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SPECIAL STUDY

Mobility Drives Process Efficiencies at a Regional Utility Provider in Germany

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EXECUTIVE SUMMARY

The organization analyzed in this report is a German regional utility founded in 1929 and is part of a large European conglomerate. It supplies energy to approximately 2 million citizens, which is equivalent to a service area of 12,000 square kilometers, and an electricity and gas consumption of about 8,200GWh each. In total, the company maintains a power supply network of 50,223km and a further 4,510km of gas pipes. In 2005, the utility company posted revenue of about €1 billion.

With deregulation sweeping through the European utility industry, the electricity provider was able to integrate a regional gas provider at the end of 2002. Prior to integrating a gas division, the utility held a share of 74% in the gas provider. Recognizing the challenge of integrating the newly acquired organization, the board of directors set up a companywide initiative entitled "Project Challenge." One of the key objectives was to streamline operational business processes with a clear emphasis on further decentralization.

The electric utility subsequently aimed at streamlining and optimizing most processes involving its field staff, which included implementing mobile asset management processes such as preventative and corrective maintenance, asset inspections, and meter reading. It soon recognized that such far-reaching business process reengineering plans needed a more efficient mobile asset management and service solution. Equally important was a continued focus on both service levels and cost reduction. With the implementation of the SAP Mobile Asset Management application, the company achieved improved efficiency, greater assurance of service level objectives, and better overall responsiveness to the needs of regulators, customers, and, ultimately, shareholders.

The financial impact of the SAP Mobile Asset Management solution, measured over five years, after tax, can be summarized as follows:

- Return on investment: 175%.
- Internal rate of return (IRR) after tax: 32%.
- Initial investment to be recuperated within 3.1 years.
- The bottom line impact was driven primarily by time savings in meter and maintenance order management, less journey time, optimized work scheduling, reduced response time with ad-hoc activities, and reduced facility costs.

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SITUATION OVERVIEW

Introduction

The organization analyzed in this report is a regional utility founded in 1929 and part of a large European conglomerate. It supplies safe and reliable power supply for approximately 2 million consumers, which is equivalent to a service area of 12,000 square kilometers, and an electricity and gas consumption in 2004 of about 8,200GWh each. In order to be able to deliver these services, the electric provider maintains a power supply network of 50,223km and a further 4,510km of gas pipes. In its fiscal year 2005, the utility employed about 1,500 people and posted revenue of €1 billion.

With such a wide-reaching network, the search for service efficiency is high on the list at the utility, which turned to a mobile solution to advance its business goals. Admittedly, service and asset management is not a new concept to the utility industry. Over the past decade, many utilities have begun to develop well-structured asset management programs to improve performance and reduce long-term costs. However, the pace of multiple mergers and acquisitions in the industry coupled with regulatory requirements has made this need more acute. This case study describes how the competitive market environment and subsequent reorganization of the utility organization were catalysts in considerable process enhancements. In particular, it demonstrates how extending enterprise applications to the field helped achieve a measurable return on investment.

Initial Situation and Decision Process

The utilities and energy industry is experiencing a far-reaching transformation throughout Europe. As former state-run organizations, most utilities were transmission network focused and operated under a philosophy of "security of supply." Both the gas and power T&D (transmission and distribution) systems needed to be reliable and redundant and provide an acceptable rate of return.

When deregulation occurred, "security of supply" was balanced against the need to focus on improving operational efficiency and increasing dividends. This has, in turn, presented opportunities for the more savvy organizations. The emphasis thus shifts to achieving an adequate return on all capital expenditure including acquisitions. In other words, utilities have become much more financially minded.

As utilities provide an essential service, regulators have put in place binding assurance controls while at the same time demanding improved customer service. In 2003, the EU promulgated two new directives on the development of the single European market. In Germany, the realization of these directives resulted in the Energy Act — Energiewirtschaftsgesetz — being amended. This means that the electric utility is bound by German law to provide reliable power to the entire area it covers. Thus, there is a heavy emphasis on improving core competencies and network performance. This asset-centered approach results in pressure to meet the needs of all stakeholders at an acceptable level. This underlying requirement to service an entire region also opens up opportunities for forward-thinking organizations.

Opportunity and Project Challenge

Power and gas distribution are moving closer together and the use of gas will continue to expand as a source of power generation. As the utility analyzed in this report adopted a vertically integrated business model, it was able to span the entire value chain from gas exploration and power generation to transmission, distribution, and customer sales.

- As a result of this strategy, at the end of 2002 the traditional electricity provider fully integrated the regional gas provider. Starting with the challenge of integrating the newly acquired organization, the utility's board of directors set up a far-reaching companywide project called "Challenge". The project kicked off at the beginning of 2003 with the primary objectives of increased focus on the company's core business, better integration of subsidiaries, creation of lean management hierarchies, and the achievement of synergistic effects among regional offices. At the same time, it aimed to increase customer service quality. One of the key objectives of the project was to streamline operational business processes, which included a clear emphasis on further decentralization. This translated into reducing 36 regional offices (24 electricity, 12 gas) to 15 serving both electricity and gas customers.

- In order to do this, it was essential to deploy mobile technology to field staff. The central challenge for utilities is that critical assets are dispersed and employees are mobile. At the same time, employees must interact with the organization's back-end systems. To do their jobs effectively mobile workers need information at the point of supply such as work and failure history, job and safety plans, and bill payment. Furthermore, managers need critical information from the field for better planning, scheduling, and decision-making.

As part of project "Challenge", the new power company methodically reengineered most processes involving its field staff including asset management processes such as preventative maintenance, asset inspections, and meter reading. Although the investment was significant, the company had the vision that it was an essential part of maintaining its commitment to streamlining its operations. According to CIO, "The capabilities that the mobile technology provides were pivotal in achieving the strategic goals defined in the project."

"The capabilities that the mobile technology provides were pivotal in achieving the strategic goals defined in the project."

CIO –
Chief Information Officer

Solution Rollout

Solution Details

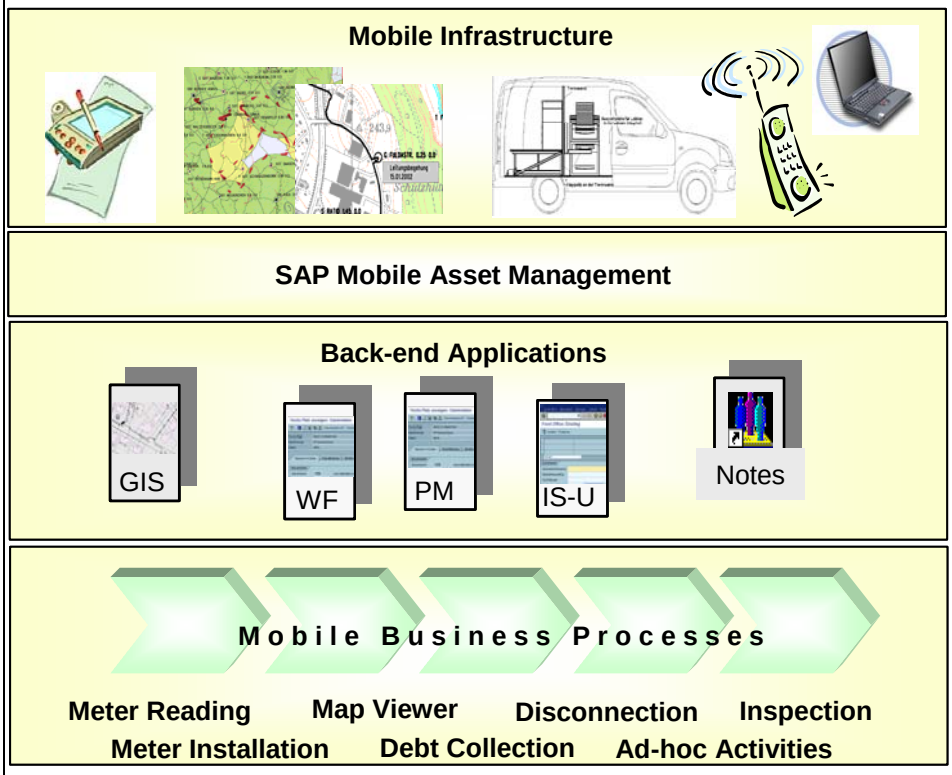
To put the back-end in the hands of service technicians, the utility provider set out to extend three SAP applications currently in production — SAP software for plant maintenance and workflow as well as the SAP for Utilities set of solutions — and its Geographical Information System (GIS) and Lotus Notes email application with mobile business capabilities.

The organization turned to SAP Mobile Asset Management as the key component in extending the SAP applications. SAP Mobile Asset management allows the technicians to perform their daily activities onsite with updated information.

As a result, the power provider equipped its 320 service employees with mobile devices and a specially equipped car. Service employees received both a PDA/handheld and a laptop for the road while the car itself has a docking station, and a printer. The service employees worked offline in the car but as soon as they could get online — at a regional office, a "data station," or via an ISDN line at home — their data was synchronized with the back end (see Figure 1).

FIGURE 1

Extending Back-End Applications to Mobile Service Technicians



Notes: IS-U — SAP for Utilities, SAP WF — Workflow application, SAP PM — Plant Maintenance application, IBM Lotus Notes, GIS (Geographic Information System) — Utility legacy application containing circuit plans/diagrams.

Source: IDC, 2005

Implementation Process and Challenges

The power company did not evaluate any mobile software solutions other than SAP as they had to integrate with SAP back-end applications. The SAP Mobile Asset Management implementation started with a pilot project in one dedicated region at the beginning of 2004, which was extended to another regional office location in September 2004. During the last quarter of 2004, the solution was rolled out to another five office locations. The remaining seven locations went live in the first quarter of 2005. By April 2005, all regional offices of the utility were live with the new mobile infrastructure. As a representative time frame, IDC chose January 2005 as the go-live date for the entire project since half the sites were live at that time. The initial implementation was not without its own initial challenges. There were problems with the new software as orders from regional offices were not completely transferred and some technical problems with data synchronization between different devices. The organization assigned a special team to ensure data quality and data consistency across all systems and (mobile) devices involved.

Investment Structure

The investment structure can be roughly divided into five main categories: software, hardware, implementation, telecommunication services, and special car equipment. At the power company, hardware costs made up a relatively greater portion of the investment pie than it is typically the case because of custom equipping each car as well as providing two devices per service technician, a notebook, and a PDA.

- **Hardware and software:** The utility's internal IT service provider, one of the top full-service IT providers to the European utility industry, is hosting the solution and a number of SLA agreements were put in place including the lease of the IT hardware and software platform. For mobile business notebooks, mobile business PDAs, printers, and mobile infrastructure (including software license and maintenance costs), ongoing leasing costs amounted to about 34.9% of total costs over five years for both, hardware and mobile infrastructure software.

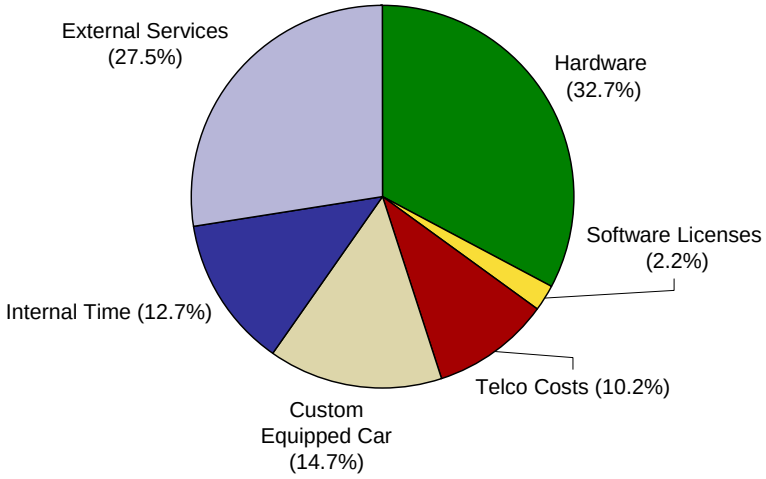
- **Implementation services (internal and external):** The utility company engaged two consulting companies to evaluate the investment and plan the mobile business project. There occurred 27.5% external and 12.7% internal charges.

- **Telecommunication services:** The company installed ISDN lines at each service employee's home and so-called "data stations" (usually power stations) that provide system accessibility within a driving radius of 10km to 15km per technician (to substitute for the consolidated regional offices). Associated mobile telecommunication services accounted for 10.2% of total project costs.

- **Custom equipped car:** Due to the special car equipment, the entire car fleet has subsequently been upgraded, incurring ongoing costs of 14.7% over five years.

FIGURE 2

Cost Breakdown Related to Total Project Investment over Five-Year Deployment



Source: IDC, 2005

Business Benefits

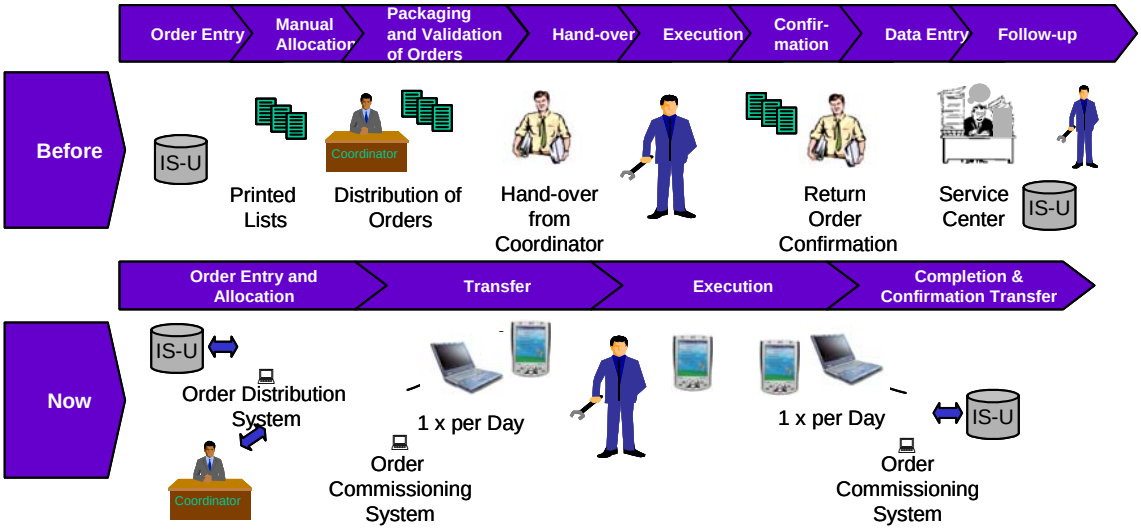
IDC examined a number of benefits while investigating this case. The greatest ongoing returns are those involving key process enhancements. Quality business systems must both minimize the chance for user error and maximize both user efficiency and user effectiveness.

Figure 3 shows where process efficiencies have been gained by comparing how the field technicians have been affected by the SAP Mobile Asset Management implementation at key touch points. In comparison with the business processes before SAP Mobile Asset Management, those made possible by the new solution eliminated coordination tasks and related paper-based communication.

FIGURE 3

Significant Simplification of Business Processes

Example: Maintenance Order Process



Notes: IS-U — SAP for Utilities

Source: IDC, 2005

Less Administrative Effort at Regional Offices

Time Savings in Maintenance Order Management

- The utility processes about 25,000 maintenance orders a year. Before SAP Mobile Asset Management, a coordinator had to print out all maintenance orders, sort them by region, and allocate individual orders to a service employee. The plant maintenance module in combination with SAP Mobile Asset Management now categorizes orders automatically and sends them directly to the service employee's mobile device. This automation has led to a time saving of five days a year for a coordinator.

- Before, every job was noted on a piece of paper. It was then handed back to a coordinator at a regional office who entered the data into the back-end system. Today, the technician enters all data into the mobile system, which saves an additional five minutes per order.

Time Savings in Meter Management

In a more competitive market environment, utilities need to gather meter data more efficiently, particularly since they distribute multiple products, such as electricity and natural gas. The integrated SAP for Utilities solutions provides an efficient way to collate and analyze all meter data for forecasting, planning, energy delivery, and maintenance.

- Before, the service employee received meter activity orders as hardcopy from a variety of sources (not as structured as the maintenance order process). Having done the work, field staff had to drop the meter forms off at the nearest regional office from where they were sent.

- Today, meter orders can be received by PDA without any delay, and all the data is captured at point of reading. Additionally, the SAP solution enables service employees to send relevant forms online directly to the central approval center. The power company conservatively estimates the time saved on data entry as 10 minutes per meter reading.

With 25,000 maintenance orders, 7,700 meter installations and 500 meter exchanges a year, the estimated annual cost savings in maintenance order management represents 5.4% of total derived benefits per annum.

Time Savings in the Field

Optimized Work Scheduling and More Accurate Time Reporting

- Without the mobile business solution, service technicians received their individual work schedules weekly at the regional office closest to their home location. Today the SAP for Utilities applications allocate work orders daily and distribute relevant project data to the respective regional district, and the individual service technician can select from those presorted orders directly.

- Technicians used to report their hours once a week (usually on Monday morning). They frequently used a "pool number" for various activities because they could no longer recall the exact amount of time taken to complete a particular order. Now service technicians report immediately when the work is done and access up-to-date project data and numbers, so that the allocation of hours in today's system is much more accurate.

Time reporting today gives a more precise picture of activity-based costs than before. Together with the simplified and optimized work scheduling process this leads to annual cost savings representing 5.9% of total derived benefits per annum.

Reduced Journey Time for Service Technicians

- Previously, service technicians were obliged to visit a regional office once or twice a day for updated work orders. With maintenance and service orders transferred electronically every day, all service technicians can do their individual route planning and start straight from their home. The utility's service employees conservatively estimated an average of 18 minutes traveling time saved per day. With 320 service technicians, the resulting annual cost savings represent 28.2% of total derived benefits per annum.

Reduced Response Time for Unplanned Activities

- The power company estimates there are, on average, 70,000 unplanned "interrupted" activities a year (across 320 employees, divided by 220 working days a year equals one unplanned activity per service employee per day). A shift from reactive to responsive "customer service" was needed. With immediate access to relevant data, service technicians reported that they saved at least five minutes in responding to and carrying out an unplanned activity while on the road. Cost savings represent about 7.8% of total derived benefits per annum.

Reduced Facility and Equipment Costs

Reduced Fixed Facility Costs from Consolidation of Office Locations

The electric provider still owns a considerable number of its former regional office buildings. Therefore it was difficult to allocate the annual fixed facility costs exactly. So far, the company has been able to sell two of its former offices. It is still uncertain when all redundant real estates will be sold off. IDC has therefore chosen a moderate approach to reflect the actual cost savings.

- IDC worked on the conservative average market rate of €5 per rented square meter per month and multiplied that by a common service space for technicians of 500 square meters per office.

- A similar approach was used for costs associated with the individual service employee's desks. The regional offices had about 160 desks for service technicians.

The estimated reduced annual rent for common service and individual desk space per office resulted in fixed facility cost savings that represent 36% of total yearly benefits.

Reduced Variable Facility Costs from Consolidation of Office Locations

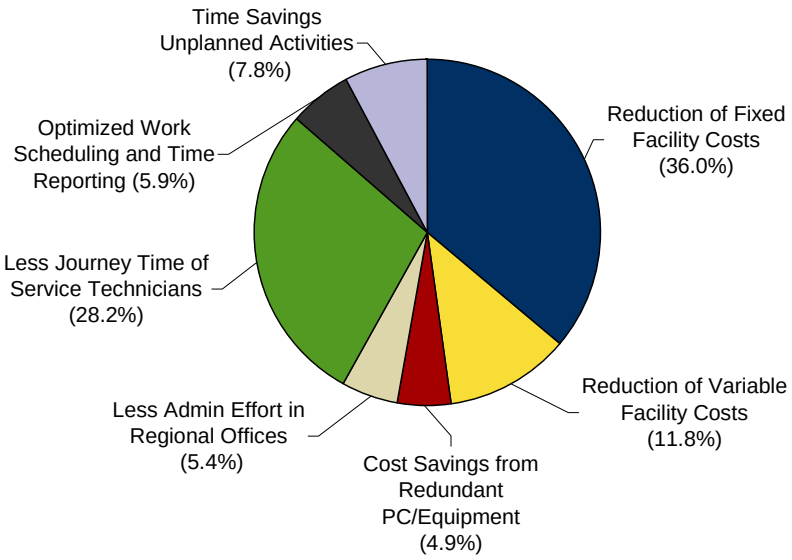
- IDC further investigated the operational cost savings from the reduction in regional offices. On comparing the operational costs in the first half of 2004 (without SAP Mobile Asset Management) against first half of 2005 (with SAP Mobile Asset Management) and translating this into the full calendar year, annual cost savings here represent 11.8% of total benefits.

Cost Savings from Redundant PC/Equipment

- Since the mobile service technicians have been equipped with IT devices as part of the specially equipped car, the PC/equipment at the regional offices became redundant. Leased IT equipment was given back to the utility's internal IT department, thereby avoiding fees amounting to cost savings representing 4.9% of total derived benefits per year.

FIGURE 4

Mobile Project Benefit Structure (in %)



Source: IDC, 2005

Return on Investment

Given the cost and benefit structure outlined in this study, the SAP Mobile Asset Management implementation at the analyzed utility provider is expected to break even at the beginning of 2007, about 38 months after its initial rollout. Over a period of five years, the IT investment will have generated about €1.2 million at net present value after tax. This corresponds to an annual return after tax of 32%.

The benefits driving the ROI arise mainly from reduced fixed and variable facility costs and from time savings in the field including unplanned activities, less traveling time, optimized work scheduling, and more efficient time reporting by service technicians. Furthermore, the deployment of mobile business solutions at the power company did give impetus to administrative time benefits at regional offices.

Qualitative Benefits

Since go-live in January 2005, the utility supplier has been able to reap significant business benefits and is satisfied with the results it has achieved so far. Executives and mobile experts within the organization expect additional quantitative benefits from the SAP Mobile Asset Management implementation. These are described below together with more qualitative, soft benefits.

Better Data Quality, Transparency and Control

- As the system is now updated and fed by service technicians at point of performance, the quality of data on assets and documentation of repair and maintenance activities for a specific asset are more precise. Paper-based operations that compromise the integrity of data-driven operations have been eliminated.

- Data validation rules and performance verification ensure that data is captured effectively and completely before being communicated to the back end. The utility is now able to run new outage reports giving more detailed information on each and every outage. This gives the responsible managers an invaluable information base to mitigate future incidents.

More Effective Asset Lifecycle Management

- With new information, better traceability of data, and ubiquitous information access to the service history of equipment, the utility can now strive for a more granular replacement policy. In the past, more general replacement "rules of thumb" or depreciation cycles were used.

- In particular, the better traceability of data was well regarded by service technicians. Before SAP Mobile Asset Management, when service technicians identified maintenance requirements in the field they reported them verbally to their management. Most of the time, however, little happened and the maintenance order that should have followed was not raised. "When the corresponding asset finally broke, service technicians were blamed for not flagging the potential defect. Today, service employees can enter work order requests into the back-office systems remotely," according to the Mobile Biz Project Manager.

- The utility supplier will be able to maintain assets more precisely and log their exact condition, so that assets' lifecycles can be extended in future. With capital-intensive assets such as pylons this would save the company a tremendous amount in incremental costs.

"Better traceability of data was well regarded by service technicians. For instance, when an asset broke, service technicians were blamed for not signaling the potential defect. Today, service employees can enter maintenance requests into the systems directly and in case of a breakdown a service employee can pinpoint exactly when he suggested that maintenance be carried out."

Mobile Biz Project Manager

Potential Improvement of Lead Time

- Properly managed meter data enables utilities to predict system load and usage in order to avoid imbalances. Data analysis can help pinpoint over- or under-utilized infrastructure, improve system throughput, and speed service restoration after outages.

- While dealing with outages faster is of no direct financial benefit to the power company, executing maintenance orders more quickly so as to repair power lines sooner benefits everyone who relies on the service.

Potential Cost Reduction in Car Fleet Management

- In the long run, the utility is expecting reduced costs for service cars. Again, due to the short period of actual deployment, the company was not yet able to provide demonstrable cost savings in this area. It could not track, for example, the number of kilometers driven since the entire fleet was changed during the past year. Also, the fuel consumption of the upgraded, leased cars today is somewhat higher than that of the old service cars. Therefore, IDC decided to keep prospective reduction of car costs at a qualitative level.

- Admittedly, the fleet manager also sees potential leasing savings. The current car lease contracts include approximately 25,000km a year but cars clearly do not cover as many kilometers as before because of the mobile and mapping technology. In the long run, he expects that the power expert will be able to renegotiate and reduce leasing rates.

Table 1 summarizes all the benefits related to the project, both quantitative and qualitative.

TABLE 1

Observed Business Benefits

Quantitative Benefits	Qualitative Benefits
Administrative time savings on maintenance-order management and meter management	Better data quality, transparency, and control
Optimized work scheduling and accurate time reporting	Fast and ubiquitous data access
Reduced journey time for service technicians	More effective asset-lifecycle management
Reduced response time to ad hoc activities	Potential improvement of lead times
Reduced facility and equipment costs due to consolidated regional offices	Potential cost reduction in fleet management and traveling expenses

Source: IDC, 2005

Lessons Learned

The following are some valuable insights acquired during the course of the project.

- **The two-device formula and usability:** The electric utility company went for a two-device strategy. The PDA is always with the technician with orders, checklists, immediate changes of asset data, and personal administration — essentially it is the device for the “last mile." The laptop is an adequate replacement of the standard fixed workplace with a large screen (useful with GIS), a full-size keyboard, and a hard drive for handling large data volumes. It was vital to determine what information was essential for each device. Once the key data was defined, the task shifted to redesigning screen views to fit the different form factors. The goal was to deploy solutions with a flexible and dynamic format based on the access device, eliminating the need to replicate content for different devices. This approach allows the access model to accommodate new access devices without modifying the underlying content. Early experience, however, has shown that the deployed applications are simply too complex to display on a PDA format. Therefore, the power company is currently revising its two-device strategy in terms of reducing it to just the laptop.

- **Early involvement of service employees:** In order to achieve a good take-up, it was important to generate acceptance among users. Accordingly, the service technicians were involved in defining and redesigning the business process. It was also necessary to provide onsite support every step of the way. Mobile asset management solutions result in significant change in the organization and users need to be fully prepared. According to CIO, "In fact, we have found it extremely worthwhile to include users in the deployment process early on when you are defining requirements and doing initial testing. In particular include the ones who are critical of the system deployment in order to make them part of the team."

- **Early involvement of the trade unions:** It was critical to keep trade unions and works councils involved in how the process reorganization would affect an employee's future. The utility company emphasized that the plan actually enabled the mobile service employee to work more innovatively and with a higher degree of job satisfaction. In addition the IT infrastructure was rolled out to each technician's home (as a laptop and ISDN connection), thus enriching the technician's family environment (many technicians were not Internet users before the project started).

- **Do not underestimate complexity:** Mobility is an easily understood concept, but because it is a horizontal process affecting a multitude of different applications, it can be extremely complex. As business processes are interconnected between departments there are many sources of error. A comprehensive business process analysis before the technical implementation starts is key.

"In fact, we have found it extremely worthwhile to include users in the deployment process early on when you are defining requirements and performing initial testing. Especially include those who are negative about the system deployment in order to make them part of the team."

CIO –
Chief Information Officer

FUTURE OUTLOOK

Looking forward, the lessons learned in the course of the project will position the utility as an innovator within the competitive environment in which it now operates. It is also in a position to identify spin-off effects and synergies across the utility group.

Data Becomes an Asset

Trusted and timely data management supports the basic and sound operation of energy delivery. It makes it possible to operate efficiently, cut costs, and achieve current and future goals with fewer resources. It will allow the regional utility provider to harvest data and link with other sources driving all aspects of business, such as:

- Workflow optimization: Better categorization and prioritization of orders based on a meaningful sequence of work steps.

- Location-based optimization: Route planning, positioning of service cars by GPS, and optimizing the next place of action.

- Ubiquitous self-service access: Empower service employees and provide them with quick access to relevant information wherever they currently are, including manuals, training, and any information that makes their job more fulfilling and easier.

Meter and inspection data will enable the company to make informed decisions and deploy new supporting technologies. Furthermore, the company expects a higher return on its existing assets: The regional utility company currently aims to extend asset life by approximately 20%. Properly managed assets and data ensure that the power supplier can deliver more value to customers and shareholders at lower cost.

Leverage Know-How for Other Mobile Projects at Utility Group Organization

The mobile business project at the regional utility provider is feeding into a European-wide knowledge pool of the utility conglomerate. This case study provides the groundwork for innovative IT developments and any regional utility organization can both leverage the platform and transfer the knowledge gained from this project.

The knowledge gained will result in faster implementation and lower recurring costs for other mobile projects at the European utility conglomerate. The energy provider has a platform to effectively reduce overtime costs, clear maintenance backlogs, complete work orders, expand capacity without adding crews, and cope with an aging workforce.

Anecdotally, IDC has been exposed to a number of mobile pilots at other enterprises that have been put aside or stalled by other "concurrent" projects with higher priority in grabbing resources. It seems that with mobile projects, patience is a virtue. The good news is that on most occasions IDC has observed that, once a pilot is completed, the visible returns have been immediate.

Appendix: ROI Details

The objective of the ROI analysis is to demonstrate and quantify the value of a software solution based on observed and quantified data. IDC applies certain assumptions across SAP ROI case studies to ensure comparable results:

- An average corporate tax rate of 40%. Most European countries have corporate tax rates in the range of 30% to 40%. IDC has selected 40% to ensure a conservative, yet comparable after-tax view of the net benefits of a software solution.
- A discount rate of 10%. The 10% rate reflects an average cost of capital of approximately 5% plus an added risk premium of five percentage points. The risk premium reflects the fact that future projected cash flows could change due to unforeseen developments and events.
- An analysis period of five years. Research shows that investments in enterprise applications have useful lives in the five- to 10-year range, depending on the industry, application area, and size of organization. The five-year analysis period represents a common, conservative assumption of the useful life of an investment in asset management software.

After conducting multiple onsite interviews, IDC applied the incremental, observed, and quantifiable costs and benefits in an ROI calculation. The result of this calculation is shown in Table 2.

The IRR of 32% was calculated using the internal rate of return method and represents the average annual rate of return after taxes. It is comparable to the annual after-tax yield of investment alternatives, such as stocks and bonds. The net present value after taxes of €1,170,200 represents the net benefit of the entire project to the regional utility provider in today's money. The project added €1,170,200 to the total market value of the regional power company assuming a transparent equity market.

TABLE 2

Common Assumptions

Average corporate tax rate	**40.0%**					
Discount rate	**10.0%**					
Cash flows (in €000)	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Net cash flow after taxes	-€1,563.9	€464.6	€608.6	€762,5	€879.3	€1,023.3
Discounted net cash flow after taxes	-€1,563.9	€422.3	€502.9	€572,9	€600.6	€635.4
Five-year net present value after taxes	-€1,563.9	-€1,141.6	-€638.6	-€65.8	€534.8	€1,170.2
Annual rate of return after taxes	32%					
Five-year net present value after taxes (€000)	€1,170.2					

Source: IDC, 2005