

Multi-System Integration of Business Processes at Ulm/Neu-Ulm Public Utilities using BPEL

Customer Profile

„The integration of mobile users is another challenge for the near future.“

– Ingo Trippenfeld, SWU Stadtwerke Ulm/Neu-Ulm GmbH

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Geo-integrated business process

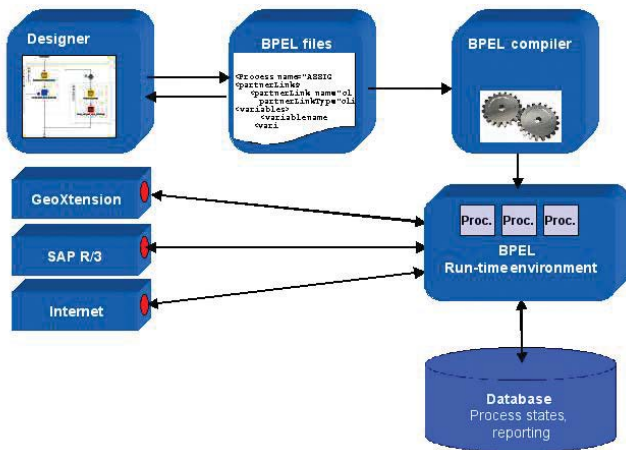
In today's business world there is a growing need to be capable of reacting faster and better to new requirements, assess situations precisely, react appropriately and cost-effectively and plan with foresight. Information from a variety of systems forms the basis for supporting and organizing processes more effectively and efficiently and exploiting entirely new value-creating options. Geographic information is very important in this process, especially for public utility companies, since 80% of their information has a spatial component, and almost any of their business processes can be localized spatially, from network planning to network operations and management of service connections. This geographical aspect offers an avenue for structuring processes more fully and for putting suitable tools into employees' hands – and to do this as comprehensively as possible.

Public Utilities of Ulm/Neu-Ulm GmbH interconnect systems using Web services and BPEL

The public utilities of Ulm/Neu-Ulm GmbH (SWU) came to this same conclusion. However they lacked the technical IT resources to achieve further cost reductions in their most important business processes, although SWU was actually well-equipped with SAP R/3 as an *Enterprise Resource Planning System* at their central offices, SAP IS-U for consumption billing and building connection management and a network information system for network documentation.

The company's acquisition of operational management of street lighting in neighboring communities was an impetus here. It was decided that a model project would be set up to integrate individual IT systems that were relevant to the operation of street lighting. Based on existing interfaces to the individual IT systems affected and the requirements of openness and assurance of future viability, FICHTNER CONSULTING & IT AG as IT service provider recommended a conversion based on modern Web service technology in the framework of a so-called SOA architecture (*Service Oriented Architecture*). To orchestrate individual Web services into complex automated business processes, it was decided not to use a classic workflow tool, rather this would be accomplished using BPEL (*Business Process Execution Language*) which is increasingly becoming the standard technology in *Business Process Management* (BPM) for such applications.

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BPEL: Interweaving of Web services made easy

BPEL is a standard supported by all large IT system producers (Bea, IBM, Microsoft, Oracle, SAP, etc.) to interweave simple Web services into more complex business processes. These business processes can then be addressed as Web services, so that in principle any desired level of complexity can be achieved. This makes BPEL an indispensable cornerstone of modern SOA concepts. BPEL processes are described in XML and as such are transparent and readily portable. Business processes are usually defined using graphic tools and are not executed until the run-time of the relevant environment. This is also a way in which to quickly adapt processes to a company's changing requirements without incurring the tedious and costly "programming jobs" that would otherwise be necessary.

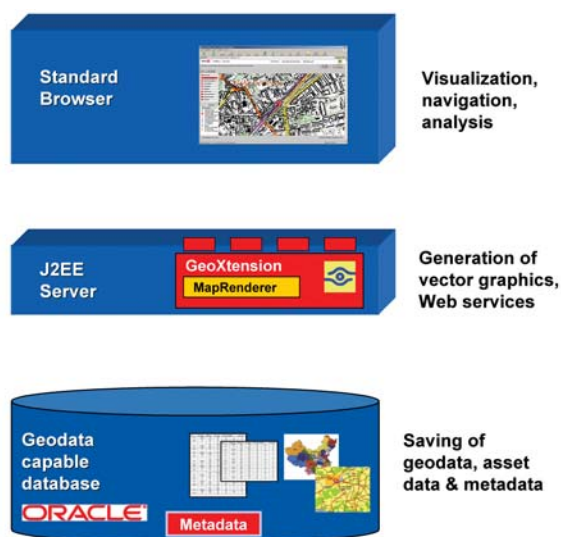
System architecture for lighting maintenance at SWU

For lighting maintenance SWU is implementing the SAP maintenance component (SAP PM). SAP PM permits hierarchical documentation of the engineering network infrastructure in the form of so-called *Functional Locations* and *Equipment* objects, and it is used to develop maintenance messages and jobs in relation to the network, configure maintenance plans, define cost collectors for later analysis, etc.

In spite of everything that SAP PM is able to do, like all maintenance tools it has no concept of "spatial proximity". It is therefore virtually impossible to expect that lighting equipment that is "close" to other equip-

ment will be maintained jointly without supplemental data and functions. Assignment by street names is imprecise and leaves valuable optimization potential unutilized. The alternative manual "quick look at the city map" simply avoids the automation issue.

Moreover, in the majority of cases technical data of the lighting installations are not even captured in SAP, rather they exist in a network information system, a type of so-called Geographic Information System (GIS). GIS applications are very powerful products and applications in the network documentation field and as such have, in addition to a map view of the network, a large number of special functions ranging from precise formal graphic dimensioning to checking the technical completeness of the utility network.

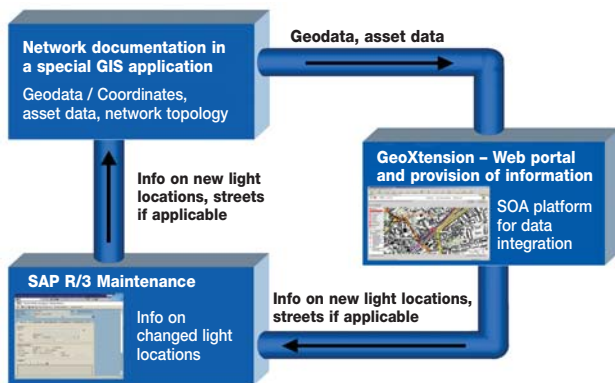


GeoXtension – Information solution and integration platform

Classic GIS applications are much too complicated for the occasional user as well as too expensive. At SWU the gap that results is in many cases filled by the GeoXtension product – a configurable component software that makes it possible to assemble, quickly and flexibly, customized applications with geodata reference and cartographic representations. Since GeoXtension is based on a Oracle database with spatial data storage, for evaluation and analysis purposes it is easy to integrate and utilize for visualization and reporting the data from other applications in the form of a data warehouse.

At SWU, GeoXtension serves various target groups: Management with its need for summary graphic representations of key indicators to support decisionmaking, as well as occasional users with their “Where is that again?” questions.

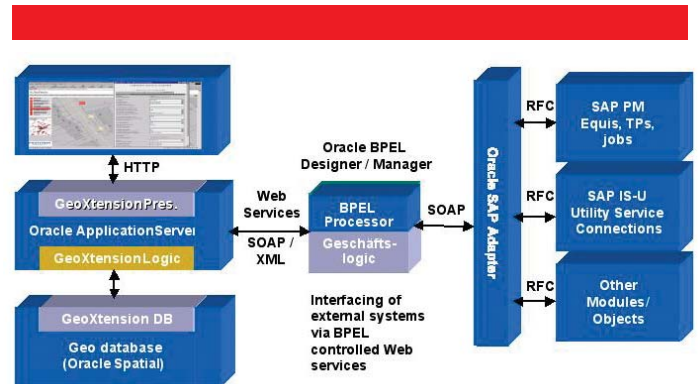
In lighting maintenance at SWU, GeoXtension is the starting point for documenting minor technical changes made to the utility network, e.g. when lighting equipment is replaced.



Data flow at SWU

Lighting locations are documented both in the GeoXtension network information system and in SAP PM at SWU. However only the representation in SAP PM goes into depth; this is where under each lighting location its lighting equipment with all of their technical data are found. In practice it is somewhat awkward to capture the technical details of the individual lights via the original SAP transactions, so an integrated solution here must give the user are more suitable way of capturing these data.

Multi-system changes to data can have a number of different causes. For example, under some circumstances lighting locations might be entered in the network information system initially and then need to be mirrored into SAP. Or status information maintained in the SAP system may need to be exported to interconnected systems. Of course data consistency must be preserved at all times in such cases.



Oracle BPEL products in use

Data synchronization functions at SWU are assumed by the flow logic configured in BPEL by FICHTNER CONSULTING & IT. The Oracle BPEL Designer was used to design the processes, and the Oracle BPEL Process Manager was used for the actual execution. What proved to be especially advantageous here was the graphic user interface of Oracle BPEL Designer in combination with an optional XML representation that offers modelers a powerful and flexible tool. The flows of all process instances are fully documented, greatly simplifying a later audit of historical process flows, e.g. for the purpose of analyzing key figures and tracking down faulty process definitions. Different than is the case with classical EAI integration solutions, for BPEL long-running business processes are no problem. For example, if an employee is on vacation and no authorized representation was assigned, the process waits until someone performs the task. If that does not happen, a message is sent to the process owner after a prescribed warning.

Various methods are used to interface to the participating external systems. In the case of SAP Web services are called; another method involves data transmission via database tables which the BPEL Process Manager monitors continuously for data changes.



Outlook: SWU will continue to advance

After the first successful prototypes in the area of lighting maintenance, SWU now wants to embark in the direction of business process management and construct, step-by-step with the help of FICHTNER CONSULTING & IT, multi-system business processes based on a Web service architecture. Initial steps will involve implementation of additional functions in the area of lighting, but will then branch out to integrate other utility areas (electricity, gas, water). The integration of mobile users is another challenge for the near future.

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