found information very hard to ascertain. Both through desk research into publicly available information and by speaking directly to managers of projects, we have only found size of project information by square foot for 8 projects, and by number of units (e.g. residential flats) for 5 other projects. In conversation with some projects leaders, they themselves were not able to give the size of the project by square feet.

A total of 72 awards have been attained by projects in the database. The awards have been classified and the distribution of awards across the projects is shown in **Table 20** below. Architecture and design awards together are most common; there is a certain amount of overlap between these two categories. Design is a slightly wider category, as it contains awards that may be made on the basis of both the architecture aspect of design, but also other factors like sustainability. Conservation awards have frequently been won by projects within the database, these tend to be built heritage projects, where the regeneration is either of a building of historic interest in order to be opened to the public, or conservation with adaptation of use. The 'unclassified' category contains projects that have won awards which either have not yet been classified, or do not fit into the given award categories.

Table 20: Classification of awards

Award for	Number of awards
Architecture	14
Art	1
Atmospheric appeal	1
Benefit to community	10
Conservation	8
Culture	1
Design	14
Ethical design	1
Food	1
Heritage	5
Regeneration	1
Social objectives	1
Tourism	1
Urban regeneration	9
Award unclassified	2
Total	**72**

TBR Ref: W1/S3

Table 21 displays the number of distinct projects that have won awards or have not won anything, but have been nominated for at least one award: 32% of projects on the database have either won at least one award or have been nominated for at least one award. This high rate of award-winning may reflect the fact that projects are relatively large, and therefore have a high profile. Additional nominations where a project has won a minimum of one award are not shown here as it would result in double-counting. A similar number of projects have won multiple awards as the number who have won one award.

Table 21: Project awards and nominations

Awards	Number of projects
Won (multiple)	14
Won (single)	12
Min 1 nomination only	6
Total	**32**

TBR Ref: W1/S3

Table 22: Awards by awarding body and award name

Awarded by	Award name	Total
Academy of Urbanism	The Great Neighbourhood Award	1
	The Great Place Award	1
BBC	Power of Sport Award - Midlands Winner	1
BERR	Enterprising Britain Award	1
British Construction Industry	Building Award	1
	Conservation Award	1
	Local Authority Building of the Year	1
British Urban Regeneration Association (BURA)	Award for Best Practice in Regeneration	1
	Best Design-led Regeneration Project	1

Awarded by	Award name	Total
CABE	Prime Minister's Award for Better Public Building	2
Chartered Institute of Building Service Engineers	Major Project of The Year Award	1
CILIP	Public Libraries Group Award - Partnership	1
	Public Libraries Group Award-Delegates choice	1
Civic Trust Awards	Award	4
	Commended	1
	Excellence in Public Architecture	1
	Outstanding Centre of Vision Award	1
	Specific Mention	1
Concrete Society	Certificate of Excellence	1
Corus Kalzip Teamkal Awards	Best of the Best	1
	Best Project over 1500 sq m	1
Daily Mail British Homes Awards	Mixed use development of the year	1
Eastern Daily Press	Design & Development Award Winner	1
EU	Mies van der Rohe Award	1
Europa Nostra Awards	Medallist	1
Gold Roses Design Award	Best Public Building	1
Institution of Civil Engineers Awards	Robert Stephenson prize for concept and design	1
International Green Apple Awards	Built Environment and Architectural Heritage	1
	Civic Pride Silver Award	1
	National Gold Award	1
	Silver medal	1
International Real Estate Exhibition and conference	Best Hotel & Leisure Project	1
Irish Food Writers Guild	Supreme Award for Contribution to Food in Ireland	1
Museums and Heritage Awards	Excellence in Restoration/Conservation	2
Northern Ireland Construction Excellence Awards	'Landmark Building'	1
Public Private Finance Awards	Operational Project with Best Design	1
Retail & Leisure Property Awards	Best Public Sector Funded Leisure Development	1
River Thames Society Annual Award	Second place	1
Royal Institute of British Architects (RIBA)	Award for Architecture	1
	London RIBA Award	2
	RIBA Client of the Year	1
	South East RIBA Award	2
	South RIBA Award	1
	Stirling Prize	1
	The RIBA Inclusive Design Award	1
	West Midlands RIBA Award	1
Royal Institute of Chartered Surveyors (RICS)	Building Conservation Grand Final Award	1
	Conservation Category	1
	London Region Award for Building Conservation	1
	Project of the Year	1
	Renaissance Award for Design and Innovation	1
	Renaissance Award for Tourism and Leisure	1
	South East Regeneration Award	1
	South East Winner	1
SCALA	Civic Building of the year	1
StructE	Award for Community or Residential Structures	1
Sussex Heritage Trust	Community Award	1

Awarded by	Award name	Total
The Observer	Ethical Award - Buildings Category	1
	Most Atmospheric Market in the UK	1
The Wood Awards	Commercial and Public Access	1
Time Out	Favourite London Building	1
Unknown	Objective 2 Celebrate Award Winner	1
Other body	Building Project of the Year	1
	Art and Work Award for a Site Specific Commission	1
	Copper Cladding Award.	1
Total		**72**

TBR Ref: W1/S4

Lastly, Table 23 below contains information regarding the distribution of projects by user catchment area.

Table 23: Projects by main catchment area of visitors or users

Catchment	Number of projects
Immediate users only	1
Immediate & Local Users	31
Immediate, Local & National Users	6
Immediate, Local, National & International Users	6
No information	38
Total	**82**

TBR Ref: W1/S6

9. Annex 5 – Impact and Outcomes Data Assessment

There are 73 Data sources in the metadata database and the distribution of these by data 'group' is described in Table 24. In most cases, data sources have more than one key subject area and therefore it is possible these will be counted more than once. The data sources have been categorised into four groups. There are more data sources that show wider social measures (43) than the other data sources. Wider social measure data includes health, education, crime and environmental data and as such has a number of different data sources. There are fewest business data sets (19), however these data sources are very robust and detailed. Cultural and Sporting Social Equity data sources hold information on visitor numbers, sports and cultural facilities and participation trends. There are 24 property data sources; these sources possess data on rental, house prices and land use. Table 2 shows you in more detail the subject areas that the data covers.

Table 24: Data-sources by category

Data group	Total
Business Data	19
Cultural and Sporting Social Equity	25
Property (Private/Commercial)	24
Wider Social Measures	43
Total	**111**

TBR Ref: W4/S1

Table 25 shows the subject area coverage of the data sources. It shows that business data sources show a number of different commercial and economic indicators and wider social measures cover a broad range of subject areas, including employment, deprivation, demographics and health. Data sources can cover a number of subject areas, for example Health surveys often provide detail on health as well as deprivation, income and deprivation.

Table 25: Subject Area by category

Subject Area	Business Data	Cultural and Sporting Social Equity	Property (Private/ Commercial)	Wider Social Measures
Business Activity	13			
Business Diversity	3			
Business Numbers	7			
Business Performance	9			
Business Turnover	6			
Community				3
Crime				4
Cultural Diversity				1
Cultural participation/attendance		10		

Subject Area	Business Data	Cultural and Sporting Social Equity	Property (Private/ Commercial)	Wider Social Measures
Demographics				10
Deprivation				6
Disability				1
Disposable income		9		
Education				3
Education Attainment				6
Education Attraction/Retention				1
Education/Skills				2
Employment				13
Enterprise	5			
Environmental				4
Ethnic Demographics				3
GDP	2			
GVA	3			
Health				11
Holdings and Storage Capacity			2	
Housing			4	
Income				6
Infrastructure			1	
Inward Investment	4			
Land Use			4	
Lifestyle				2
Lone Parents				1
Perception of place (external)				2
Perception of place (internal)				2
Planning			2	
Poverty				1
Preservation of buildings/landscape			1	
Property Market - Commercial			8	
Property Market - Domestic			12	
Quality of Life				6
Resources available				2
Rural/Urban			8	
Social Capital				6
Social Inclusion				2
Social Mobility				2
Sports Attendance		1		
Sports Participation		3		
Sustainability				3
Time				2
Travel and Commuting				2
Unemployment				10
Visitor Numbers		9		
Visitor Spend		7		
Voluntary Work				2
Total	**52**	**39**	**42**	**119**

TBR Ref: W4/S2

Table 3 demonstrates the geographical coverage of the data sources. This information has been filled to show the lowest publicly available geographic level of the data. It shows that data sources are most likely available at Government Office Region (28), Local Authority District (administrative) (36) and Lower Super Output Areas (21). However when we look at the data in more detail Business and Cultural and Sporting Social Equity Data have fewer data sources available at lower super output area and this suggests that there is a geographical detail shortage in these data categories. Postcode level data is another important level of data and only 3 data sources have data at this level. It is also needs to be considered that data sources may come to their geographic coverage through a number of different methods. Some will collect data at the level it is produced whilst other data sources calculate data using samples. This has different impacts upon how the data can be used in assessing the impact of regeneration.

Table 26: Geographic areas by category

Geographic Area Studied	Business Data	Cultural and Sporting Social Equity	Property (Private/ Commercial)	Wider Social Measures	Total
GB	1	1			2
GOR	4	9	3	12	28
LAD (Admin)	3	6	13	14	36
LAD (CAS)				1	1
Lower SOA	4	1	7	9	21
Middle SOA			1	1	2
Nations of UK		3		5	8
NUTS 3	1		1		2
NUTS 4	1				1
Output Area			1	1	2
Postcode	1	1	1	1	3
Regions of UK		1		1	2
UK	3	2			5
Ward (Admin)				2	2
Ward (CAS)			1	1	2
Total	**18**	**24**	**28**	**48**	**117**

TBR Ref: W4/S3

There are 43 data sources that have data available since 2008 and information on how to access the data sources is available for all data sources. Data is more consistent and thorough for certain data sources. The data that is available enables a platform from which to develop an evaluation study.

10. Annex 6 – Key Studies Summary Table

Table 27 : Key summary table for Varma (2003), CABE (2005) and CABE (2007)

		(Varma 2003)		(CABE 2007)	
		Yes/No	Notes/Comments	Yes/No	Notes/Comments
Theory of effect the study is testing		To measure the significance of green spaces in explaining the variation in house prices in London using Hedonic pricing of property		To calculate the marginal financial value that good street design contributes over average or poor design using multiple regression	
The impact/ dependent variables	Type	Economic		Economic	
	Source: Primary data, secondary data, nature of secondary data, public data, private data	Secondary (public) - House prices (£ mean price for dwellings per ward)		Secondary - House and Retail property prices/rents (property websites)	
The control/ independent variables	Type	Social, Environmental		Social, Environmental	
	Source: Primary data, secondary data, nature of secondary data, public data, private data	Secondary (public) - Green spaces, housing attributes, density, travel access (to central London), education scores (SATS), income deprivation, recorded burglaries, access to health services, air quality (NO_2)		Primary (proprietorial model) – Street design quality (audit), retail and property mix (observation); Secondary (public) – population (residential, workplace) demographics, deprivation, transport accessibility, retail catchment	
Data structure	Time-series i.e. repeated observations over time	No	Single point (2001)	No	Single point
	Cross-section i.e. observations across a range of projects	Yes	Area based (Greater London)	Yes	10 case study areas
	Panel data i.e. where there are repeated observations over time across a range of projects (i.e. both time series and cross section)	No		No	
	Geographic location (where are the areas covered)	Yes	London wards (n=760)	Yes	10 London high streets

			(Varma 2003)		(CABE 2007)	
			Yes/No	Notes/Comments	Yes/No	Notes/Comments
	Geographic scale (what geographic scale is the analysis on)		Yes	Wards	Yes	High streets (linear), 800m buffer zone
	GIS data		Yes		Yes	
Analytical approach	Averages/descriptive statistics		Yes	Dependant variables, above – Minimum-Maximum, Mean, SD, Skewness (positive)	Yes	Multi-criteria system for rating quality of public realm. CACI's retail footprint gravity model based on four components (combination of distance or travel time by car; the attractiveness of the retail offer; the degree of intervening opportunities or level of competition; the size of the population within an area), travel accessibility PTALs (TfL); Population (ONS Census, IMD), Property prices (Nethouseprice.com) and retail rents (Valuation Office website)
	Correlation analysis		Yes	Collinearity diagnostics model, Pearson correlation coefficients (-1,1)	Yes	Control variables – between street design (PERS scores), property rent/values, vacancies/voids, spend per head/catchment area. 'Best fit'
	Regression analysis estimation technique (If it doesn't say the answer is probably OLS)	Ordinary Least Squares (OLS)	Yes	Semi-log and pooled semi-log regression model using dummy variables to check for segmented preferences	Yes	Linear regression model, R^2. standardised beta coefficient
		Generalised Least Squares (GLS)				
		Maximum Likelihood (ML)				
		Generalised Method of Moments (GMM)				
	Other comments on regression					
	GIS/Spatial Impact Model as analysis tool		Yes	Used for travel access modelling	Yes	Travel journey times and retail catchments

			(Varma 2003)		(CABE 2007)	
			Yes/No	Notes/Comments	Yes/No	Notes/Comments
	GIS/Spatial Impact Model as presentation tool		Yes	Strategic green space, average house prices by ward, travel time, income support, dwelling density, crime, overcrowding, air quality, health services	Yes	Descriptive maps showing secondary data
Approach to tackling evaluation issues (if stated)	Counterfactual		No		No	
	Control areas		No		No	
	Self-selection		No		No	
	Additionality		No		No	
	Deadweight		No		No	
	Displacement		No		No	
	Causality		Yes	Multiple regression	No	
Econometric evaluation techniques (standard techniques that may have been used)	Event study		No		No	
	Difference in differences (DiD)		No		No	
	Spatial lag		No		No	
	Propensity score matching		No		No	
	Instrumental variables (IV)		No		No	
	Panel data	Random effects	No		No	
		Fixed effects	No		No	
Findings Etc…			A 1% increase in the amount of green space in a ward can be associated with a 0.3 to 0.5% increase in the average house price in that ward.		For each single point increase in the street quality scale, a corresponding increase of £13,600 in residential prices could be calculated. This equates to a 5.2% increase in the price of a flat and 4.9% to retail rents for each point on the scale.	
Limitations noted by authors						

Table 28 : Key summary table for Plaza (2008), Plaza (2006) and Coates and Humphreys (1998)

		(Plaza 2008)		(Plaza 2006)		(Coates, Humphreys 1998)	
		Yes/No	Notes/Comments	Yes/No	Notes/Comments	Yes/No	
Theory of effect the study is testing		Economic Impact of Guggenheim Museum Bilbao (employment)		Return on Investment/Net Present Value (ROI/NPV) of the Guggenheim Museum Bilbao		The linkage between sports franchises and venues and personal income in urban areas in the United States between 1969 and 1994.	
The impact/ dependent variables	Type	Economic		Economic		Income per capita (real income and growth in real personal income)	
	Source: Primary data, secondary data, nature of secondary data, public data, private data	Secondary - Employment in hotels (5*)		Primary- No. of full-time jobs in service sector		Secondary Data	
The control/ independent variables	Type	Economic		Economic		Economic	
	Source: Primary data, secondary data, nature of secondary data, public data, private data	Primary – museum visitors, secondary – tourists, employment (industry, NACE), labour productivity		Primary – total visitors, public investment (project), Secondary (public) - employment statistics, hotel bed spaces, tax revenues (additional)		Secondary data i.e. average per capita	
Data structure	Time-series i.e. repeated observations over time	Yes	1997-2006, employment (1996-2005)	Yes	Monthly visitors 1976-2004, seasonally adjusted (using ARIMA model to attribute total to museum effect.	Yes	Data between 1969 and 1994
	Cross-section i.e. observations across a range of projects	No		No		Yes	Different franchises, different stadia, different construction in 36 US cities
	Panel data i.e. where there are repeated observations over time across a range of projects (i.e. both time series and cross section)	No		No		Yes	
	Geographic location (where are the areas covered)	Yes	Single facility and City	Yes	Single facility and Metropolitan area, Region	Yes	Standard Metropolitan Statistical Area
	Geographic scale (what geographic scale is the analysis on)	Yes	Metropolitan area (city)	Yes	Metropolitan area (city)	Yes	Standard Metropolitan Statistical Area
	GIS data	No		No		No	
Analytical approach	Averages/descriptive statistics	Yes	Annual Visitor Nos., Overnight stays, hotel employment		Monthly visitors to museum and tourists to Basque country (overnight stays)	Yes	Commentary is given to analyse the results as well as the model, results and previous studies
	Correlation analysis						

			(Plaza 2008)		(Plaza 2006)		(Coates, Humphreys 1998)	
			Yes/No	Notes/Comments	Yes/No	Notes/Comments	Yes/No	
	Regression analysis estimation technique (If it doesn't say the answer is probably OLS)	Ordinary Least Squares (OLS)	No		Yes	Auto-Regressive Integrated Moving Average (ARIMA) model to estimate the % of overnight staying tourists attributable to the museum	Yes	Event study methodology and Linear reduced form empirical model are used.
		Generalised Least Squares (GLS)	No		No			
		Maximum Likelihood (ML)	No		No		Yes	
		Generalised Method of Moments (GMM)	No		No			
	Other comments on regression						Structure is given to the regression error in the Study	
	GIS/Spatial Impact Model as analysis tool		No		No		No	
	GIS/Spatial Impact Model as presentation tool		No		No		No	
	Other							
Approach to tackling evaluation issues (if stated)	Counterfactual		No		No/Yes?			
	Control areas		Yes	GVA in other national regions	No		Yes	Using average rather than other cities as control.
	Self-selection		No		Yes		Yes	Cities chosen due to sporting store
	Additionality		No		Yes	Additional tax revenues to City		
	Deadweight		No		No			
	Displacement		No		No			
	Causality		No		Yes	Attributed using ARIMA model	Yes	Link made between sport and wider economic development due to results
	Etc							Dummy Variables
Econometric evaluation techniques (standard techniques that may have been used)	Event study		No		No		Yes	
	Difference in differences (DiD)		No		No		No	
	Spatial lag		No		No		No	
	Propensity score matching		No		No		No	
	Instrumental variables (IV)		No		No		Yes	
	Panel data	Random effects	No		No		Yes	Random effects results presented

			(Plaza 2008)		(Plaza 2006)		(Coates, Humphreys 1998)	
			Yes/No	Notes/Comments	Yes/No	Notes/Comments	Yes/No	
		Fixed effects	No		No		Yes	
Findings Etc…			Employment growth in hotel and restaurant sector gained 4000 employees partly attributed to the Guggenheim Museum. 81% of goods & services consumed by tourists are produced locally		ROI of 10.9% discounted (NPV) to 8%. Initial public investment recouped after 9 years since opening, or 18 years after discounting (NPV) and accounting for continuing operational funding. 700-900 additional FTE jobs attributable to the GMB		Negative relationship between Sporting Stadia and Franchises and personal income, the authors theorised on different explanations for the reasons as to why this occurred, these were: that people were willing to accept lower real income for the non-pecuniary benefits accrued; public spending on stadia reduced public spending elsewhere in the economy; the workforce was less productive because it was distracted by discussions about sport.	
Limitation noted by the authors			None noted				The study, purposely, doesn't cover non-pecuniary benefits, which may be as valuable to society if not as easy to measure in financial terms.	

Table 29 : Key summary table for Jones (2003), Feng and Humphreys (2008) and, Stern and Seifert (2010)

		(Jones 2003)		(Feng, Humphreys 2008)		(Stern, Seifert 2010)	
		Yes/No	Notes/Comments	Yes/No	Notes/Comments	Yes/No	Notes/Comments
Theory of effect the study is testing		Economic, social, and cultural		Impact of proximity to sports facilities on residential house prices		Economic, social and cultural	
The impact/ independent variables	Type	Economic, Social [62]		Residential property prices		Cultural profile	
	Source: Primary data, secondary data, nature of secondary data, public data, private data	Secondary; Change in the social environment (age structure, family composition, incomes, education levels) – Public sector Change in economic conditions (business mix, property values, employment, income, retail sales, vacancy rates, business start up, building permits) change in neighbourhood character (e.g. crime, ethnic diversity) - is a combination of primarily public information combined with private sector business directory data.		Secondary data: "Transactions data for the year 2000 in Columbus, Ohio."		Primarily secondary data but of a type that would need significant collection and collation to use effectively. Also used private sector business directory type data.	
The control/ dependent variables	Type	Economic, Social, Property prices		House characteristics, commercial factors.		Economic, Social/demographic	
	Source: Primary data, secondary data, nature of secondary data, public data, private data	Control area data is secondary public sector information from the Canadian census.		Secondary data relating to housing physical properties and neighbourhood characteristics		Primarily public sector Census data, but also a dataset from another project whose source is unclear.	
Data structure	Time-series i.e. repeated observations over time	Yes	A highly important aspect Range of time-series used across the indicators but generally used two time points, 5-years apart with the intervention part way through the time-period.	No		Limited	Most of the analysis looks at two time points
	Cross-section i.e. observations across a range of projects	Limited	Only 3 projects considered two of them were close together and of the same type	Limited	2 stadia considered	Yes	Over 1000 blocks were assigned values.
	Panel data i.e. where there are repeated observations over time across a range of projects (i.e. both time series and cross section)	No		No		No	
	Geographic location (where are the areas covered)		Vancouver and Toronto	Yes	Residential areas around two sports stadia in Columbo, Ohio USA, exact boundary of study area not defined in article.		USA, primarily Philadelphia

[62] NB. The division between independent and dependent variables is less relevant in this study since modelling is not employed in the same way as other studies.

			(Jones 2003)		(Feng, Humphreys 2008)		(Stern, Seifert 2010)	
			Yes/No	Notes/Comments	Yes/No	Notes/Comments	Yes/No	Notes/Comments
	Geographic scale (what geographic scale is the analysis on)			Local area defined by individual postcodes or very small groups of postcodes		Individual properties, linked to zipcode		Blocks and the area within 0.5 miles of them
	GIS data			Yes	Yes	GeoDa used to map data		
Analytical approach	Averages/descriptive statistics		Yes	Including indices			Yes	Including indices
	Correlation analysis		No				Yes	
	Regression analysis estimation technique	Ordinary Least Squares (OLS)	No		Yes		No	
		Generalised Least Squares (GLS)	No		No		No	
		Maximum Likelihood (ML)	No		Yes		No	
		Generalised Method of Moments (GMM)	No				No	
	Other comments on regression				Also spatial two-stage least squares robust estimator (S-2SLS Robust)			
	GIS/Spatial Impact Model as analysis tool		No	The presentation of information spatially is a key part of the analysis to understand the dynamic of the area, but GIS is not used to create distance to amenities variables for modelling in the way other studies do.			Yes	Spatial lag regression
	GIS/Spatial Impact Model as presentation tool		Yes				Yes	Plots of indices on maps
	Other			General descriptive statistics and presentation techniques				

			(Jones 2003)		(Feng, Humphreys 2008)		(Stern, Seifert 2010)	
			Yes/No	Notes/Comments	Yes/No	Notes/Comments	Yes/No	Notes/Comments
Approach to tackling evaluation issues (if stated)	Counterfactual		Partially	In principle the wider area figures provide the counterfactual. However, trend information is often not presented so the information is incomplete.			Not as such	This study is different from other studies in that it does not look at the effect of the presence of a particular facility. Each area had a score of culture, and the measures were such that you would expect some level of culture in any area. Perhaps more counterfactual by degrees (if you didn't have as much then).
	Control areas		Yes	Some statistics presented with wider region statistics			Yes	Not control areas as such, but the differing levels of culture were accounted for
	Self-selection		No				No	But no indication that there was any selection bias
	Additionality		No				No	
	Deadweight		No				No	
	Displacement		No				No	Beyond saying that the majority of spending would be displacement, however they don't actually look at spending.
	Causality		Some	The authors are careful about claiming causality, but it is implied		Factors causing bias are controlled for where possible.	Some	Although they do not claim to have proved causality, the analysis is all about association between variables.
	Etc							
Econometric evaluation techniques (standard techniques that may have been used)	Event study		No	Do note timing of events but don't model them.			No	
	Difference in differences (DiD)		No				No	
	Spatial lag		No		Yes		Yes	
	Propensity score matching		No				No	
	Instrumental variables (IV)		No				No	
	Panel data	Random effects	No		No			
		Fixed effects	No		No			
Findings Etc…			They conclude that there is an impact in terms of growth, development, gentrification, reduced crime and reinvestment in property – residential and commercial. They note that the research is effective in demonstrating the		Positive, significant relationship between proximity to stadia and property prices.		High levels of association between density of cultural assets and various socio-economic indicators. Although they look at the impact on increase in house prices, this study is about association more than causality, and	

	(Jones 2003)		(Feng, Humphreys 2008)		(Stern, Seifert 2010)	
	Yes/No	Notes/Comments	Yes/No	Notes/Comments	Yes/No	Notes/Comments
		complex profile of social, economic and cultural impacts. In addition to monitoring the effectiveness of creative players and interventions, it is viewed as potential tool for municipal planners to develop sustainable communities.				perhaps better explains the conditions in which cultural activity thrives.
Limitations noted by authors		They see this as a first step and wish to simplify and refine research methods and tools developed over the course of the project. They do however believe in the overall robustness about their methodology, but note there is a need to improve and tweak the indicators. They also note a need to look at more case studies covering different types of facility and other regions.				They suggest a number of hypotheses for future research to further strengthen their findings. These are more about primary research into the cause and effect relationships.

11. Annex 7 – Bibliography

This Bibliography contains full references to studies cited in the text and commentary of this Literature Review, as well as studies, documents and articles read as part of background or preliminary reading, but which did not directly contribute to this work.

The 8 sources from which the studies assessed in detail (section 4
An assessment of approaches) are drawn are highlighted below using a **blue, bolded** font. Please note that the two Plaza studies are considered within one case study, so there are 8 studies and 7 case studies.

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