

Interoperability does matter

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ABSTRACT

In companies, the historically developed IT systems are mostly application islands. They always produce good results if the system's requirements and surroundings are not changed and as long as a system interface is not needed. With the ever increasing dynamic and globalization of the market, however, these IT islands are certain to collapse. Interoperability (IO) is the bid of the hour, assuming the integration of users, data, applications and processes. In the following, important IO enablers such as ETL, EAI, and SOA will be examined on the basis of practicability. It will be shown that especially SOA produces a surge of interoperability that could rightly be referred to as IT evolution.

Keywords: EAI (Enterprise Application Integration), ETL (Extraction - Transformation - Loading), Interoperability, SOA (Service Oriented Architecture), Web Services.

1. INTEROPERABILITY

In the May 2003 issue of the Harvard Business Review Nicholas G. Carr published an article with the rebellious title "IT doesn't matter". According to Carr, information technology (IT) has lost its ability to provide companies with a competitive advantage. Carr's opinion triggered a heavy debate between those that support him ardently and the opposition. Here we will look at only two of these opinions:

- Brad Boston, CIO of Cisco Systems: "*Wal-Mart, Amazon, eBay and other great companies didn't succeed because their information technology was better than others. Their vision was.*" [1].
- Carr in response to Jeffrey Immelt, CEO of General Electric: "*Although companies have wasted a great deal of money on IT, continued investment in IT will remain a competitive necessity even if it doesn't provide a competitive advantage.*" [1].

Without reliably operating information technology, even the most creative and progressive visions are of no use. Carr's polemic has a point here. The IT has to work. But it does not work if the company is overloaded with files, applications and the sky-rocketing IT expenses that come with them. Application integration inability and a total failure in interoperability lead to ineffective communication and inadequate interaction between the various applications. This is the chief cause of ineffective IT. Interoperability does matter!

With interoperability an integration and communication concept is understood. Interoperability allows that in distributed applications two or more systems can reciprocally access and utilize their application components. Interoperability is therefore like

an elixir of life for living and artificial systems. In the case of IT application systems, interoperability calls for the integration of users, data, applications and processes.

Integration has remained on the agenda of CIOs since the beginning of information processing automation. However, even today the IT landscape in many companies is characterized by fragmented business processes, functional IT application best-of-breed silos, redundant and inconsistent data and rigid infrastructures. The bitter consequences of this development include that:

- the heterogeneous data sources are not available for companywide analysis essential for top management,
- the linking of business processes necessary for successful eBusiness and globalization is unachievable,
- company mergers are hindered due to current IT landscapes,
- the costs for "Brain-" or technical interfaces used to bridge the application and data islands have become extreme. According to SAP, annual costs up to \$15,000 can be expected for a program interface.

Interoperability is in this respect the best way to link the historically developed system worlds, because the existing, approved and accepted company-owned mini-IT-worlds can be retained. Every overall corporate business, adjustment of sub-contractors and business merger can profit from interoperability. That is why the European Commission identified interoperability as a key issue in the current IT program eEUROPE 2005. [2].

Important enablers for interoperability are:

- ETL (Extraction - Transformation - Loading) in the context of data warehouses,
- EAI (Enterprise Application Integration),
- increasingly SOA (Service Oriented Architecture) on the basis of Web Services. SOA is hoped to be this golden key to change the IT world.

2. ETL

The database development that began in the 1970's has been, until now, successful, as long as only one database is processed at a time. However, if management needs a cross-database integrated analysis, it is confronted with severe problems. Therefore it seemed that Bill Inmon, with his concept of Data Warehousing had indeed found the proverbial Philosopher's stone. As in the ANSI/X3/SPARC model, a consolidating integration layer is sandwiched between the outer layers. This layer is called the data warehouse. This integration structure is suc-

cessful because the ETL, as middleware, secures the consistency of the data warehouse. The ETL process consists of the following principal tasks:

- To analyse and document the operational source system,
- To extract data relevant to the data warehouse,
- To transform the source data according to the target convention of the data warehouse,
- To cleanse the transformed data,
- To periodically load the data into the data warehouse.

Modern ETL systems are not limited to the use of only the known APIs (Application Programming Interface). Integration technologies such as UDI (Universal Data Integration), JDBC (Java Database Connectivity) and SOAP (originally for Simple Object Access Protocol) are also used. Looking at the total expenditure of a data warehouse, ETL's expense comprises between 50 and 80%. This makes ETL the principal success factor. According to the statement of Giga Information Group, Informatica is the global leader of the data integration market with an 18% market share.

Current market analysis shows that data warehouse-based Business Intelligence (BI) solutions are increasingly used in medium-sized enterprises. According to Gartner, BI is the process of transforming data into information and, through discovery, into knowledge. Given that BI requires the data warehouse and that the data warehouse calls for ETL, BI, when employed, is a consistent platform for the integration of the company's data world. With it, an excellent foundation is installed on which later efficient application and process integration can be created. The ETL-packages put together for medium-sized companies, for example from Embarcadero or IBM, support this process.

3. EAI

In companies historically developed applications were deployed at high expense in order to realize a competitive advantage. The functionality achieved within each application's island (e.g. CRM, ERP, SCM) was often sufficient. But this island world showed its defects increasingly: There were no bridges to connect the islands and therefore no interoperability. This was the chance for Enterprise Application Integration. EAI focused on the integration of company-relevant applications with the help of different technologies/standards (CORBA, COM, XML, J2EE, .NET et al.) and components (from basic adaptors/connectors to application servers). EAI transcends the classic system integration because it not only masters the problem of data transfer, but also links heterogeneous applications to integrated business processes.

Today's EAI market is divided. Approximately 70 to 80 vendors are campaigning for the customer's favour. The market leaders are considered to be IBM, Mercator, SeeBeyond, Tibco, Vitria and Webmethods. According to Meta Group, 15% of the companies in Germany are currently actively working with EAI. In the USA every third company has already collected its own EAI experience. It is suggested that the German reservation is attributed to the positive integration effects of SAP R/3. However, today the integration abilities of the ERP monoliths are reaching their limits, and it is evident that ERP only represents a part of a company's total application system.

The market is predicted to soon be saturated with EAI software, because it is expensive and proprietary. Important evidence of the validity of this assumption is that with XML-based Web Services and the Service Oriented Architecture (SOA) a para-

digim shift is emerging in information technology. This is the chance to open interoperability and integration solutions.

4. Web Services and SOA

Successful business operations increasingly depend on the implementation of real process orientation. If business processes are no longer organized exclusively within a company, but rather optimized by suppliers and customers, the Web Services era will begin. "A Web Service is a software application identified by a URI (Uniform Resource Identifier)..., whose interfaces and binding are capable of being defined, described and discovered by XML artefacts and supports direct interactions with other software applications using XML-based messages via internet-based protocols." [3, p. 3].

With Web Services various applications on different servers should automatically be linked within the running time in order to secure the interoperability of a business process. They work with modular software components that, thanks to excellent interface characteristics, locate and create defined sub-functions of business processes in the internet and prepare them for use. They are not dependent on software platforms, programming languages or their physical location.

Web Services profit from producer-independent standards that have, with the support of WS-I-Consortium (Web Services Interoperability), rapidly enabled: XML (Extensible Markup Language), SOAP, UDDI (Universal Description, Discovery and Integration Services), WSDL (Web Service Description Language), BPEL/BPEL4WS (Business Process Execution Language/for Web Services). With the assistance of Orchestration-/ Choreography-Tools, Web Services can be aggregated, integrated, and cascaded. However, the hoped for interoperability-surge still has not taken place – there are complicated security issues when working in the WWW.

Nevertheless development rapidly continues in favour of interoperability. We are experiencing the symbiosis of SOA and Web Services in a closed intranet: The new technology will be easily set up in the successful client/server architecture and enhanced in service orientation. "SOA stresses interoperability." [4]. The illustration shows this connection (cp. figure 1).

Despite the success achieved with the client/server architecture, in terms of the current integration and interoperability problems, the following weak points can be seen:

- fixed interfaces between the software-/hardware-architecture in enterprises and that of the users,
- functional alignment that does not correspond to the dynamics of business processes,
- narrowly defined interfaces that are costly when updated,
- no standards based on business processes.

These weak points will be eliminated provided that:

- the IT-basis architecture is based on business processes,
- business processes are implemented into the entire process chain, from the suppliers to the customers,
- new or changed business processes are made to be executable while using existing software components and only minor reprogramming is required,
- the expense of customizing ERP systems is effectively reduced,
- the programming is mainly comprised of code generation,
- the existent IT world be integrated into the new architecture,
- universal uniform standards be created,

- the user-friendliness be increased to the point that the actual technology is pushed to the background.

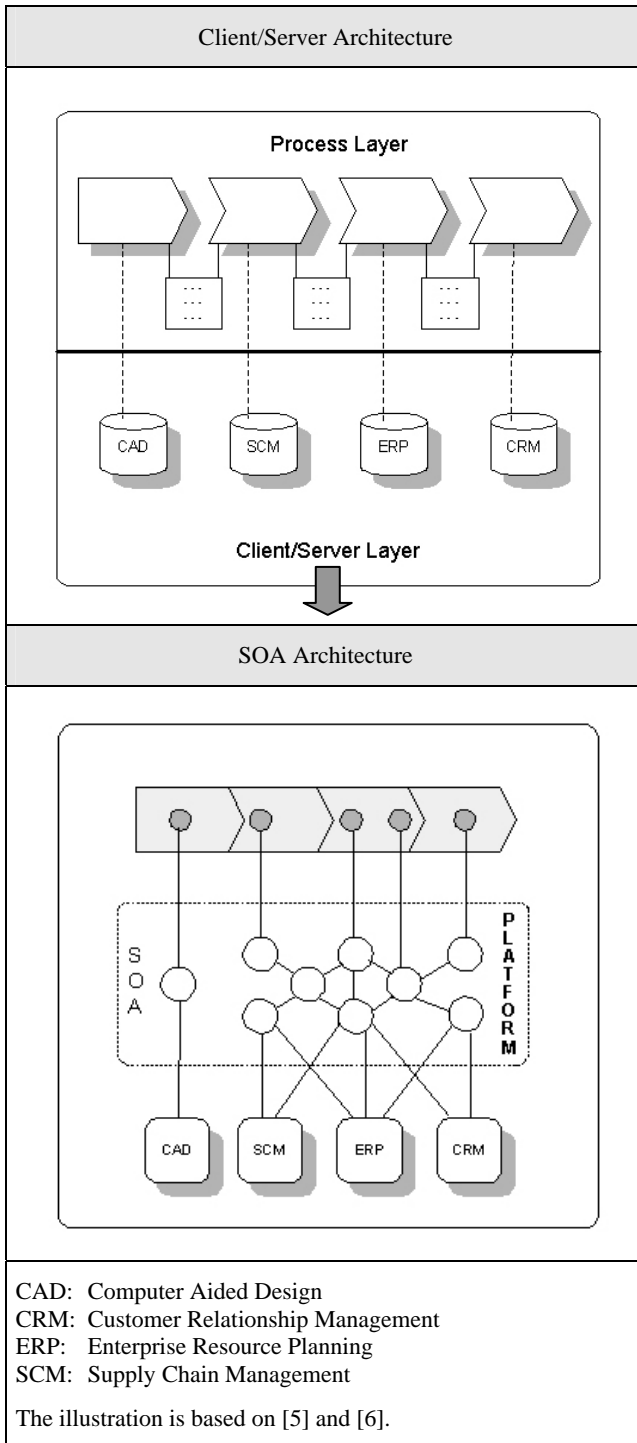


Figure 1: From Client/Server to SOA Architecture

SOA is thus the answer to the current non-compliance of the integration and interoperability postulates of computer science. According to Microsoft [7], SOA describes a software infrastructure which supports loosely linked services to make highly flexible business activities possible and with which technology is pushed to the background. In the SOA platform Services can be arbitrarily distributed and dynamically combined to create business processes. They exchange data independently from the

underlying technical platforms. SOA determines the interface with which the other systems, via network, can use the services. Therefore, SOA is also always an interface-oriented architecture. Above all, that it is possible on the basis of Web Services to consolidate and reuse software components makes SOA an instrument of Lean Management in IT-departments and will noticeably reduce the Total Cost of Ownership.

Using SOA the business processes are in the foreground. It is the logical consequence if, for example, SAP adds business contents to its SOA concept and therefore advances to Enterprise Services Architecture (ESA): ESA expands the Web Services concept to an architecture for business purposes. SAP has introduced NetWeaver as its ESA/SOA solution. Oracle has taken the offensive with its Business Integration Solution and BPEL Process Manager. IBM and Microsoft launch their SOA initiatives. Siebel's answer is Universal Application Network (UAN), Sonic Software has Enterprise Service-Bus (ESB) and Informatica's PowerCenter is already working as a Web Service Consumer.

With SOA, the future of IT in the area of business has begun. With SOA, there are new possibilities for large as well as medium-sized companies. By implementing business processes in medium-sized businesses it will be increasingly possible to work without private software resources and instead to make ample use of the present global component supply.

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