

Utility Businesses and Asset Management

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Optimising the use of assets for the benefit of customers and shareholders and to satisfy regulators

Utility companies are under increasing pressure to deliver value to both customers and shareholders whilst satisfying the demands of regulators. A key component in improving business performance is better asset management. This paper looks at the challenges posed by asset management in utility companies and what can be done to optimise business performance through better asset management.

Executive summary

- The UK utility market has undergone constant change since the privatisation process first started in the mid 1980s. Throughout the time since, there has been huge pressure on individual utility companies to provide better and cheaper services to customers whilst satisfying shareholders and regulators. Better asset management has become a key competitive tool.
- Utilities have always held information about their assets, but traditionally this has been held in different parts of the business and not integrated into a single coherent system. Good asset management is increasingly about being able to feed information from business processes across the whole company into the asset management system and then use information from that system to improve financial and operational performance.
- Better asset management can deliver tangible benefits to the bottom line. Six figure savings in operational expenditure have been delivered and rapid returns on investments have been made across a variety of utility companies and functions. Customer service has been improved, thus reducing the risk of regulatory intervention and improving the image and reputation of the organisation.
- Business processes which need to link to the asset management system include customer service, scheduled maintenance and emergency repair. Making sure that accurate information about assets is available and useable means that operational efficiency can be maximised and customer service improved. New technologies such as mobility and geographic information systems mean that more information can be available in a more accurate and timely manner.
- Many of the most important utility assets are linear ones: pipes, cables, sewers etc. These present particular challenges for any asset management system: individual elements can be hard to identify, data needs to be presented in different forms for different purposes and they are vital to the delivery of most utility services. Any asset management system for utility companies must be able to manage linear assets in a comprehensive manner.
- Good information technology (IT) is essential to underpin good asset management. A greenfield project is a rare thing, so the IT infrastructure underpinning asset management must be able to take information from legacy systems as well as integrate with new applications such as mobility and geographic information. Such projects can be expensive to implement, and may involve changes to business processes, but the long-term benefit of efficient asset management will be big improvements to business performance.
- Many utility companies have the IT skills needed to manage their legacy systems, but not necessarily those to develop the business processes needed, implement new asset management systems and integrate these, so they turn to 3rd party system integrators who do. The manpower costs of the systems integrators are the major component of such projects.
- Systems integrators with off-shore operations are increasingly being selected by UK utilities to implement asset management systems. Their costs for off-shore and on-site manpower are much lower and they will be able to make cost effective re-use of skilled staff that have experience in both the relevant software and the industry sector. As well as off-shoring IT development, business processes are also beginning to be off-shored, but this is a development which requires careful thought and planning, particularly in making sure that processes are fit for purpose before being off-shored.

REPORT NOTE:

This report has been written independently by Quocirca Ltd to address certain issues found in today's utility organisations. The report draws on Quocirca's extensive knowledge of the technology and business arenas, and provides advice on the approach that organisations should take to create a more effective and efficient environment for future growth.

Quocirca would like to thank all the organisations we spoke to as background for this report (see section 8) and a special thanks to SAP, the report's sponsors.



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1. Introduction

Utility companies today face more challenges than ever before: regulators continue to put pressure on pricing and performance, customers are ever more demanding as competition bites and share prices are always in the investors' spotlight. The history of public ownership and the particular importance of power and water supplies for both businesses and consumers mean that the results of decisions taken by the management of these companies have high profile consequences. Senior management needs to make investment decisions that will deliver the highest performance at the lowest cost.

For utilities, asset management is a key component of business performance. Making existing assets work to deliver improved performance allows investment plans to be targeted where need really exists; integrating asset management with other business processes allows end-to-end asset management, proper risk analysis and feedback into financial systems to target maintenance programmes and investment into new assets in the most cost effective way.

The Information Technology (IT) underpinning asset management needs to be chosen carefully in order to deliver the performance benefits sought by the business. Key to this choice is how well the technology enables a single view of an asset, including its status and performance in terms of capital and operating expenditure, both historic and future, where it is in its lifecycle and its impact on the business should it fail or need to be replaced.

As well as being able to give this holistic view of the asset concerned, an asset management system also needs to be integrated with other business processes, reducing the amount of manual transfer of data between systems and maximising the effectiveness of both the business process itself and the existing underlying IT investment. With IT environments increasingly moving toward service driven open systems or "Service Oriented Architectures" (SOA), integration with existing systems and not 'rip out and replace' is becoming the norm for improved IT performance at a financial cost bearable for the business. Even so, the amount of effort involved in integrating asset management (or any other new application) will vary depending on the existing interfaces that are available in the chosen product.

To implement asset management systems and to integrate them with existing systems requires skills that many utilities do not have in-house. Therefore, they often turn to systems integrators (SIs) with existing experience. Increasingly these are SIs with an offshore capability, who can deliver this expertise at cost-effective prices. The question business managers need to ask here is the extent of the cost advantages of off-shoring compared to the risks – for example in losing management control over the integration process.

This white paper sets out some of the key current business issues for UK based utility companies and gives senior business managers guidance on what to look for in an asset management system and the potential benefits of working with systems integrators with an offshore capability.

The paper should also be of interest to other non-UK based utility companies, and indeed to other companies with large volumes of assets, as many of the issues faced will be common.

2. The UK Utility Market

The UK utility market is in a state of flux, having been mostly privatised over 15 years ago, it is more deregulated than its European competitors and UK utility companies are increasingly becoming targets for merger and acquisition, often ending up being owned by non-UK based companies.

Gas and electricity

The UK gas and electricity markets were privatised in the 1980s. The market structure is similar for both:

- wholesale supply: generation in the case of electricity and supply from a range of sources in the case of gas
- transmission: National Grid Transco owns the national gas and electricity grids
- local distribution: carried out by different organisations in different regions of the UK
- retail: the sale of gas and electricity to domestic and industrial consumers is carried out by a large number of companies, some of whom form part of larger groups who also own supply, transmission and distribution operations

The sector is highly regulated by The Office of Gas and Electricity Markets (Ofgem), which states that its principal objective is to protect the interests of gas and electricity consumers *where appropriate* by promoting competition, which is not possible in all parts of the market:

- wholesale supply is competitive; Ofgem has recently created a UK-wide electricity market with the aim of improving access to the market for generators and creating a competitive wholesale market; gas comes from a range of sources including North Sea, Russia via continental Europe and, more recently, from anywhere as liquefied natural gas
- transmission is a monopoly run by National Grid Transco (NGT) for both gas and electricity

- distribution is a series of localised monopolies. In electricity distribution, fourteen authorised areas are run by seven companies. Gas distribution was a monopoly run by NGT until 2005, when it sold four of its distribution networks, with four others remaining in its own hands
- retail markets are competitive: In the UK where most domestic customers have a choice of 6-7 retailers Ofgem estimates that around 50% have changed suppliers since privatisation

With the network operators competition is not possible, so Ofgem regulates the structure and level of prices charged by these monopolies and stipulates the quality of service that they must provide. Price controls and quality of service standards are typically set for a five year period, and the gas and electricity markets have been aligned so that both are reviewed at the same time. The aim of the price control regime is to drive down costs and increase efficiency, making pricing reflect costs and mimicking the effect of competition, whilst at the same time enabling investment at rates of return also decided by the regulator.

Ofgem also aims to incentivise specific investment: for example, in encouraging efficiency in the gas main replacement programme, or to encourage the electricity distribution companies to respond to increased fragmentation in generation, including buying excess power from micro-generators, such as consumers with solar power.

As well as economic regulation, Ofgem can also oblige energy companies to take certain steps to improve performance through licence conditions – for example, it recently asked for ‘self regulation’ from the industry to introduce independent dispute resolution, improve customer contracts and stop seeking payment where retailers have failed to issue customer’s bills for more than two years (reducing to one year by 2007).

Water

The UK water industry was privatised in 1989 and has been a tightly regulated monopoly ever since through the Office of Water Services (Ofwat). However, the Water Act 2003 does now allow some competition for very large industrial users, and since December 2005 it has been possible for businesses using over 50,000 cubic meters of water per annum (estimated by Ofwat to be just over 2,000) to switch supplier. Ofwat regulates:

- prices charged: the most recent price control was introduced in 2004 and covers the five years to 2010
- standards of service: these are set in areas such as keeping adequate water pressure, responding to complaints, making and keeping appointments or handling interruptions to the water supply
- consumer protection measures: for example in treating customers with debt problems or reducing the risk of homes being flooded with sewage

The same constraints apply in water as in gas and electricity: the regulator aims to drive down costs and increase investment at a regulated rate of return. The regulator also publishes advice to consumers on standards of water quality and customer service.

Other utilities

The telecommunications industry, the utility industry which has perhaps undergone the biggest changes in recent years, has been purposely left out from this document due to the different market conditions that it faces. However, there are other mostly specialist utilities that face all the same challenges such as British Waterways that run and maintain the UK’s canals and navigable rivers.

Consumer watchdogs

Both Ofgem and Ofwat also act on behalf of consumers to ensure that business processes such as customer acquisition are carried out fairly, and have powers to censure companies that break the rules.

Added pressure comes from consumer watchdogs, set up to be independent of both the companies and the regulator, who act as champions for consumers and pressurise both the industry and the government to improve service and reduce costs.

- The Consumer Council for Water acts for consumers in England and Wales. It publishes advice on what to expect from monopoly water suppliers and for businesses eligible for competitive supplies. It also publishes guidance on competition in the water market
- Energywatch is the consumer body for the gas and electricity industries. It too publishes advice on a range of consumer issues including how to switch supplier and how to complain, and also offers an online price comparison service to assist consumers in finding the best deal

3. The business challenges of utilities

In today’s environment, utility companies face numerous challenges, some similar to any industry with demanding customers and shareholders, others particular to a highly regulated industry.

Gaining new customers; retaining existing ones

In their customer acquisition and retention strategies, utilities face many of the same challenges as other sectors. Competition is becoming firmly embedded in the retail gas and electricity sectors; customers have become increasingly demanding and knowledgeable about the possibilities of switching suppliers. They are also helped, and more pressure is put on utilities, by the assistance from government, consumer watchdogs and the regulators in providing information about the possibilities of switching retailers and consumers' other rights. Consolidation in the market is likely to lead to strengthening of brands and hence stronger competition as consumers become more aware of a smaller number of suppliers.

In this environment, knowledge of the customer base is important; whilst demand flexibility might be relatively low (it's difficult to tempt customers to use more electricity), knowing whether they have switched supplier in the past and assessing whether they might be likely to switch in future is important to keep down costs (gaining new customers is estimated to be up to five times more expensive than keeping existing ones). Knowing how valuable customers are is an important input to the processes governing maintenance and repair activities and being able to rapidly and effectively model customer behaviour is a valuable tool in helping beat the competition.

Satisfying regulators

The regulatory burden is a direct and real cost with no discernable positive revenue value for utilities. One of the primary aims of the regulators is to keep utilities under pressure to invest capital in order to reduce running costs. Having systems in place to meet regulatory requirements and demonstrate compliance is common across the utility sector:

- in retail markets, customer acquisition, retention and billing processes must fulfil regulatory requirements in a number of areas including transfer processes when switching suppliers and handling bad debt
- in wholesale markets, prices are set by agreement with the regulator through scrutiny of the organisation's financial plans, as are forward investment plans
- the regulator requires the separation of certain businesses from others to monitor performance and prevent anti-competitive practices such as cross-subsidy of competitive business from monopoly ones

From an IT perspective, this leads to a need for systems able to deliver accurate financial and operating data specific to the sector and which is scrutinised to a high level of detail by the regulator.

Satisfying shareholders

Industry regulators set down realistic rates of return that they expect utility companies to deliver. In a market undergoing major consolidation, performance against the regulators targets is critical to a company's future. If a company performs better than expected shareholders benefit; if it performs worse they suffer. Without access to detailed on-going financial information regarding required investments in assets and likely maintenance costs for a given period, it is hard for a utility company to predict its financial performance against the regulators exceptions. Poor performance means a lower share price and the company in question is more likely to be the target of a takeover. Better performance means a stronger share price putting the company in a position to acquire.

The impact of industry consolidation

The move from public sector monopolies to private sector organisations has had a profound impact on utility companies' outlook and approach to management. Gone are the days of investment plans being decided by government and civil servants running utility companies (although investment plans must still be approved by regulators). Now takeovers, restructuring and new business opportunities are the norm, on an international as well as national basis, with overseas companies taking over many UK utility companies as well as UK companies expanding overseas and into other areas such as telecommunications. This has impacted on companies' business strategies and on their needs for IT investment:

- business strategy must concentrate on investment to reduce running costs and improve profitability: this is a shareholder as well as regulatory priority. Companies that fall behind industry norms in terms of efficiency will find themselves takeover targets for organisations able to exploit their assets more efficiently
- many utility companies have large legacy IT systems and need to incorporate as much of this as possible into new technology investments – the days of 'rip and replace' are fast disappearing, and the key to success in IT development is being able to put in place an architecture which uses as much of the underlying systems as possible
- utility companies often have significant in-house operations, including IT departments. These can be exploited in two ways: either as an opportunity to cut costs by outsourcing, or as a business opportunity offering operational or strategic consultancy to other companies in the sector. Where companies do decide to outsource, then including partner companies within the business processes and investment planning is key to cost-effective working that delivers customer and shareholder benefits

- in a industry sector where mergers and acquisitions are a way of life, integration of different business processes and IT systems poses a particular challenge: in some cases, despite the merger, businesses must be kept apart for regulatory reasons, and this means building financial accounting and underlying IT systems that deliver the ‘Chinese walls’ necessary

4. Asset management for utility companies

Utilities are asset-rich businesses, from photocopiers to power plants, transit vans to transformers; they can own hundreds of thousands of metering devices, thousands of kilometres of pipes and cables – asset values run into £billions. It is vital that it is known how each individual asset or group of assets can be safely operated. For example the pressure a gas pipeline is run at must be known, monitored and maintained correctly to avoid leaks and potentially explosions.

The move from public to private sector ownership and introduction of regulatory pressures has meant an increased focus on the strategic aspects of asset management – that is, the separation of operations such as maintenance, customer care and repairs from the development of strategies to maximise returns from the assets held by the utility company. This has led to the development of “strategic asset management” models, whereby the asset owner separates operations from asset management, in some cases going so far as to contract out operations, and in others contracting out the asset management itself. Some utilities have developed consultancy or service companies which offer either operational or asset management capabilities to others within the sector. This approach enables utility companies to focus on the strategic aspects of managing assets and how they can maximise their return on investment for a particular asset. All this means that asset management, rather than operations, truly drives the business.

Utility companies have always needed to have knowledge about their assets and, therefore, systems for managing assets. But these have often been in different ‘silos’ for different parts of the business:

- finance will keep records of what has been purchased, when, book values, recommended maintenance and replacement schedules
- maintenance will have records of scheduled and actual maintenance, and may well be recording the current condition of assets
- field operations will know what assets have been repaired, and possibly for what reason and by whom
- customer care will have records of the numbers of complaints and requests for repair
- the human resources department will know what staff are qualified to work on what sort of asset, including training plans to improve staff knowledge and qualifications

This silo-based approach has worked well in the past. However, ever increasing industry pressures are leading to new challenges in consolidating knowledge about the asset base and incorporating that knowledge into business processes to improve productivity and maximise returns.

The challenges of managing assets

Whether it is developed as part of a strategic asset management model, or part of the business with operations, good asset management is about two key principles: maximising asset utilisation whilst minimising capital and operating expenditure. Asset management must be in line with the organisation’s business strategy, responding to demands from customers, regulators and shareholders: both customers and regulators will want to see high levels of customer service at the lowest possible cost, while shareholders will want to see their returns maximised. These often conflicting demands must be reconciled within the asset management strategy.

What to look for in an asset management system?

- Can it take input data from across all your existing systems?
- If not, will the process of enabling to do so be an easy one?
- Can it cope with the number of assets you have?
- Does it give a single accurate view of an asset from a range of sources?
- Can it break down network assets into sections?
- Can these sections be seen on a map?
- Can connections with other assets be seen?
- How much can the processes and analysis be automated?
- How easily can it be integrated with front office systems?
- Does it have a mobile data access capability?
- Can it be easily integrated with the systems of your suppliers and business partners?

Maximising asset utilisation involves making sure that the asset is in use, delivering benefits, for as long as possible – that it is repaired quickly and efficiently if it fails as well as extending its lifetime. This means diagnosing or predicting faults quickly – increasingly through the use of remote diagnostics – and making sure that if the asset fails, the impact on the customer is minimised and the right people can be sent to repair it, with the right tools. Mobility services and Geographic Information Systems (GIS) are increasingly being used to improve the speed and efficiency of asset maintenance and repair.

The special challenges of managing linear assets

For utilities the most business critical assets are their linear ones – pipelines, sewers and power cables. These present particular challenges:

- they are a vital part of delivery of the relevant service. There is no margin for error when it comes to safety, in gas and electricity in particular, and in the water industry there are penalties for service delivery failure, so a burst water pipe can incur greater cost than just that of repair
- it is difficult to distinguish one part of the asset from another; some form of identification of different sections of the asset must be used, and these then linked with each other and the other relevant assets – the end network then is likely to encompass elements not in any particular geographic location
- many of them are underground, so weaknesses and potential faults are difficult to diagnose and their exact location is often not clear to the degree of accuracy required to maximise efficiency of repairs and maintenance
- they cannot easily be replaced by a similar asset and then repaired or maintained off-site; unlike a transit van, work on them must be carried out in situ, ideally without disrupting service or keeping disruption to a minimum
- as most assets are in public environments – disruption caused by fixing an asset can have knock-on effects to the utility company's customer perception and, therefore, brand

The challenge of linear assets places particular demands on an asset management system: it must be able to map the characteristics of the network into a series of different pictures according to the questions being asked about the asset: “when do we need to replace this pipeline?” needs a different output to “where exactly is the part of the pipeline that we need to repair?”

Increasingly, asset management systems must be able to integrate with mobility and geographic information systems to provide the exact location and status of linear assets and enable feedback from field engineers to be taken into the system for real time decision making – a problem with a particular asset that might impact on another part of the network can be fed back into the organisation and immediate action taken to prevent further problems or downtime in the network as a whole.

Increasingly, good asset management is about having a holistic view of the asset with input data taken from systems across the business and outputs feeding into the full range of business processes. Presentation of this data needs to be automated as far as possible, avoiding unnecessary labour costs and errors due to incorrect manual transfer of data between systems. Typically the sort of data needed might include answers to the following questions:

- how old is the asset? what is the expected lifetime of the asset? where was it purchased, at what price and what were the terms and conditions?
- where is the asset? what other assets is it linked to? can we see a picture of the part of the network most relevant to this asset? can we see the whole network?
- what is the maintenance history – both planned maintenance and unplanned repair - of the asset? what sort of work has been carried out? why has work been carried out? when, by whom? and how much has been spent?
- what is the expected future spend on maintenance? would it be cheaper to replace the asset rather than repair it?
- what level of risk does this asset present to the business? what is the likelihood of the asset breaking down? what is the impact on customers if the asset breaks down? what is the regulatory impact? what impact is there on other assets in the system?

The benefits of managing assets well

There are many benefits that derive from good asset management, but the major financial benefit is prolonged asset lifetimes – a more robust infrastructure running at a lower cost. In addition, good asset management can improve customer service without increasing costs, and avoid regulatory intervention if service is not to the standard required. Better customer service also has benefits in terms of a good corporate image, reducing the potential damage caused by adverse Public Relations. Some of the areas in which asset management can benefit utility companies include:

- **reduced service costs:** getting repairs right first time reduces the cost of repeat visits; if the repair schedule is linked to the importance of the customer through integration of work scheduling, asset management and customer data, then priority customers can be targeted, increasing loyalty and reducing churn.
- **improved customer service:** knowing what is happening to an asset – whether a burst pipe is being dealt with, or an electricity meter due to be read – and being able to communicate this to customers can improve customer care, reducing the risk of complaints and avoiding regulatory intervention.
- **reduced emergency repair costs:** knowing where the asset is located precisely – for example, where exactly on the moor the pipeline passes – avoids unnecessary cost in searching for it and enables repairs to be completed more quickly.
- **reduced labour costs:** making sure that the workforce is equipped with the right replacement parts, and that the right person turns up at the job, in the right place, means that the workforce is more efficient and that head count can be reduced.
- **reduced capital expenditure:** knowing the history of maintenance and repairs to the asset enables asset lifetimes to be maximised, taking into account the most up to date information on the performance of the asset.
- **reduced maintenance costs:** there are real benefits to be gained in avoiding unnecessary maintenance by scheduling maintenance according to the condition of the asset and risk as well as a pre-set maintenance schedule. Up to date information on replacement costs can also optimise the ‘repair or replace’ decision.
- **keep stock levels down:** efficient maintenance programs means a better knowledge of when spare parts will be required meaning less stock needs to be kept on-hand.

The benefits in practice

There are many examples of good asset management practice leading to improvements in service and reductions in cost. Some examples include:

- **reductions in planned maintenance costs:** a UK electricity distribution company saved £200,000 in the first year of an 18 year plan to even out its maintenance schedule. This was achieved by consolidating all of the information on its assets at sub-stations and creating ‘outage zones’ which were then profiled to reduce resource peaks and optimise the planned maintenance schedule.
- **reduced labour costs:** the same distribution company saved around 4.5 full time equivalent posts by being able to create automatic service orders from their improved maintenance planning rather than relying on these being created manually. The project involved a total investment of around £240,000 and has achieved payback within one year.
- **improved asset management across multiple services:** a German utility company delivered annual savings of around £275,000 per annum through a major programme to optimise business processes and asset management across its electricity, gas, water and district heating businesses. The project delivered improvements in a range of areas, including maintenance and inspection, fault clearance and order management.
- **improved customer service:** improvements in the knowledge of the condition and connectivity of both the water and waste water network has resulted in 20% reduction in customer contacts and over a 40% reduction in written customer complaints at a leading UK water company, as work on the network is now better planned and communicated to customers. This increased knowledge of the water network has enabled the company to reduce interruptions to water supply in excess of 24 hours from 280,000 2 years ago to only 16 in 2005.
- **better customer service and reduced costs:** the same water company has introduced an integrated work management, customer service and GIS system which has allowed over 40% of customer operational calls to be closed on first contact. With real-time status feedback from the field the customer can also be informed of progress and expected time of resolution so reducing repeat calls by over 10%. Overall, the company has achieved a reduction of 40% of field service call outs and has introduced additional customer appointments at evenings and weekends with no additional costs.

Benefits of off-shoring IT development of utilities

For a utility company, using an SI with an off-shore capability for some, or all, of its IT development and maintenance can considerably reduce both capital and operational expenditure:

- packages designed for the job that form part of an integrated suite will require less development effort, but there will always be some. Engage with potential partners during the software supplier selection process to get an understanding of the balance between product capability and the development effort required to tailor it.
- actual developer costs are considerably lower for staff living and working in many geographies outside of the UK; you save not only on staff costs but the associated management costs and physical overheads such as hardware and office accommodation.
- bringing overseas staff to the UK on a temporary basis can be cheaper than using local staff, even when costs of travel and accommodation are taken into account, for implementing new applications like an asset

management system the use of onsite staff is unavoidable. However, there has been pressure from trade unions in some cases to pay staff on a level basis for work done while on site.

- financial benefits can be gained earlier by temporary use of SI off-shore capability; the regulatory framework typically allows some flexibility in implementation of investment plans, and those that offer the greatest financial benefits can be implemented first using temporary offshore resource.
- use of off-shore resources enables 'strategic' outsourcing, whereby the client maintains a higher level of influence over technology strategy decisions and avoids some of the problems with traditional outsourcing when contracts are agreed which need to be renegotiated in the light of changing the changing business or technology landscape. Using low cost off-shoring enables discrete chunks of development to be handled offshore, combining cost reduction with management control.
- organisations with an offshore capability are typically working at the leading edge across many markets and can bring expertise and input from other markets that the organisation would not otherwise have
- software companies like Microsoft and SAP provide specialised consultancy resources, specific to their own products. They rely on 3rd parties to take a lot of the high volume integration and development work associated with their software. With asset management, where the majority of the budget can be spent on services, off-shoring can be the only way of containing costs.

The pitfalls of managing assets badly

The downside of not managing assets well has financial, regulatory and customer implications, all of which then impact on shareholder value. Poor returns means that the company may become a takeover target, failure to meet regulatory obligations means financial penalties and failure to meet customer expectations increasingly means that customers go elsewhere.

5. Integrating asset management with other business processes

All businesses run on processes, and being able to manage processes efficiently with help from the underlying IT is a key concern of both business and IT management. Utility companies are no exception: business processes run across value chains from the customer through in-house departments to suppliers and partner companies, and present a number of challenges:

- business processes in utilities vary in size and complexity, from a simple meter reading at a residential site to complex repair and installation at a power plant.
- customer and asset data must be communicated accurately and completely through the end-to-end process.
- information about the asset should be fed back into a range of different systems to maximise knowledge about the status and performance of the asset.

When it comes to the efficient running of utilities one of the most important process driven functions is asset management. The asset inventory must be at the heart of work management processes – a large utility can generate hundreds of thousands of work orders per year, and there needs to be IT applications in place capable of managing the integration of asset management and business processes.

Asset management is closely integrated with virtually all business processes within utility companies. Some examples include the following:

- **business planning:** the expected replacement cycle and the actual asset performance history feeds into the business planning process. Such knowledge can help assess when further capital expenditure might be needed on replacement for this asset, or help with a decision on new capital spending on similar assets. Accuracy in capital expenditure forecasting is crucial in such a regulated environment – the ability to feed in the most recent performance measures can help improve forecasting significantly.
- **maintenance programmes:** knowledge of the asset's history assists in optimising planned maintenance programmes. Scheduled maintenance at the start of the asset's life can be updated with knowledge of the history of that asset, and of similar assets in similar situations, thus scheduling maintenance based on the asset's current condition as well as the recommended maintenance cycle, avoiding unnecessary expenditure. Linking this to risk through an understanding of the probability and impact of the asset failing is a further step to optimising maintenance expenditure. Integration with the organisation's HR database can improve the efficiency of staff allocation to maintenance work, with the right staff with the right qualifications allocated to the work.
- **repairs:** knowledge of the asset's history improves productivity when unplanned repair is needed: linking into the organisation's HR database and work scheduling systems can help with sending the best person to do the job, making sure that they have the right tools or replacement parts.
- **customer service:** linking the asset database with customer service help desks can improve service by enabling call centre staff to have a clear view of the asset in question. Specific asset history – for example, if

other customers were complaining about water pressure reduction in a particular part of the network - would enable them to assess what the overall problem might be and hence set in motion the most appropriate action.

- **staff recruitment and training:** having a clear view of the status of assets, upcoming maintenance needs and importance of the asset to the business enables staff recruitment, training and development to be aligned with the actual status of the assets that are being managed.

Outsourcing business process management

Many utilities turn to 3rd party system integrators (SIs) to help install, integrate and maintain their internal IT systems. Many companies also consider outsourcing whole business processes.

Utilities have taken significant strides in outsourcing business processes – many have set up separate companies to manage day to day operations on behalf of their organisation and potentially others. A further step is to move those same processes off-shore.

Off-shoring business processes such as billing, debt collection, credit management finance and customer care can bring significant benefits:

- labour cost savings have been estimated at between 40% and 70%, depending on the nature of the work, although they are somewhat offset by higher communications costs and management overhead
- customer service can be improved by attracting highly educated staff well equipped to address complex problems presented by customers
- the market is highly competitive and therefore there is a lot of choice, with companies willing and able to increase their skill levels to meet the needs of specific customers

Business process outsourcing has challenges which must be carefully managed. Just because a graduate is employed in the call centre, it does not automatically follow that customer service will be improved. What counts is the ability of the outsourcing partner to attract, train, motivate and retain staff to a level appropriate to its needs. A common problem is outsourcing and/or off-shoring processes which are inadequate to begin with. The first issue is to understand the processes to be outsourced: how good are they? do they meet the business' needs and those of its customers? could the processes be improved? how critical are they to the business?

When it comes to off-shoring, it is a good idea to think only of simple, standardised processes – perhaps those that are outsourced locally already. Once the processes to be off-shored have been identified, then issues such as where, when and with what sort of provider will come into play.

Given their public sector inheritance and strategic importance to the economic welfare of their home country, utilities face particularly difficult challenges in seeking to offshore business processes, and need to manage the wider political and social considerations carefully.

6. Using IT to drive further value out of asset management systems

There are many other opportunities for improving the effectiveness of asset management. Some, such as giving field workers handheld data devices, have been around for a while. Now technology is enabling these different possibilities to be brought together into a seamless service, automating previous manual processes and allowing significant savings as well as improved customer service.

Enabling asset management for mobile workers

The use of mobile devices to enable access to back-office systems for workers away from fixed locations has a wide range of applications and benefits:

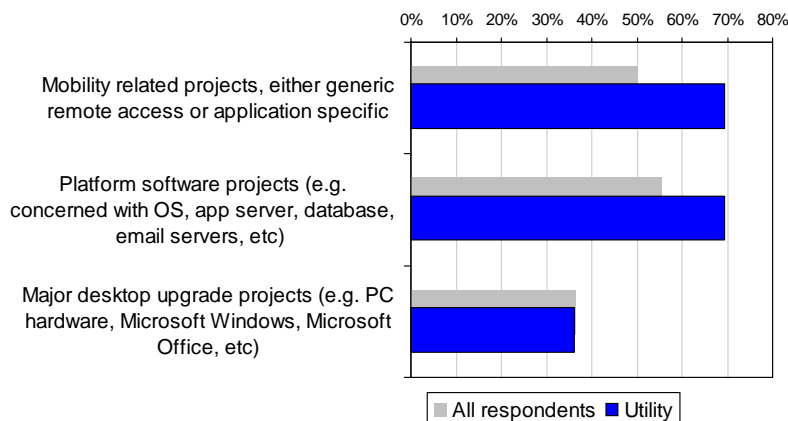
- service engineers can receive their daily schedule direct to a mobile device rather than visiting a fixed location, saving on travelling time, and improving customer service and productivity.
- sales people can have access to email and customer information as well as details about stock levels and current prices, all this improving customer service and shortening the sales cycle.
- senior managers can have access to email and business intelligence systems on the move, enabling them to be alerted to important issues or changes in key performance indicators, all this improving business decision making.

For asset management in particular, back office integration with mobile devices has further specific benefits:

- better information on assets in the field can enable engineers to make better decisions about maintenance requirements and in many cases carry out repairs on the spot, without having to return to base to check facts, leading to obvious efficiency gains and customer service improvements.
- plant downtime is reduced by faster and better decision making which can also increase asset lifetimes, in turn improving profitability.
- information can be fed back directly into asset inventories, eliminating the need for back office staff to re-enter data, reducing errors and improving productivity as well as getting information on asset performance swiftly back to feed into asset performance monitoring and planning.

Research shows the importance of mobility projects for utilities. 70% of European utilities were planning new mobility initiatives in 2005, 20% more than other industries and as important to them as platform software projects (Figure 1).

Key project types slated for 2005



Europe wide research (2005), 400 respondents (36 from utilities)

Figure 1

Mobile communication capabilities have been around for a number of years and utilities have traditionally been big users, particularly of private mobile radio systems for field forces. However, the technology has improved in a number of ways, and the key to success in developing mobility solutions now is to make sure that the business, IT and communications departments work together to deliver an integrated service for the organisation. Choices exist in three areas:

- **Access:** here users need to ask themselves what sort of data needs to be transmitted, do users need real time access to databases or can they work offline sending updates later? Many of the tasks carried out in mobile asset management do not need real time access to back office systems, but the right synchronisation regime is important, as is knowing when and how to 'push' information such as changes to job schedules or updates on asset status to field engineers. Mobile coverage is improving, but gaps still remain, so reliability of the solution is important – if coverage is lost, then data must be stored on the device and synchronised when coverage resumes. Many utility sites are in remote areas, which may mean some users remaining on specialist mobile radio systems, and these systems needing to be incorporated into overall mobile solution.
- **Devices:** devices are constantly changing and will continue to do so. Different devices will be needed for different applications – laptops for sales people, perhaps with an additional smartphones for voice and email, rugged handheld devices for field engineers. Mobile solutions must be able to support a range of devices to deliver functionality across business processes and business departments.
- **IT infrastructure:** getting the underlying IT infrastructure right is now crucial. Big software vendors such as SAP and Microsoft offer mobile extensions to their packages, and are increasingly able to offer integration to other vendors' back office systems – although this does not cover the full range of back office applications as yet. There is also a range of middleware providers emerging who can develop end to end services across a range of devices and systems. Flexibility is again the key – integration is likely to be the most expensive part of the overall solution and users must make sure that the total cost of ownership is taken into account, including consideration of upgrades to the back office system feed through to the mobile solution and recognising the need to replace devices on a fairly regular basis.

Overall, mobility solutions need specialist support; this may come from the mobile operator or software provider, but whichever supplier provides the service, the needs of the business must come first.

Remote monitoring

Remote monitoring of utility assets is carried out by a number of different sensors, meters and SCADA (Supervisory Control and Data Acquisition) systems. These are normally part of the organisation's legacy IT system, and serve a vital role in the operational management of the organisation – outputs such as alarms are typically passed to some sort of operator to decide what to do when an alarm is raised.

However, such systems also contain vital information on the performance of an asset – how frequently a particular piece of equipment gives rise to some sort of alarm might be an indicator of the health of the asset. This can be fed back into planned maintenance systems, compared to the performance of other similar assets and eventually fed back into the business planning process as an input to the asset replacement programme. If an alarm requires unscheduled intervention from a field service engineer, then feeding back information from the asset database to that engineer will improve his knowledge and decision making capability.

A further enhancement to remote monitoring involves setting up 'intelligent alarms' which send data on trends in asset performance which might suggest that a breakdown of the equipment is imminent, and hence allow action to be taken to prevent such breakdown of the equipment. In other cases, pure performance data can be sent – for example on power utilisation – which enables analysis of asset performance to be undertaken and measures to be taken to improve effectiveness of asset investment and maintenance – for example, by purchasing the most energy efficient equipment in future.

Integration of remote monitoring systems with the asset management system therefore improves the organisation's knowledge of asset performance and hence its ability to improve its return on that asset.

Geographic Information Systems

Geographic information on the whereabouts of utility assets is nothing new, but many organisations have very disparate legacy systems within no central repository of information and manual processes to update information between systems, let alone the capability of integrating the full suite of geographic information into other business systems. Hence data is often transferred manually between systems, leading to inefficiency and risk of error in business processes. Creation of a corporate GIS is often the first stage of linking GIS to asset management and other business processes. Bringing GIS and asset management together gives a number of important benefits, enhanced even further if a mobility element is included:

- data can be collected in the field and sent straight back to be used in other business processes – knowledge of the exact whereabouts of the asset will save time and money in both routine asset maintenance and emergency repair.
- a single view of the network and the location of its assets can be seen across the organisation, reducing the risk of misunderstanding, sending engineers to the wrong place, leading to unhappy customers and increased costs in getting the job right second time.
- real-time data on the status of asset can be fed back into business and financial planning processes. It can also enable real-time updates to network configuration or planning – for example, if an engineer goes to inspect the site of a planned installation and finds an unexpected obstacle in the way, this can be fed back and the installation plan dynamically changed to reflect the new circumstances.
- front-end GIS interfaces can show data in map format and allow assets to be found and input of data via this interface. This improves the user experience and reduces the potential for error – most users find it easier to locate data via a map than a complex database system and it cuts down on time inputting data back into the system.

Workforce scheduling and optimisation

Efficient workforce scheduling is a major opportunity to reduce costs and improve customer service. Repairs and routine maintenance need the right people, in the right place at the right time. Utilities will face major differences in demand for services from customers: the first cold snap of the winter will bring burst pipes, or last minute requests for boiler servicing. Assets will need maintaining in according with the asset management plan. In the first instance, some form of overall plan and forecast for workforce scheduling and optimisation is needed: what sort of people do we need? when are our peaks for different types of work going to be? when might we need contractors? Such planning needs to be integrated with the asset management system, so that planned maintenance is visible to all who need information on that asset, and so that the actual maintenance can be fed back into the data on the asset.

With a base plan to work from, the day-to-day scheduling can be planned to optimise workforce utilisation. Specialist software scheduling packages enable data such as technician skills and experience, service level agreements committed to and optimal routes, to be taken from a number of sources across the company and a workforce plan for the day to be set up. However, no day is without its changes, and workforce plans need to be flexible enough to respond to

emergencies or requests for service from higher priority customers – or the need to work on higher value assets. Here, specialist software really comes into its own, taking into account the range of variables and automating the decision making on workforce scheduling, enabling fast responses to unplanned situations. An experienced team of dispatchers can do this too – but often takes longer, and costs more than a properly automated solution.

Integrating a mobility element further improves the real-time access to data and hence decision making, whether manual or automated. As well as giving the field force the ability to feed back real-time data and receive work orders without going back to the depot, GPS vehicle tracking enables the control centre to see where vehicles are and more effectively route the most appropriate people to an emergency

Such solutions are not to be undertaken lightly. They require the supplier to really understand your business, and to have the technical ability to write complex software programs. Automating workforce scheduling can have important business process and staff implications if processes are done automatically that were previously the domain of experienced staff. However, the business benefits in improved customer care and reduced costs can be considerable, and appropriate links to the asset management system will both improve asset management and enable the right information on the asset to be communicated to those in the field.

7. Conclusions

The tangible benefits of better asset management in terms of more efficient working leading to cost savings and improvements in customer care can be seen from the examples set out in this paper. Significant savings and improved performance have been delivered in:

- maintenance scheduling: £200,000 savings in Year 1
- resource utilisation: saving of 4.5 full time equivalent posts
- combining asset management across multiple services: annual savings of around £275,000 per annum
- customer service: 40% reduction in written complaints
- field service costs: 40% reduction in number of call outs needed.

The benefits of good asset management are visible to all stakeholders:

- regulators: accurate knowledge of the asset base and its likely performance can improve the accuracy of cost savings agreed with the regulator; improved customer service can reduce the risk of regulatory intervention.
- shareholders: basing cost savings on a comprehensive knowledge base avoids unpleasant surprises and cost over-runs; there will be better returns for shareholders if asset performance can be further improved and savings over and above those agreed with regulators delivered.
- customers: better asset management means customer service and satisfaction can be improved: if emergency repairs are needed, the right person with the right part can be got to the customer more quickly.
- staff: making sure that the right staff are dealing with the right asset not only improves customer service, but can improve job satisfaction and offer better training and career opportunities to staff.

Good asset management is a virtuous circle: a good asset inventory forms the basis for effective planning, but this is not enough in the current environment. It needs to be improved upon as information is fed back into it from other functions such as customer service, operations, HR and finance. These functions can in turn work more efficiently as information is fed to them about the status and performance of each asset.

The increasing importance of asset management can be seen by the importance attached to it by utility companies: some, such as Wales and West, have appointed specialist Directors of Asset Management, others have specific investment programmes targeted at integrating and improving the performance of assets across the business – including integration of asset management across different businesses where companies manage gas, electricity and water assets.

There are an increasing number of tools available in the market to implement the IT systems that make comprehensive asset management possible. As we have seen, asset management is not a stand alone function and needs to be an integrated part of a utility company's financial, service management, workforce scheduling and other applications. Integrating all these can be complex and costly to undertake, but has to be done to get a full understanding of how well the asset is performing and what can be done to improve it.

In looking for an asset management system, two issues are key:

- how well does the system identify the assets in the way in which we need? how well does it analyse asset performance? can it give us the information we need, in the way we need it, to manage the business in the way we want to?

- how easily does it integrate with the other systems we have in place? can it interface with our legacy systems and specialist applications, particularly those which are emerging such as mobility and geographic information systems?

Projects to implement asset management systems are inevitably going to involve more than simply putting in place a standard set of software. Things may be simpler if the existing systems are all from a single vendor, but this is unlikely given the range of specialist applications in areas such as schedule automation, vehicle tracking and geographic information systems. There is therefore no getting away from the manpower costs of tailoring the system to the requirements of an individual utility company and integrating it with the wider IT infrastructure. In many cases, business processes also need to be taken into account – new processes may need to be established and existing ones changed in order to make the new asset management system work effectively. Software vendors themselves cannot provide the volume of resources required and so utilities need to turn to system integrators. Those integrators with off-shore capabilities are increasingly experienced at implementing asset management applications for utility companies and are able to do so at much reduced costs.

The efficiencies and cost savings that many utility companies are achieving through good asset management are enabling them to over achieve on their goals for customer service, satisfy shareholders and keep the regulators off their backs. Those that get it right are the likely survivors in a global utility market undergoing consolidation. Those that don't are likely to be consumed by those that do.

8. Acknowledgments

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