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Successful public/private collaboration for high volume, automated, information and e-information services to the public, business and commercial markets

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1 Background

The Coal Authority was established by Parliament in 1994 to manage unworked coal, license coal mining operations, and to deal with historic mining liabilities. The Authority also has a duty to provide public access to mining information.

It exercises this latter duty by providing public access to its collection of coal mining plans and by providing a coal mining enquiry and reporting service. The plans are largely used by mining experts, academics and engineers. The mining reports service is used in areas of property conveyance, property development and the mortgage and insurance market. Groups using the service include engineers, planning authorities, academia and the general public. The report is a due diligence requirement for law society practitioners in England and Wales and s best practice requirement in Scotland. The reports are detailed and property specific.

Last year over a thousand people visited the Authority's archive of 100,000 source plans showing coal mine workings, and in excess of 540,000 mining reports were requested and delivered.

In the past the source plans were manually interrogated to provide the mining facts that were then processed into a completed report. Today the reports are produced using the Authority's Mining Reports and Surface Damage System (MRSDS). Note: - The Authority has incorporated a sub-system within the MRSDS which is used in discharging its responsibilities for mining subsidence. This sub-system is not discussed in this paper.

The MRSDS was developed under a Private Finance Initiative (PFI) deal with systems integrators Cap Gemini Ernst & Young (CGE&Y). Beginning in 1997 the MRSDS was a joint development and provided at that time a state of the art integrated GIS/Oracle system driven by business process workflow. The MRSDS brings together a GIS containing national large and small scale Ordnance Survey (OS) digital mapping, OS digital terrain model, OS address point data, the Authority's unique coal mining database and an Oracle database for administration and enquiry tracking. The system also has to deal with the complexities of modelling three dimensional (3D) underground mining information to the real surface using complex conical projections. MRSDS uses a MOSS 3D modelling system, unseen by the user, to add the 3D analysis required by the GIS. All are accessed using a workflow system aligned at that time to a newly defined optimal business process.

The MRSDS went live in October 1998 and in 1999 was recognised with the AGI awards for Technology and Excellence in Central Government. The MRSDS project also led to recognition from the British Computer Society and the Authority is currently the proud holder of the British Computer Society's award for Excellence in IS management. The Authority and Cap Gemini, Ernst & Young (CGE&Y) are joint holders of the Management Consultancy Associations Award for Excellence in Outsourcing.

The MRSDS system will continue to be supported by CGE&Y under contract through to 2010.

The heart of the service is a GIS database of coal mining information based upon the Authority's collection of coal mines plans. The information has been captured at a scale of 1/2500 to a high degree of detail and comprises in excess of 2 million mining objects. The effects of underground coal mining are mapped in the GIS to the surface using advanced 3 dimensional modelling and an OS digital terrain model.

The system had been designed to provide a capacity of 460,000 mining reports enquiries per annum. This would provide for an extra 25% above the perceived maximum demand of 368,000. The demand in 1998 was 275,000. Since that time the demand for the service has exceeded 500,000 enquiries per annum.

This service was designed for conventional paper based delivery since the provision of an electronic service was not a requirement of the market at that time. The service was also designed to meet the requirements of the Authority and took no account of collaborative working with any other organisation. However, the existing system does provide a sound platform from which to take advantage of emerging electronic service delivery methods and is equally suited to enabling the development of collaborative working.

The Authority is seeking to develop services with other public sector organisations. Electronic service fulfilment is part of everyday life and increasing in importance, particularly in light of the Government targets for e-business deliveries in 2005.

The approach the Authority has taken to the problem of providing this service is unique and has been proven to be a resounding success. It is in light of this that it is considered appropriate to investigate the sharing of this service delivery vehicle with other Government organisations as a precursor to any further systems development.

The Authority has had to make strategic changes to the way it delivers this service to meet the changing requirements of customers, the wider markets initiative, cross government collaboration and technology. The current and potential future developments of the systems to meet these demands and the other initiatives necessary to deliver further information services is the subject of this paper.

2 Drivers

The Authority and CGEY have invested heavily in the development of the service with respect to capital, market understanding, business processes and other emerging factors influencing the market for these services.

In order to build on the successes to date the information services function will need to continue to improve the alignment of its service delivery to the needs of customers and stakeholders. It will require a dedicated organisation to be able to respond to the increasing rate of change in the market.

Despite the history, standing still in the current economic, technical and government environment is not an option for delivering the services needed by customers and stakeholders.

The transition from paper based to electronic service fulfilment is gathering pace. Electronic service requests have risen from 0% in 2000 to 33% in 2002/3. Full electronic service fulfilment is currently provided through the National Land Information Service (NLIS) and through the Authority's www.coalminingreports.co.uk website. Further developments could be required to ensure all potential electronic channels can be satisfied.

On the technology front, reliable flexible architectures using web based technologies, modular systems architecture and integration technology allows more freedom in the design of component based systems. This is viewed as the approach to providing the reactive systems required for the changing business conditions of the future.

Increasing encouragement from Government for public sector bodies to share knowledge, best practise and systems for the benefit of the tax payer and the customer has led to discussions with bodies such as the British Geological Survey (BGS), Valuation Office and the Environment Agency to look into the technical and organisational feasibility of collaboration to bring other information services to the market place in this way. Both technical and organisational issues have been studied

The findings from these studies has helped shape the nature of the current development of the systems and organisation discussed in further detail below.

3 The Requirement

The next generation of the MRSDS will need to take account of the following factors:

- The need for flexibility in the underlying technology to allow the growth of the existing services and the development of new services to at least 2 million service requests per annum. The development of services based upon other information could lead to still higher demands.
- Expansion and seasonal production issues could require services to be delivered from multiple sites through multiple organisations.
- Electronic service fulfilment will continue to expand. The transition from 90% paper, 10% electronic to 90% electronic, 10% paper service fulfilment over the next 3 years is a real possibility.
- The potential for delivering information services on non-coal mining.
- The potential for delivering new services on behalf of 3rd party organisations.
- The potential for a new organisation to focus on the delivery of information services.

4 Technology

The MRSDS system is currently undergoing its first major re-engineering since it was completed in 1998 by CGE&Y and the Authority. The project to upgrade the system (internally known as MRSDS II) was started in June 2002 and is planned for completion at the end of October 2003.

The system will deliver fully scaleable components to manage the business process. The separate components encompass the following:-

Web Based User Application

Enquiry logging with PAF address standards, finance administration and customer relationship management.

Property location and digitisation using web based ESRI GIS technology.

Batch GIS Query Engine

Coal Mining GIS database using APIC technology for batch GIS query and results formulation.

Reports production and finishing

Producing the finished article with output in paper, fax or PDF for e-mail and/or FTP transmission.

Web Services

Electronic requests service based upon PAF addresses accessed by customers through the www.coalminingreports.co.uk internet service.

Electronic requests service within the NLIS (National Land Information Service) intranet one stop shop service provision.

Integration Framework

A messaging and workflow service linking the system components based upon IBM Websphere and MQ messaging services and the Versata workflow package.

Each of the sub-systems has been engineered to be flexible within the design & volume constraints referred to above.

As demand increases additional pre-configured hardware components are added to the overall system. This is made possible by the integration services layer. Likewise if for instance demand on any component

reduces, as is likely to be the case with manual enquiry logging for paper based service fulfilment, then components are removed. Again the integration framework automatically takes account of the new system configuration.

The ability to expand or contract components gives the flexibility in the systems to quickly adapt to the impacts of market changes.

This technology will be deployed at Mansfield but the architecture allows for deployment at multiple locations.

The existing application requires a high volume of mapping data to be transmitted from a central GIS server to the user to complete the job. This has meant that the service has to be co-located with the equipment. The browser application greatly reduces the data volumes and so can be deployed into other offices to allow for expansion or to external distributed call centres to handle peak demands throughout the year.

With the establishment of the wholly owned trading company the application could be distributed to the offices of its member organisations or potentially over the internet, directly into the homes and offices of customers.

5 New Services

A coal mining report is essential for customers wishing to make informed decisions when buying or selling property in coal mining areas. However, having received a report some customers can still experience problems at some time in the future.

The coal mining reports cannot be protected from change since new and updated mining information is received on a near daily basis. The Authority understands its customer and stakeholder issues in this respect.

It is therefore possible that the contents of a coal report can vary between house purchase and subsequent house sale. The Authority does not have a liability for such changes in the reports which, in a small number of circumstances could lead to a reduction in the potential market value of domestic property. To try to help this situation the Authority will be improving its current service by introducing insurance cover for all residential mining reports. The insurance provides up to £20,000 of cover for policy holders. This cover will be provided with every coal mining report for residential property issued after the go-live date of 30th September 2003.

This service improvement, which will help customers in these circumstances, is supported by a consortium of stakeholders comprising the Council of Mortgage Lenders, Association of British Insurers, the Royal Institute of Chartered Surveyors (RICS) and the Law Society.

A further new service development is being aimed at the difficulties experienced in some parts of the UK in arranging mortgages for properties where coal mine entries are identified in the coal mining report. The existing report contains reference to all mine entries within 20 metres of the property boundary as part of the scheme agreed with the Law Society of England and Wales and the Scottish Law Society. Whilst the Authority has a liability to make good any damage caused by the ground movement attributed to a coal mine entry, there has nevertheless been perceived issues leading to problems in arranging mortgages in some circumstances.

The Authority has discussed the issues and requirements with the consortium members, the outcome being that whilst mine shafts are reported within 20 metres of property boundaries potential ground movement may affect a much reduced area. Indeed in many cases any potential ground movement could be distant from the built structure subject of the potential purchase. Furthermore any damage from such an instance is covered by the provisions of the Coal Industry Act 1994 for which the Authority has responsibility. Agreement has been reached on the form of a new report service where the Authority will provide an expert interpretation of the potential affects of ground movement of those features reported in the original coal mining report and the remedies available to the property owners.

It is expected by all involved that this service will help improve the understanding of the legacy of mining which will in turn improve the mortgage status of properties where the coal mining report contains reference to mine entries. This new service will be provided at a cost of £40 to customers who request the service, having already received a coal mining report containing reference to coal mine entries.

This service will go-live on 30th September 2003.

6 Other Related Initiatives.

Coal Mining Information

The coal mining reports service is built upon a digital GI database containing a representation of the Authority's holdings of coal mining plans. This unique collection comprises in excess of 100,000 plans showing mining activity dating back to the eighteenth century and earlier. The plans are public records and are now housed in a new state of the art archive facility commissioned by the Authority during 2002 at the Mansfield site. The facility is fully accredited by the National Archives (formerly the Public Record Office).

These plans are primary records for engineering and development projects in Britain. Due to the nature of the information and the archaic referencing system determined in the 1930's, the plans have always been the domain of specialist consultants. Whilst an understanding of mining will remain a prerequisite to understanding the plans content, search and retrieval can be improved considerably.

The plans are used by the public on a daily basis by over a thousand customers per year. Allowing the continued use of these irreplaceable mining records is not tenable due to their fragile nature. Expansion of the uses of these records cannot be considered for the same reason.

The Authority's objective is to scan these plans, to scale and in high quality colour format. This will achieve the dual goals of providing a record capable of being used in the event the original collection is lost through catastrophe and providing high fidelity colour images and prints for public use. Improved search and retrieval methods will help broaden the access to the information.

The task is formidable due to the size, nature and quantity of the originals. Some examples are in excess of 3 metres by 3 metres in size. Customers will require high fidelity copies if the originals can no longer be used. Additionally, it is estimated that the collection of images could generate in excess of 12 terabytes of data for long term storage.

The Authority has formed a close working relationship with Oce, the image and reprographics specialists, for the development of these systems. Magneto-optical mass storage is provided by Disc Storage. Disc management is provided by a Q-Star system.

It is intended to provide public access to the information through a concept mining library facility at Mansfield. Visitors to the library will use the facilities to search, retrieve, review and order hard copy of mining plan images as required. In the longer term services could be developed to allow internet access to the service, although data volumes and the large colour format of the images are likely to mean that hardcopy will still be produced and mailed from Mansfield for some time to come.

The Authority has invested in state of the art roller scanning equipment and image manipulation, storage and retrieval systems and reprographics from the Oce company. The project commenced in September 2002. The production facility was commissioned in June 2003. The customer facility will go live in October 2003.

So far over 7000 plans have been scanned and over a terabyte of data has been produced in the first month of operation.

However, this scanning facility cannot handle the very largest of the plans in the collection which comprise some 40% of the plans. These plans will require a unique very large format facility. In response to the Authority requirements Oce have put together a prototype array of high resolution digital cameras. This array will provide a single image from the array without the need for referencing marks on the originals or

the manual work usually associated with images comprising multiple elements. This approach will improve the time needed to capture the images and improve their fidelity.

If ordered this facility will provide the largest digital imaging platform of its kind in commercial use in the world.

Longer term it would be possible to georeference the images within the MRSDS APIC GIS to provide an internet map based search and retrieval system.

The Authority has also commissioned the British Geological Survey (BGS) to scan former British Coal prime geological records of deep mine borehole logs sunk for the purposes of coal exploration. This collection comprises 20,000 borehole logs and other notes with an OS National Grid reference for the locations. The work has already started and is due to be completed by June 2004.

This collaborative venture will allow the BGS and the Authority to publish the borehole information in a more meaningful way and could provide for access over the internet.

Together these two initiatives will bring together a single comprehensive database of coal mining images depicting where coal has been worked and where it is known to exist. The benefits to the UK's coal exploration and exploitation industry in the future will be considerable, a primary objective for the Authority.

The key again will be to bring the information together in a GIS to provide the framework and the natural context of the information.

Other Minerals Mining Information

Whilst the Authority offers a comprehensive information service for coal mining information, the position with respect to the mining of other minerals could not be more different. The information about the mining of these other minerals is spread throughout archives across the country. It is worth noting that whilst coal mining is widespread throughout the UK it is not commonly known that some form of minerals extraction has taken place in every county in the UK. In order to investigate the potential for providing a single source for this information a consortium of interested parties has been set up. The non-coal mining consortium comprises the British Geological Survey, the Valuation Office, the National Archives, the Cambourne School of Mines, the Health and Safety Executive and the Coal Authority. Determination of the extent of these records throughout the UK leading to a feasibility study for the collection of the records onto a single site is a prime aim of the consortium. Each member has a real operational interest in the information and to some extent already provide a service to customers relating to their own information holdings.

The work of the group could lead to a single point of reference for the mining of other all minerals to the benefit of customers and key stakeholders.

Conclusion

The Authority are committed to providing customers and stakeholders with the services they require and ensuring they are the leading public sector provider of land conveyance information.