



Acacia cost and benefit study – an initial assessment

A REPORT PREPARED FOR THE ACACIA BOARD

May 2004

Study outline

- This study examines the costs and benefits of achieving the Acacia vision. This vision is the creation of:
 - *a definitive, consistent and joined-up national infrastructure of property addresses and related data with the related mapping so as to facilitate major economies, efficiencies and service improvements both in the public sector and throughout the economy.*
- This report sets out the economic framework in which to identify all the potential types of costs and benefits associated with a new national infrastructure. The framework involves:
 - outlining the value chain of address information, from its origination to its end uses;
 - identifying the key stakeholders in the different parts of the value chain; and
 - establishing the government's role within the value chain.
- The report then begins to develop an evidence base that can be used to measure the potential costs and benefits. Due to the very short timescales involved in this project, the study has made a high-level, and necessarily selective, examination of these issues. This report concentrates on the benefits side of the equation and only provides an initial assessment on their scope. The evidence base presented here draws on:
 - existing work carried out by Acacia and other stakeholders;
 - a series of meetings and subsequent discussions with key stakeholders; and
 - basic scenario analysis undertaken by Frontier Economics
- We believe the resulting evidence base is robust enough to allow some key conclusions to be drawn regarding:
 - the areas in which significant benefits from creating a national infrastructure are likely to arise;
 - the high-level outcomes that a national infrastructure will have to achieve in order to secure these benefits; and
 - some key obstacles that are currently holding back progress towards a new national infrastructure.

Key points

This study makes a preliminary, and necessarily selective, examination of the costs and (in particular) the benefits of developing and maintaining a national infrastructure of definitive addresses with the related mapping, readily accessible, as envisaged in the Acacia vision. The key points to emerge are:

- Organisations across the economy depend on addresses information and spend substantial sums on developing and maintaining it. The Acacia member organisations alone reported spending around £15m a year in this area. The costs to local authorities of maintaining address lists are likely to involve at least the same level of expenditure again, while the addressing aspects of the full range of local authority activities (e.g. street naming and numbering, electoral register, local tax collection, etc) may run to over £100m a year.
- It would be possible to spend either more or less on completing development of the proposed infrastructure than the estimate made last autumn (£15m-£17m of development costs, about half of it for local authorities to supplement their existing programmes, followed by annual costs of £2m possibly financed from revenues).
- The study identifies a substantial number of potential benefits, occurring at all levels of the value chain and across a spectrum of organisations.
 - The benefits include savings in data collection, handling and maintenance costs, for example in the Land Registries and credit reference agencies (where potential savings of over £1m a year are identified across just three organisations). Major savings could also be available throughout the local authority sector. To give some idea of scale, time savings amounting to only one or two staff members per district authority would release some £10m to £20m of resources a year across England and Wales.
 - Probably more significant than cost savings are the potential benefits to provision of services, both existing and new, in central government, local government and the private sector resulting from quality and access improvements in the data. We have identified some of these among a subset of users. These include more accurate and comprehensive personal identity checks, improved e-delivery of services and enhanced information on local populations allowing better policy formulation.
- While substantial numbers of benefits have been identified, it is important to note that we have been able to question only a limited number of potential users in selected sectors. A wider and more in-depth study may well identify potential benefits among users whom we have not been able to consult. Likewise greater clarity about the likely form of the national framework will allow stakeholders to identify benefits that are not currently foreseeable.
- Many stakeholders, particularly in regard to multiple-occupancy households, felt that the status quo is unsatisfactory. Some benefits can only be realised, and additional costs avoided, if there is certainty about the way forward. Early resolution of present uncertainties will therefore be important. Several stakeholders emphasised the need for clarity about access costs, and commercial and IPR arrangements.

The remainder of the report is structured as follows

- The next section provides a more detailed summary of the main findings of this report
- The second section sets out the economic framework for examining the production and use of address information
- The next section provides three short case studies on potential benefits arising from improvements in the quality of address information. The case studies cover:
 - the need for improved address information in the production of the census;
 - the potential for the enhancement of existing, and the development of new, services by private sector firms; and
 - the valuation of the benefit of increasing revenue from local taxes.
- The following section scopes out a wide range of other potential benefits arising from quality improvements.
- The fourth section looks at potential cost savings in a range of stakeholder organisations:
 - Acacia members;
 - local authorities; and
 - private sector companies.
- The final section examines the need to resolve the uncertainty currently surrounding the development of a national addressing infrastructure and looks briefly at the possible costs of developing the framework.

Summary of main findings

The study identifies a substantial number of potential benefits

- These benefits occur at all levels of the value chain, with the benefits presently foreseen by users appearing greater than those foreseen by originators and packagers. Benefits have been identified across the spectrum of organisations, including local government, central government and the private sector. Specifically:
 - This study has identified numerous potential benefits arising from improvements in the quality of address and associated data. These improvements can lead to enhancements in existing services and to the development of new ones. We have been able to examine a number of these in some detail. We believe that the major benefits of a national infrastructure will arise from such quality improvements.
 - We have identified some cost savings that could be achieved within Acacia members by the introduction of a national framework. There may be greater cost savings at a local authority level. However, there are considerable variations between different local authorities, making it impossible to produce reliable aggregate estimates within the timescales of this project.
 - Some benefits can only be realised, and additional costs avoided, if there is certainty about the way forward. In particular, a number of organisations are currently undertaking investments in new technology. An early decision on the form of a national infrastructure can ensure that the investment being undertaken is compatible with it. This will avoid the need for potentially costly and time consuming reengineering of IT systems.
- While substantial numbers of benefits have been identified, it is important to note that we have been able to question only a limited number of potential users in selected sectors. A wider and more in-depth study may well identify potential benefits among users whom we have not been able to consult. Likewise greater clarity about the likely form of the national framework will allow stakeholders to identify benefits that are not currently foreseeable.

Outline of potential benefits

The potential benefits outlined in this report include:

- Enhancements of existing services and government functions:
 - improving coverage of private sector services, such as expanding credit checking services, and hence access to credit, to over 200,000 adults living at addresses that cannot currently be matched;
 - allowing better population estimates to be generated, particularly in relation to the undercounting of the population in certain areas, from the £200m spent on the 10-yearly census;
 - improving local authorities services, allowing the delivery of more effectively tailored services such as social care or extra education to local populations;
 - improving of the collection rate of local taxes;
 - facilitating more accurate identity checking and providing assistance to the immigration service through improved information on houses in multiple occupation; and
 - reducing in the sampling error involved in ONS social surveys and increasing the accuracy of local area statistics.
- Development of new services:
 - allowing the private sector to develop new, value added, services, such as address management software based around additional address-related datasets as well as the PAF;
 - facilitating interaction between the public and private sector service providers, such as by allowing utilities to more efficiently inform local highway authorities about the location of proposed road works;
 - allowing the development of services to provide intelligent travel related information, such as potential travel times, by linking road specific information (e.g. speed limits, low bridges, etc) to a definitive road and property mapping; and
 - allowing greater access to existing property information through map based interfaces, particularly in relation to rural areas where addresses are less reliable.
- Reductions in the costs of creating and maintaining address data which, with the implementation of a fully developed, accurate, current and regularly maintained national addressing infrastructure, would include:
 - around £900,000 per annum of savings for the Land Registry;
 - a substantial amount of the £250,000 annual maintenance budget of Registers of Scotland; and
 - potential cost savings in the private sector, including around £200,000 in one contacted stakeholder.
- Resolution of the current uncertainty over the future direction for UK property addressing, allowing organisations to:
 - incorporate support within existing IT investment programmes; and
 - begin the development of supporting services.

We can draw some conclusions about what the framework needs to achieve and how progress can be made towards it

- It is beyond the remit of this study to consider the form the national infrastructure should take, how it should be delivered, or what its relationship should be with existing facilities, such as the NLPG, the PAF and OS data.
- However, we can identify the high-level outcomes that a national infrastructure would have to achieve in order for all the benefits outlined in this report to be realised. These are:
 - a widely available and definitive means of cross-referencing between the major sources of address information;
 - a universally agreed mechanism for accessing at a national level address information generated at a local authority level and from other sources; and
 - a definitive and regularly maintained source of property data that includes information not currently available via the PAF, such as details of sub-premises and geographically related objects without postal addresses.
- It should be noted that many stakeholders felt that the status-quo was unsatisfactory. In particular, stakeholders noted the following points:
 - There are several existing sources of address data, which are not all readily accessible or consistent. Indeed, there was concern that not all data sources were maintained to well-defined and verified standards.
 - There are on-going disputes over the intellectual property rights for particular data. It is important to recognise that little of the benefits outlined in this report can be realised unless this is resolved. Whatever decisions may be made for the future, it will be important to solve the issues of access costs and commercial and IPR arrangements, though the solution will depend on the nature of the delivery structures and processes chosen.

The companion study by the project managers on stakeholder requirements elaborates on these issues in some detail.

- On the costs side, the ISB bid last autumn estimated development costs at some £15m, followed by a self-financing regime thereafter. Depending on the actual form of the infrastructure, there is scope for spending more or less up front than this bid envisaged. In terms of value for money, the amount that is worth spending on development, and the priorities within the programme, depends on the scale of the benefits foreseen.

There is potential for future work to improve the evidence base

Given the limited timescales within which this study has been conducted, there is clearly scope for further improvements in the evidence base. We set out our views, based on the data collected to date, about where any additional work should be concentrated.

○ **Further analysis of the benefits from quality improvements:**

- In some areas, the timescale of this project has not allowed a detailed investigation of the potential benefits. These areas include the potential for quality improvements in some local authority services, the utilities and the emergency services, including the police.
- In other areas, there is considerable scope to enhance the evidence base. Such enhancements will, however, be much easier to deliver once the structure of the new national infrastructure has been more clearly defined.

○ **Further analysis to better identify possible cost savings:**

- Among the Acacia member organisations, estimates of potential cost savings in data collection and management vary widely. More detailed analysis of the processes of each organisation, and the overlaps, as discussed in the separate report by the project managers, would indicate the scope for further savings. We believe, however, that cost savings in this area will be less important than user benefits in establishing the case for a new national infrastructure.
- Due to the importance of local authorities in the data origination process and the large number of such authorities, a further investigation of how LA processes could be improved would be most valuable.

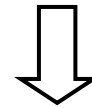
Economic framework

There is a value chain of address information

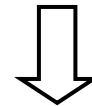
The study involved assessing the use of address data across a range of organisations. At a high level, we can divide the contributions of these organisations to the value chain of address information into three categories:

- **Data originators.** These are organisations that directly gather information about events in the real world that affect address data. The primary data originators are the local authorities. In undertaking their statutory duties (e.g. handling planning applications; compiling electoral registers; collecting council tax and non-domestic rates) they acquire information about new and changing addresses. Aside from local authorities, a number of other organisations also originate data. Examples include:
 - Royal Mail via the postal network;
 - Ordnance Survey via its surveyor network;
 - the Land Registry and Registers of Scotland in the course of the registration of property ownership; and
 - the VOA in the course of the valuation of property.
- **Data packagers.** These are organisations that package up data into a new form. For example, the Royal Mail packages address data to create the PAF, a list of addresses primarily designed for postal delivery. In general, data packagers bring together data from more than one source. Only two organisations we studied were solely data packagers – Intelligent Addressing who package local authority and other data to create the National Land and Property Gazetteer (NLPG) and an address management software vendor.
- **Data users.** These are organisations that use address data to provide a particular service. Most of the stakeholders consulted during this study were data users (the exceptions being Intelligent Addressing and the address management software vendor). The uses of the data varied between all these organisations. For example:
 - Royal Mail use the data to deliver post;
 - VOA use it to value properties; and
 - A private sector company uses it as a way of referencing credit checks.

Data originators



Data packagers



Data users

The role of stakeholders in the address information value chain

The following table sets out the role of the stakeholders interviewed during the course of this study in the value chain for address information. In addition to these organisations, we also spoke to the Office of the Deputy Prime Minister, the Office of the E-Envoy and the Acacia project team.

Organisation	Originator	Packager	User
<i>Acacia members or their representatives</i>			
Intelligent Addressing (for LGIH)		✓	
Ordnance Survey	✓	✓	✓
Land Registry	✓	✓	✓
Registers of Scotland	✓	✓	✓
Royal Mail	✓	✓	✓
Valuation Office Agency	✓	✓	✓
<i>Other government organisations</i>			
Local authorities	✓	✓	✓
Office for National Statistics			✓
Home Office			✓
Department for Transport			✓
<i>[passage omitted at request of stakeholder]</i>			✓
<i>Private sector organisations</i>			
A credit checking agency		✓	✓
An address management software vendor		✓	

The current value chain has a number of important structural features

There are a number of particularly important features of the current structure in which address information is produced. All of these have consequences for the development of a national infrastructure.

- **The role of local authorities.** Much of the address data is originated by local authorities while undertaking various statutory duties. This means that similar data is originated in around 375 separate organisations. From a purely address data point of view, it may be more efficient to produce this data in fewer, larger-scale organisations. However, the organisation of statutory functions is clearly driven by factors other than the need to originate address information. So the multiplicity of data originators is taken as a fixed feature of the value chain. This presents two issues for a national infrastructure.
 - There needs to be a mechanism for drawing together the information from each of these local sources into a national format. There are already mechanisms that aim to achieve this. The main aim of the National Land and Property Gazetteer (NLPG) is to bring together the local land and property gazetteers. And the VOA holds lists of all properties assessed for local taxes.
 - There may be important economies in the development of a coordinated approach to the way local authorities administer their address data. It is unlikely that more than 300 bespoke IT solutions will be the way forward. A national infrastructure may allow greater uniformity in approach at a local level.
- **The roles of Ordnance Survey and the Royal Mail.** Both these organisations play a central role in the value chain of address information. The Royal Mail is responsible for postal addresses, including the allocation of postcodes, and the Ordnance Survey provides definitive geographical references for the UK. Both organisations will continue to play central roles within any foreseeable national infrastructure.
- **The assignment of intellectual property rights.** There are currently on-going disputes over the intellectual property rights for particular data. This has effectively led many stakeholders to view the sources of address data as being split into two camps. The first is grouped around the Royal Mail's PAF and Ordnance Survey's AddressPoint geographical data. The second is organised around the National Land and Property Gazetteer. It is important to recognise that little of the benefits outlined in this report can be realised unless these two worlds are brought together.

We have examined possible benefits from moving to potential national infrastructures

- The Acacia vision has been set out as:
 - *a definitive, consistent and joined-up national infrastructure of property addresses and related data with the related mapping so as to facilitate major economies, efficiencies and service improvements both in the public sector and throughout the economy*
- It is clear from discussion with stakeholders that there is currently no consensus view about what this national infrastructure will look like. This causes difficulties in a cost/benefit study. In agreement with the Acacia board, we have concentrated on the benefits side of the equation. For each potential benefit, we have established the high level outcomes that a national framework would have to achieve in order for the benefit to be realised.
- The outcomes of the national infrastructure necessary to achieve all the benefits outlined in this report would be:
 - a widely available and definitive means of cross-referencing between the major sources of address information;
 - a universally agreed mechanism for accessing at a national level address information generated at a local authority level and from other sources; and
 - a definitive and regularly maintained source of data that includes information not currently available via the PAF, such as details of sub-premises and geographically related objects without postal addresses.
- In agreement with the Acacia board, this study has not considered how any national infrastructure should be implemented to achieve any or all of these outcomes. There are issues about how much the proposed national infrastructure will cost. The costs will depend in practice on the specifications and processes used. In terms of value for money, the amount that is worth spending on development, and the priorities within the programme, depends on the scale of the benefits foreseen.

The potential benefits of a national infrastructure can be divided into different categories

There are three principle categories of benefits that could arise from introducing a national infrastructure.

- **Cost savings.** For data originators and packagers, the introduction of a national framework of address information has the potential to deliver cost reductions. The particular examples include:
 - Data originators: replacement of directly originated or collected data with information supplied by other originators or packagers.
 - Data packagers: reduced cost of packaging data through easier cross-references between data sources; removal of duplication by allowing a single organisation to perform a given packaging task (e.g. linking records to the PAF or data matching) currently performed by multiple organisations.
- **Quality improvements.** Address data in itself has little value. Its major role is in facilitating the services provided by data users. A national framework, by increasing the quality and coverage of available data, could allow data users to improve their existing services. It is also possible that the national framework could allow entirely new services to be developed. Two points should be made about the benefits arising from quality improvements.
 - The benefits are highly heterogeneous. The use of address data varies widely between data users. Some provide services that are highly related to address information and service improvements flow directly from improvements in the quality and coverage of the data. For example, a private sector company consulted can only carry out a credit check if they can match an individual to an address – increased coverage of addresses increases the coverage of the service they provide. In other cases, data users want improved information to allow functionality that is subsidiary to their main role. So, for example, the VOA are interested in attaching spatial coordinates to their data to allow map-based access to it. Land Registry similarly want to improve address information so as to facilitate on-line access to their data. Given this diversity, assessing each and every potential benefit in detail would be a large-scale undertaking.
 - There may be currently unmet demand for quality improvements. A number of stakeholders felt that they would like to move forward and deliver new or improved services but were constrained from doing so by features of the current infrastructure, in particular the restricted access to the NLPG.
- **Certainty.** Some benefits can only be realised, and additional costs avoided, if there is certainty about the way forward. In particular, the world is not static and a number of organisations are currently undertaking investments in new technology. An early decision on the form of a national infrastructure can ensure that the investment being undertaken is compatible with it. In the case of local authorities, a national infrastructure may allow coordinated approaches to data handling, and avoid organisations duplicating investment in developing bespoke solutions.

Government has a role as originator, user and standard setter in the value chain

In any public sector cost benefit exercise, we need to establish the rationale for government intervention. In regard to property information, government, in its widest sense, has a number of distinct roles:

- **Data origination.** The government plays a key role in the value chain by being a key originator of address information. Local authorities have a statutory role in assigning certain aspects of addresses, while the Royal Mail maintains a definitive list of postcodes. Also, a large amount of information on changes to property addresses is generated during the performance of key government functions, such as taxation and the registration of changes in legal title.
- **Data usage.** The government is also a key user of address information. The information is needed for a wide range of activities and across many different levels of government, as outlined in this report.
- **Policymaking and standard setting.** There are also reasons for a wider interest by government in property addressing information. Information has particular economic characteristics that differentiate it more traditional goods. For instance:
 - It may be efficient for there to be a single producer of definitive data, as duplication of costs may not make sense. In such cases, government regulation may be necessary, as normal competitive pressures will not apply to the sole producer.
 - The additional cost of using data is very small, so pricing at this level will not cover the fixed costs of generating the data. In such cases, the government may have a role in setting the pricing structure and ensuring that monopoly positions are not exploited.

Also there may be a key role for government in directing what is to be done (e.g. whether there is to be a national infrastructure) and setting standards across the range of local originators and packagers. This would ensure that an acceptably uniform quality is available across the country and problems of duplication and omission between (as well as within) local authorities are effectively tackled.

Aside from these on-going roles in the value chain, there may also be a short-term need for government action to overcome particular features of the current structure in which address information is produced. As noted, there are currently on-going disputes over the intellectual property rights for particular data. This has effectively led many stakeholders to view the sources of address data as being split into two camps. It is probable that some form of government action will be necessary to resolve this situation.

Quality improvements: short case studies

This section sets out three short case studies of potential benefits

- This section sets out three short case studies. These are intended to indicate how the potential benefits from a national infrastructure could be realised. The following section outlines other areas where, due to the timescales of this work, it has not been possible to examine the potential benefits in as great a detail.
- The case studies look at the potential value of benefits that improved address data could provide through:
 - enhancing the accuracy of the census;
 - facilitating the private sector to improve the coverage of existing services and to generate new ones; and
 - securing additional local tax revenues.

There is a clear demand for improved address data for use in the census

- There were a number of well documented problems with the 2001 census which lead to an undercount of the population in certain areas. This was primarily driven by a lack of information on multiple occupancy houses.
 - The basis of address information used in the census was the PAF. In most areas of the country this provided an accurate means by which to identify households. As most houses are occupied by a single family, postal addresses in PAF give relatively accurate coverage. But in certain areas the PAF does not accurately reflect the household structure of the normally resident population. These tend to be areas where there is a high transient population and properties are sub-divided into separate flats, bedsits, etc.
 - The census enumerators gathered specific local information on households in these areas, but this did not resolve all the problems. Since the census, the population counts for Manchester have been revised, and a review is underway in Westminster. Population estimates may be revisited in other areas as well.
- The cost of distortions to resource allocations could be high.
 - The census is used to obtain population estimates, which in turn drive the allocation of central government funding to local authorities. If the local population is underestimated, this will result in too few central resources being allocated to such areas. This in turn will result in under-provision of services (relative to the assessment exercise) and/or higher council tax for local population. While these effects have been identified in theory, there are no existing empirical estimate available of size of these distortions.
 - However, the census costs about £200m to conduct, which can be seen as representing the minimum value society places on getting population estimates right. It is likely that getting more accurate population estimates will be valued as small but significant proportion of this amount.
- The census has also incurred some additional costs as a result of poor quality data.
 - For the 2011 census, the ONS plans to start posting out the census forms where there is good PAF coverage of the population. However, in areas where the PAF is weak, there will be a need to use local enumerators. ONS estimate that local checking of addresses in 2001 cost around £750,000. Much of this expenditure could be saved if a better address list were available.
 - The ONS have undertaken various exercises reviewing the data following the 2001 census. For instance, the Census Matching Project compared administrative address lists in Manchester and Westminster with those used for the census. Local authorities that have been concerned about the undercount in their areas have also expended resources on investigating the situation. However, we have been unable to obtain any estimates about the level of these expenditures.
- A new national infrastructure could improve the situation if greater information were available on multi-occupancy addresses and households.

There are potential benefits from improving the coverage of private sector services...

During the evidence gathering phase of this study, we met with two private sector organisations. In both cases, we have identified potential for the services they provide to be improved through a national infrastructure for address information.

○ **A credit checking business.**

- The company are one of the largest private sector users of property address information in the UK. Their credit checking department has an annual UK business turnover in the region of £150m.
- The company currently encounters problems in locating approximately 10% of the UK population from address information supplied by individuals seeking credit. These problems stem from the electoral roll not providing detailed enough information on the property addresses, or the customer providing information that is very different from information held by the company. In terms of the level of detail of the information available, problems occur most often with sub-premises and countryside addresses. There are particular problems with Welsh addresses and addresses relating to Scottish tenements.
- Computer and manual reconciliation work resolves most of the problems. However, approximately 0.5% of property addresses end up being unresolved. This translates to over 200,000 adults not being able to access credit in the UK. The company envisages that an improvement in the quality of electoral roll data (possibly by making an easier match between local authority property addressing and the PAF format) would reduce the number of property addresses that cannot be identified.

and there is potential for the private sector to deliver new services

○ An address management software vendor

- This company is a value added reseller of PAF data. They specialise in the development and sale of address management software. The software that the company supply can be easily integrated into other software applications (e.g. customer relationship management systems). Their main business is based around PAF, where they have a substantial proportion of the UK marketplace.
- The company believe that there could be a market for local authority originated address data over and above the PAF, provided this data is of a high quality. They identified the more geographically focused nature of this data relative to the PAF (i.e. the inclusion of objects without postal addresses) as the key element likely to be valued by their consumers. The potential customers for this data would include the emergency services and the utilities.
- The company also identified local authorities and central government as potential customers. The relationship would be similar to that with the Royal Mail (the company currently sell the PAF, augmented with their search technology, back to the Royal Mail). The company felt that there is a market for both a product which uses the NLPG as opposed to PAF in the back-end of their products but also a potential market for the UPRN matched to PAF. If the NLPG was matched against PAF and each PAF address was allocated a UPRN, then it could be possible, should the data become available, to return a PAF address plus a UPRN. This would be of benefit to any organisation or central or local government department who wished to return both a PAF address and its equivalent address on the NLPG.
- The company believe that they could generate an uplift on their current level of trade, already in the tens of millions, if they had access to local authority information cross-referenced to the PAF. However, they were unable to estimate the size of this uplift, especially as the pricing of access to the data has not been established. The company's business is based around an invest/develop once, sell often model. So they were interested in a pricing structure that would allow a relatively high volume of trades and would provide a reasonable entry level price for the market, particularly where low user numbers are prevalent.

A national infrastructure could improve the collection rate of local taxes...

- **A large amount of local tax revenue goes uncollected.** Work in connection with the ValueBill estimates that around 4% of the council tax and 2% of non-domestic rates are uncollected. In monetary terms this translates into over £800m of uncollected revenue. There may also be additional revenue foregone because properties are not registered for tax purposes over and above the uncollected figure.
- **There may be scope for a national infrastructure to increase the collection rate of local taxes.** This could occur if the VOA and tax collection departments in local authorities had access to more accurate and timely information. The existing ValueBill project aims to reduce uncollected revenues by 25%, yielding over £200m in additional revenues each year. No estimates are currently available on the impact of a new national infrastructure on tax collection, but extrapolating from the figures in the ValueBill business case, each 1% increase in collection rates would amount to an £8m increase in revenues.
- **The valuation of the benefit of additional revenue is complicated.**
 - Taxes are transfer payments, in that they redistribute purchasing power from one individual or organisation (in this case taxpayers) to another (in the case of taxes, to the government). As no additional output is generated from this transfer (as opposed to the uses to which the tax revenue may be put), the gross amount of transfer payments are generally not included in cost/benefit studies. To see this intuitively, it is clear that we would not pay £100, or even £95, to collect £100 of tax revenue.
 - Rather than considering the gross amount of revenue generated, we need to assess the value of increasing the efficiency with which tax is collected. There are a number of possible criteria – one would be that an efficient collection system would trade off the costs of collecting an extra unit of revenue against benefit of marginally reducing tax rate on other taxpayers. There will also be value in having a “fair” tax system, were taxpayers are seen to be paying the amount of tax for which they are liable.

and we can place rough bounds on the value of collecting more revenue

- **There are no generally accepted valuations of the benefits of collecting extra revenue.** But we can get an idea of their likely scale by examining the average cost of collection of particular taxes. The table opposite shows the average cost of tax collection for the major Inland Revenue taxes.
- **Average costs of collection can provide a lower bound** In terms of complexity, the taxes most similar to council tax and non-domestic rates are likely to be capital gains tax and inheritance tax. The average costs of collecting £1 of these taxes is 2.7p and 1.4p respectively. These will be lower bounds on the value of collecting an additional £1 of revenue.
- **The upper bound on these valuations is likely to be considerably higher than the average.** It is likely that the marginal value of collecting an additional £1 is well in excess of the average value, because we care about the fairness of the tax system. Taking a figure that is four times higher than the average cost of collecting capital gains tax would produce a value of around 10p per £1 collected.
- **Using these bounds suggested, every 1% improvement in the local tax collection rate would justify between £225,000 and £800,000 of on-going expenditure on improving tax compliance.**

Inland Revenue taxes and social insurance contributions	Cost of collection (p per £ collected)
Income Tax	1.41
Corporation Tax	1.15
Petroleum Revenue Tax	0.26
Capital Gains Tax	2.73
Inheritance Tax	1.38
Stamp Duties	0.17
National Insurance Contributions	0.66

Source: Inland Revenue Annual Report 2002-03

Quality improvements: other areas identified

The section scopes out other potential benefits from improving the quality of address information

- The following section scopes out a wide range of other potential benefits arising from quality improvements. Due to the timescales of this work, it has not been possible to examine the potential benefits in as great a detail as in the preceding section. It should be noted that the benefits outlined here are highly heterogeneous. Given this diversity, assessing each and every potential benefit in detail would be a large-scale undertaking.
- Likewise, while substantial numbers of benefits have been identified, it is important to note that we have been able to question only a limited number of potential users in selected sectors. A wider and more in-depth study would identify potential benefits among users whom we have not been able to consult.
- The areas covered in this section are:
 - ONS requirements, aside from the census, for higher quality address data;
 - areas identified by the Department for Transport for benefits arising from enhanced geographical data;
 - *[passage omitted at request of stakeholder]*
 - the UK Passport Service's requirements for address information for use in checking personal identity; and
 - other benefits arising in local authorities, the utilities and the emergency services.

Aside from the census, the ONS has other requirements for higher quality data

- Aside from the census, there are other areas in which ONS see potential benefits from improving address information.
 - The ONS are considering how the proposed Citizens Information Project (CIP), which will contain up to date census information on a continuing basis, will be structured. This may follow the “Scandinavian” model, with definitive person, business and address registers and cross-references between them. Clearly this will only be possible if there is a definitive address register, but plans are not at a stage where this could be costed.
 - ONS are involved in creating a series neighbourhood statistics, that provide key information at a range of geographic levels. The information underlying these statistics will be supplied by a range of government agencies. ONS then need to match this information to geographic areas. It has been estimated that there could be a 10% failure rate on matching, which would imply about 300,000 mismatches per month. In these circumstances the ONS would use statistical methods to attempt to correct for any biases introduced to the statistics. It is not currently clear how successfully this would correct for the problem, or what the cost of developing and maintaining such adjustments would be. Further investigation would be necessary to establish the potential for a national infrastructure to generate benefits in this area.
 - Currently the ONS’s social surveys are based on the PAF. This means that certain addresses will contain multiple households. ONS have instructions for what interviewers should do when they encounter such a situation, but this adds to the sampling error involved in conducting the survey. Improved information on sub-premises would therefore allow the sampling error in such surveys to be reduced. However, ONS believe that the value of any reduction is likely to be small.

Better and more up-to-date address information should help to underpin national schemes for checking personal identity

Establishing identity is a key element in a number of core services, including the issuing of secure documentation and provision of financial services. Determining current and previous address provides a unique key for the identity checking process and improved address information should be able to ease problems currently encountered in this process.

- The UK Passport Service (UKPS) are currently piloting a new mechanism for checking the identity of passport applicants, the Personal Identity Project (PIP). UKPS are working in association with Equifax, a private sector firm that provide identity and financial services, to develop a system that confirms a person's identity. This system provides real time access to public and private sector databases, to track whether there is a record of personal interaction with these organisations. Establishing a 10-year address history is one of the central parts of this checking process. In addition, the PIP attempts to establish the authenticity of the applicant's current address, so that passports can be delivered securely. The PIP currently draws address information from a range of sources, including the PAF.
- The current trials show that there are problems in fully establishing identity in around 10% of cases. About half of these involve problems in verifying the current address. Most of these cases involved situations where people had moved within the last few months. In about 3% of cases, the applicant could not be matched to any information. Where the PIP cannot establish identity, the cases are flagged to the UKPS investigation staff for further attention.
- There is potential for improving this performance if address information is enhanced. Primarily UKPS identified the need to have more up-to-date information about people changing address, so they can verify more current addresses. But any increase in the quality of address information is likely to increase the PIP's ability to establish identity. Improvements would help to focus detailed investigations on those cases where fraudulent claims are most likely, allowing actual fraud to be more easily detected.
- In the future, there is potential for the PIP identity checking system to be used to underpin national schemes for checking and confirming personal identity.
- Improved address information may also be able to reduce the cost of undertaking checks. UKPS estimate that the address verification element of a check costs roughly £1 per application based on current assumptions. The UKPS Corporate and Business Plans forecast that there will be over 6 million applications in 2004-05. This suggests that improved address information could yield significant cost savings.

The Department for Transport see potential for both short and long run benefits from enhanced geographical information

- The Department of Transport identified a number of potential benefits from creating a national infrastructure for address information.
 - There are potential benefits if the new national framework provided an easier method for utilities and councils to locate road works. While there is a standard noticing procedure by which utilities inform the local highway authorities about the location of their proposed works, currently there is no standard method of describing location. It is proposed that notices should be required to contain OSGRs, although this would normally require an additional stage in the process. In many cases, the location will be specified by reference to a fixed location. For example, the contractor knows that gas leak is outside No 21 Acacia Avenue. The same applies to local authorities' own works in locating, say, potholes. If this property address is linked to a unique identifier, which in turn is linked to geographic referencing information, then information on road works could potentially be rapidly made available both to the network manager in the authority responsible for coordinating activities on the road, and to road users. This could improve traffic flow and could be particularly important for freight traffic. If utilities also had access to these identifiers, that could speed up the process by incorporating the information as the notice is sent.
 - Certain properties are of particular interest for transport purposes. Examples include supermarkets and hospitals, which have postal addresses, and bus-stops and car parks, which do not have postal addresses but could be included in the proposed national infrastructure as objects without postal addresses. Geo-coding the location of all such properties would allow new services to be developed using GIS technologies. Recently Transport Direct, the new government sponsored portal for transport information, started geo-coding the location of all bus stops in the UK. Further investigation will be needed to establish how this geo-coding was achieved and how it will be maintained..
 - In the longer term, the Department expressed an interest in linking road specific information to a definitive road and property mapping. The information cited included speed limits, road classifications and low bridges. This information could allow the development of services that provide intelligent information about potential travel times and in future allow automatic car speed controls. Equally information on weak/low bridges could help in the planning movement of abnormally large goods. The DfT are currently creating a system to allow electronic planning of such movements.

[Passage omitted at request of stakeholder]

Other benefits are likely in local authorities, the utilities and the emergency services

- Local authorities provide a wide range of services. Intelligent Addressing have informed us that most local authorities hold between 60 and 120 address datasets. The Local Land and Property Gazetteers (LLPG) now being developed will help to deal with this. If a national infrastructure for address information was able to increase the quality and accessibility of data within local authorities, then there is significant potential for improved service delivery. A number of examples were identified by stakeholders:
 - Improved information could be used by some councils to provide more sophisticated services to residents. For example, Surrey County Council is using user address identification to improve enquiry and transaction handling and to deliver tailored services such as social care or extra education.
 - If improved property address information is held by medium sized and smaller organisations, the public-private interaction would be made more efficient as the organisations would be able to more easily locate and provide their services – rather than rely on local authorities to provide more detailed location information.
- There is scope to improve the access of customers to existing services. For example, the VOA are committed to greater transparency in the information underlying valuations used for tax purposes. They would like to be able to provide a map based route to their data, particularly in rural areas where addresses are less reliable. As VOA are updating their systems to align with the NLPG, this functionality would be most easily achieved if NLPG data was combined with a definitive spatial mapping.
- The Royal Mail believed that a national infrastructure could improve the timeliness and completeness of information from local authorities about new and updated addresses. They felt that this could allow postcode information to be available earlier to interested parties, such as the utilities. This may have some benefits in terms of service provision. Further research could examine the situation of the utilities and their demand for address information.
- The Home Office identified other potential uses for improved address information and were interested in understanding more about the functionality of the proposed infrastructure. For example, the immigration service find that, when arriving at an address, they do not always know in advance whether to expect a single household, multiple flats or a series of bed-sits. However, further understanding of the infrastructure would be needed to establish whether it would provide sufficient benefits to support service delivery.
- A number of organisations identified the emergency services as potential users of improved address information, particularly if this contain greater geographic information. Further work could examine the situation of the emergency services and their demand for address information.

The potential for cost savings in the origination and packaging of address data

A definitive source of property information should facilitate some cost savings within Acacia member organisations

○ Land Registry

- The primary function of Land Registry is to hold a register of title of ownership of property. This information is originated when applications are received to register title to land. Subsequent applications record any changes to the register of title including change of ownership. Underlying this is a property address information dataset that was put together using data provided by Royal Mail together with information provided by Address Point (Ordnance Survey) and non-postal address properties originating from property descriptions on the register of title.
- The property address information is updated in two ways. Firstly, there is a periodic automatic update of address information from Address Point. Secondly, a manual update by Land Registry internal users from information provided by local authorities or taken from applications received.
- Both the register of title and the property address information datasets are updated continuously. The register of title is updated from information sent through by applicants and the property address information dataset is updated from a variety of sources.
- Land registry estimates that it spends an approximate annual figure of £3,674,000 on keeping its property address information dataset up to date. This figure is broken down into the following constituent costs:
 - £2,500,000 for the District Land Registry staff costs
 - £1,000,000 for local address managers
 - £100,000 for staff in survey and mapping services
 - £50,000 for IT staff costs
 - £21,000 for IT staff costs for the maintenance aspect of the data integrity project
 - £3,000 for the PAF licence
- It is difficult to identify what proportion of these costs would reduce due to the development of the national infrastructure. Land Registry consider that there could be savings of approximately £900,000 per annum across the casework and local address management areas if the implementation of a national addressing infrastructure were to be fully developed, accurate, current and regularly maintained.

A definitive source of property information should facilitate some cost savings within Acacia member organisations

○ Registers of Scotland

- With one definitive data source maintained by a separate organisation, a “substantial amount” of the £250,000 maintenance budget for the addressing could be saved. Much of this budget is spent on manually reconciling addresses, which would no longer be necessary. A residual part would still come from original change information on addresses that comes when properties are registered.
- Registers of Scotland felt there was little scope for direct cost savings if the national infrastructure only involved an increase in the quantity of information flowing into them, say through improved cross-referencing mechanisms. This might reduce some of the costs from checking problems reported by clients, but the extra quantity of change information to be handled would probably increase costs.

○ Valuation Office Agency

- Considerable investment is already being undertaken to enhance bilateral links between the VOA and other organisations, such as local authorities, the stamp office and the Land Registry. This investment is based around the use of the Unique Property Reference Number (UPRN), and the NLPG. This investment may lead to significant cost savings.
- The VOA might also be able to make savings by reducing its own origination of data. VOA currently issues questionnaires to businesses about sales transactions to underpin their valuations of properties. They hope that better data links would allow them to reduce the amount of information they collect via this route.
- The VOA believed there would be little cost saving if new infrastructure involves enhanced cross-referencing of information. It was felt that the Acacia trials had indicated that such a system could lead to a large increase in work load.
- There is some scope to reduce costs if data from the PAF and the Ordnance Survey was supplied from a single source. However, the VOA is likely to retain a number of bi-lateral links, as it needs to access taxing data on properties on a timely basis to ensure up-to-date taxing lists.

Ordnance Survey and Royal Mail, on the other hand, would not expect the national infrastructure to reduce their costs significantly

○ Ordnance Survey

- Ordnance Survey primarily provides a geo-referencing framework for Great Britain together with integrated and up-to-date topographic, address, imagery and transport network information. Address information can be mapped onto the underlying topographic information. Ordnance Survey's address information was created initially from Land-Line and has been maintained on a continuous basis since the early 1990s by adding change information from the Royal Mail PAF. Ordnance Survey adds 10cm coordinates to new addresses sourced from PAF. Ordnance Survey is a value-added reseller of Royal Mail and pays royalties to Royal Mail when Ordnance Survey address products are licensed to end-users and partners.
- Topographic information is surveyed by ground survey and photogrammetric survey methods. Addresses are matched to OS MasterMap by a national team of 360 Ordnance Survey surveyors. Surveyors operate with handheld pen computers which hold data downloaded from the master database at Ordnance Survey headquarters. Updates are passed back to headquarters on a continuous basis. The updated information is available for licensing within hours of being validated and loaded into the master database. Ordnance Survey agrees appropriate update schedules with individual end-users. Some end-users seek very frequent updates while others are content with longer timescales between updates.
- The cost to Ordnance Survey of maintaining its address information is approximately £3.5m per annum. This figure has been stable for a number of years. Surveyors undertake a number of different tasks in parallel in the field in order to make the most efficient use of their time. It is highly unlikely that the number of surveyors employed by Ordnance Survey would fall solely due to the development of a national address infrastructure. Ordnance Survey staff numbers have reduced significantly recently as result of technological change affecting the wide range of its activities. Any reductions from specific addressing developments would generate only a small further reduction in Ordnance Survey costs.

○ Royal Mail

- The Royal Mail created and maintains the Postcode Address File (PAF). The PAF is the file that provides a postcode for each physical postal address. The PAF format is also important because it is the format most often used by individuals when providing their property address information.
- The PAF is kept up to date using information collected by 80,000 postmen and fed to 60-70 full time employees who make the changes. There are also 20 full time employees who focus on maintaining the quality of the dataset.
- The national infrastructure certainly would not reduce the number of postmen that are employed. Similarly, information will continue to need to be updated and quality checks will continue to be undertaken. Cost reductions due to better information may take place in full time staff employed to update and check the information being fed through from the postmen. There may be a small reduction in the number of full time employees required due to the national infrastructure, however, this number would be small - of the order of 2-3 full time employee employment costs in total.

Due to their large number, cost savings in local authorities are potentially more important...

- There are a large number of local authorities – 375 in England and Wales – carrying out this work independently of each other. Major savings could also be available throughout the local authority sector. To give some idea of scale, time savings amounting to only one or two staff members per district authority would release some £10m to £20m of resources across England and Wales.
- According to the Whitefield survey covering local government and the NLPG, these functions are carried out to varying degrees and to different levels of accuracy by the different local authorities. Information made available to us by Intelligent Addressing (IA) tells us that around 90% of local authorities use third parties to help with initial data cleaning and matching. The remaining 10% (approximately) use internal resources to carry out the work. IA informed us that around 25 authorities are yet to actively start much work on data cleaning and matching.
- Given the degree of variation between different authorities and the short length of the project, we have been unable to speak enough local authorities to get a clear picture of the aggregate situation. Our primary evidence is based on telephone conversations with a representative of Surrey County Council and a meeting with Intelligent Addressing. We have been provided with the following anecdotal information:
 - Local authorities typically have between 1 and 5 full time employees working on a number of tasks – a small proportion of which relate to property address sorting work. Any reductions in staffing costs would be a proportion of the number employed to carry out these general administrative tasks.
 - The government has previously carried out work to consider the benefits of joining up addressing information. Specifically, the ValueBill programme is designed to improve information transfer between the Valuation Office Agency and local authorities by joining up their information services. The business case for ValueBill was developed on the basis of several assumptions and produced a total figure for cost savings of £24.1m. This number is, however, caveated heavily within the business case due to the number of assumptions made in reaching it.

There should be scope for cost reductions in the private sector

- One major role for address information is to match customers with other information held about them. In such cases, the property address information is used as a referencing tool. Stakeholders expressed the view that information provided by customers tends to be in the format found in the PAF because this is the form that customers are most used to using for providing postal information. Differences between the PAF format and other formats held by the company will lead to the need for a reconciliation process.
- We have gathered evidence on the costs of this process. We spoke to one of the largest private sector users of property address information in the UK - the credit referencing department of a company consulted. This department has an annual UK business turnover in the region of £150m. Variable resource costs for reconciling property address datasets are as follows:
 - 20 temporary staff during the first three months of each year identifying differences between the property address information provided by the electoral role in each year. There are also additional computers carrying out matches.
 - 4-5 full time employees carrying out manual matches of information presented by applicants for credit when the computer systems are unable to carry out the match.
 - Reductions in cost of employees could not be much more than £200,000.
- In the company's view, there would be reductions in the costs incurred in these reconciliation processes if the implementation of a national infrastructure led to a convergence between the format of property address information held in the electoral roll, and that provided by customers (i.e. the PAF format).

The need for certainty in developing the addressing infrastructure

Organisations are currently making risky investment decisions...

Some further benefits may be realised, and additional costs avoided, if a coordinated way forward can be agreed.

- **There is uncertainty over the future direction for UK property addressing.** Many stakeholders expressed uncertainty about how the UK's addressing infrastructure would evolve. This mainly arises from the widespread perception that the sources of address data are split into two camps. The first is grouped around the Royal Rail's PAF and Ordnance Survey's AddressPoint geographical data. The second is organised around the National Land and Property Gazetteer, which aims to package information originating in the local authorities.
- **Uncertainty makes existing investment programmes more risky.** Uncertainty about the future direction of a national infrastructure adds to the risk faced by organisations currently upgrading their own addressing infrastructure. Across government and other stakeholders, there are always investment programmes in IT improvements. For instance:
 - the VOA have recently undertaken an investment programme that has been based around the NLPG;
 - the DWP are currently undertaking a large investment programme in their IT infrastructure, including customer relationship management systems, which will involve £1bn of expenditure in 2004-05 alone; and
 - at local authority level, a range of solutions are being contemplated, with authorities like Camden making substantial investments to improve their internal use of property data.
- These organisations run the risk that, should a national infrastructure be established, they may have to reengineer their systems to integrate fully with this new framework. This would have a cost in terms of both time and money. For example, if there were an agreed national infrastructure for property addressing, then DWP could include basic support during their current IT investment programme. Otherwise, if the benefits any improved address information were not be sufficient to justify a stand alone upgrading to IT systems, then support would have to be added during the regular system upgrades. But this would both increase the cost, and delay the realisation, of any benefits.

Clarity about the future will encourage the development of new supporting and value-added products

- **Uncertainty could prevent the development of new services, which could distort how any new infrastructure is taken up.**
 - *[passage omitted at request of stakeholder]*
- It is difficult to place a cost on the effects of uncertainty. It will be proportionate to the possible benefits associated with a new national infrastructure. However, given the number of organisations that need to coordinate their efforts around any infrastructure, there are likely to be substantial benefits in an early resolution of the current uncertainty.

The costs of developing the framework should be related to the envisaged benefits

- The best existing information on the potential costs of developing a national framework comes from the ODPM's bid last autumn for funds from the Invest to Save Budget. This estimated development costs at some £15m-£17m, with estimated on-going maintenance costs of about £2m per year. The proposal envisaged the on-going costs would be covered by income generated by data licensing. The development costs were envisaged as:
 - around £6m on a quality improvement process to generate a fully integrated database including non-postal/multi-occupancy addresses;
 - payments of just under £8m to 375 local authorities in England and Wales (an average of £21,000 per local authority) for local land and property gazetter improvements and preparations for participation in new maintenance procedures;
 - about £2m for survey validation of a) multiple occupancy addresses and b) objects without postal addresses
- It is beyond the remit of this study to consider the form the national infrastructure should take, how it should be delivered, or what its relationship should be with existing facilities, such as the NLPG, the PAF and OS data. We have therefore not gathered any new information from stakeholders about the cost of developing a national infrastructure.
- Depending on the actual form of the infrastructure, there is scope for spending more or less up front than this bid envisaged. In terms of value for money, the amount that is worth spending on development, and the priorities within the programme, depends on the scale of the benefits foreseen.

THE FRONTIER ECONOMICS NETWORK
LONDON | COLOGNE | MELBOURNE | SYDNEY

Frontier Economics Ltd, 71 High Holborn, London, WC1V 6DA
Tel. +44 (0)20 7031 7000 Fax. +44 (0)20 7031 7001 www.frontier-economics.com