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## Geospatial information: a foundation for a global business

Jerry Larthe de Langlature, Leadership Team, Geoscience Integrated Services, Shell International EP Technology Applications and Research

### GeoSpatial Data – a Foundation for Global Business

Spatial data can be looked at as the glue around business knowledge – through the common component of location. Over 80% of our data in EP (and probably true for most other enterprises) contains this spatial component – if you seek a common foundation or building block across your enterprise – why look further?

The Shell EP businesses stretch globally with business strategy set at the CEO level for the Group. This paper focuses on the E and P sector which by the nature of its business activities is in the forefront of innovative technology – this applies to the management of spatial data as much as the development of cutting edge tools for subsurface imaging and well engineering.

The knowledge of what we have allows us to concentrate on making the best of it while ensuring that the new ground we focus on is truly 'new'. Re-invention of the wheel is an activity in which many organisations indulge, we too have had our examples but are seeking to avoid costly re-work by ensuring that we know what we already have and where we have it. Our asset base consists not only of oil and gas fields, pipelines and facilities but also contains vital knowledge and information without which much of our core physical assets would never deliver the returns we desire. Furthermore, this knowledge and information is managed by our greatest asset – people.

People need to know what other people are doing in order to deliver best performance. You cannot put a person in a box (or technical discipline silo) and expect her/him to integrate their work with that of others in the organisation – or in the case of Shell EP with others in a far flung group of companies. The key to integration of people and knowledge is to enable the availability of the knowledge of all to all – you will be familiar with this state – we call it wisdom.

All of the foregoing begs the question – how? What is the strategy? How do we get where we want to be – and how will we know when we have arrived? Consider the extent of the problem – multiple, disparate, heterogeneous datasets covering the majority of business processes, residing in databases, data warehouses and proprietary files. Much of the data is accessed by proprietary applications unable to communicate or exchange data freely, except in some cases, through the medium of exchange file formats.

This recognition of this data management issue coincided with the emergence of a need for seamless integration throughout the EP business processes in response to an increasing need to deliver long term profitability and a consistent return on our assets. A review of business processes resulted in the adoption of an asset-based organisational structure in many of the EP companies - this gave impetus to the need for integrated data access, which in turn focussed on the spatial element as the enabler common to the majority of the datasets. The Geographic Information System (GIS) was widely regarded as the appropriate enabling technology. However, the adoption of a commercially available system which had tight links between a series of applications and a proprietary data model made the maintenance of spatial data and provision of GIS functionality (browsing, selection of data) difficult to integrate with other systems. Until recently data sharing between business-critical systems relied on the monolithic GIS with de-coupled spatial elements and other attributes. The process of data sharing between proprietary systems (and data

formats) became the domain of a limited number of experts, a with consequential competency resourcing impact on the business.

A review of Shell Group spatial technology strategy in 1997 identified the emerging Universal Server technology as a platform from which the management of geospatial information could be simplified within a completely open architecture by storing and maintaining both attribute (description) and spatial (location) components of the data in the same database. Oracle Spatial provides this open architecture and at the same time retains all the key data management and security functionality associated with the Oracle RDBMS. The review also identified the component based tools architecture (eg Open Spirit) as an alternative to the proprietary vendor solutions that were currently available .

In 1999 Oracle Spatial was evaluated with fully satisfactory results. The evaluation was performed against a set of benchmark criteria using viewing and analysis tools from a variety of GIS vendors in a controlled environment. While the evaluation demonstrated that the tools available were struggling to optimise the benefits of Spatial the functionality of the Oracle product met the evaluation criteria. However, since then the rapid development environment in which many GIS tools are deployed has enabled significant advances in functionality in the majority of the vendor products.

The evaluation showed that the possibility of global access to data throughout the businesses could indeed become a reality although there was still a long way to go. However, the strategy road map was beginning to take on a firmer shape with the subsequent evaluation of GIS vendor products to replace the existing Shell Group GIS. The ESRI ArcGIS 8 product family was chosen as the enterprise GIS, coupled with the capabilities of Oracle Spatial is to provide the next step along the path to making all data available to all people within the organisation. Global licensing agreements were subsequently concluded with Oracle and ESRI with operational deployment of the products scheduled for 2001/2.

However, although Spatial provides open access to data and is fully scaleable across an organisation this is an early step, many core issues have yet to be resolved. The many Shell businesses have variations in data models, type definitions, symbology and attributes – overcoming these differences will require extensive collaborative work between the businesses. A key question, for example, is what data may a local operating company make available to the Shell intranet and therefore by definition to the corporate enterprise? The sensitivities of joint venture partners, host governments, local interest bodies and other stakeholders need to be managed carefully to ensure that data sharing is treated as a business enabler rather than a threat.

Looking ahead to the end of 2002 – where do we expect to be? Current projects will have come to fruition, the implementation of Oracle Spatial and ESRI ArcGIS 8 should be complete, however, progress in data migration from legacy systems into Spatial will be varied across the operating units. The (Shell) North Sea operators are well advanced in sharing data - the current project covering the Southern North Sea may well be extended to other areas of the UKCS but this will be local to Europe. How to advance the process across the global business is the next question.

Emerging technologies provide an indication of the direction to take – the concept of the internet browser based portal has been discussed at length and several prototypes/pilots have been developed. The question that these applications are seeking to answer is “who is out there like me?” Who are the people working on projects that have a some sort of relationship to what I am doing? How do I find them? This portal based approach may open up part of our working environment but it has to be done in such a way to ensure that people do not see it as an imposition, another well intentioned initiative that fails to deliver because the people part has not been adequately addressed. Any proposed change in work practice (as portal technology will bring) must go hand in hand with comprehensive change and expectation management – this is so well known that it must be accepted as a given in any implementation plan.

Assuming that the intranet based portal can be successfully implemented and that people change their way of working in order to maximise the benefit, what has to happen behind the scenes to ensure seamless and transparent data availability across the business? The portal must serve information which is relevant and up to date with a minimum of user intervention and must fit the “someone like me” requirement. This calls for intelligent filtering and logic based on an individual’s business profile, and while there are systems available on the market that go some way towards this goal the universal application serving personalized, relevant data through a portal has yet to appear.

But – while we wait, there are possibilities offered by existing systems currently in use. Mapping services can be delivered through the intranet using a geography network enabled through ESRI products, this will be initially implemented in a number of Shell operating companies. The concept of a networked mapping and information service brings with it the need to understand what we have in our information assets. This need for metadata is fundamental to achieving the goal – the first question asked of any information system is “what have we got?” – a catalogue of knowledge about our information asset is therefore an essential pre-requisite. Once in place the user can be presented with a choice of information sources from which judgements and decisions can be based – in the knowledge that all the factors contributing to the decision have been considered. The term information source is used advisedly as portal access need not be restricted to internal sources only.

Assembling and maintaining a metadatabase calls yet again for changes in work practices – from a mindset concentrating on completing the current job and getting straight onto the next one to that of accepting there is a “duty to posterity”. What does this mean – simply that to archive projects, complete with metadata catalogues allows our successors to access and understand what we have done – and then use our work to complement their own. A comprehensive metadata catalogue is therefore a powerful and essential element in effective data sharing (and consequent knowledge building), it calls for diligence and care in those who are responsible for the catalogue and again, this may raise a larger issue, that of accountability for data within an organisation.

Shell business practices have traditionally assigned the duty of care for data to the data owner who may delegate this responsibility. In today’s world of explosive data growth this traditional view is becoming more difficult to maintain effectively – the future may well see the emergence of the data management specialist – providing services to the asset teams and more importantly to posterity. Have we come full circle to the GIS manager of old? I think not, his was a role to manage a system that to the organisation was a black box, this is not the situation of today. People are using the “black box”, the GIS tools available no longer confront the user with a complex interface, and user friendliness is key to widespread acceptance of applications in the organisation. The data management specialist becomes one of the asset team, providing an essential service for today and tomorrow. With these changes in work practice the metadatabase then becomes the essential ingredient of the geography network providing mapping and spatial information services into the personal portals of the people.

There are of course technical issues that must be resolved before we get close to this state – many of them have already been addressed: scalability is essential and the capability of the Oracle DBMS to provide scaleable access is well known and accepted. The storage of geospatial data within one common repository also results in significant savings in data management resources across an enterprise. The ESRI GIS tools provide user friendly functionality and intranet/internet mapping services through the geography network such that a user no longer needs to be familiar with terms such as GIS, or Spatial Information Management, GIS functionality has moved out of a specialist niche and into the mainstream business arena.

GeoSpatial information can provide a foundation for global business, it is the glue holding the building blocks on the business in place. However, to be an effective enabler the information must reside in a scalable data repository, capable of operating over a network of distributed locations with comprehensive metadata catalogues and user friendly access. In addition, the sharing of information across an enterprise can only come about if the people who create, manage and use the data are aligned with work practices that enable effective sharing. The development and implementation of such work practices will be the major challenge facing any organisation looking to build a business with GeoSpatial information as a firm foundation.