EAForum
www.eaiforum.de

RTE

Real-Time-Oriented IT Architecture

White Paper "Altogether now": Strategic Planning of IT Architectures

Part 1: General Part

English Version 1.0

Authors:
Richard Nussdorfer
CSA Consulting GmbH, München

Dr. Wolfgang Martin
Wolfgang Martin Team, S.A.R.L. Martin, Annecy

August 2003

With friendly support of:

webMethods. SeeBeyond. FUJITSU COMPUTERS SIEMENS csk software Axway a Sopra Group company MAGIC www.magicsoftware.com IBM

Preface

The present White Paper "Real-Time Enterprise RTE" describes the streamlined IT architecture, which is

- based on a traditional IT architecture, and which
- develops it in an evolutionary way.

For many years already both authors have been working in managing functions in the IT business as analysts and business orientated project managers. Both have a practical background and both have been coming to terms with strategic thinking and future developments.

The present RTE White Paper is divided into two parts. First there is a general part describing the reference architecture. The second part describes vendor platforms necessary to realize the mentioned reference architecture. To enable readers getting a fast survey of the actual market, the authors have created a separate description—showing an identical agenda—for each vendor.

Application-Framework-Platforms

Here we distinguish between the IT generalists and their overall Applications Framework platforms. Seven vendors in the market are offering correspondent products.

- IBM's WebSphere
- SAP's NetWeaver
- Sun Microsystems' Sun ONE
- Microsoft's .NET
- Fujitsu Siemens Computers' openSEAS
- BEA's WebLogic-Platform
- Oracle's 9iAS

Best-of-Breed-Products

Supplementary to the IT generalists there are best-of-breed products, offered by specialists in this market.

- EAI specialists such as TIBCO, SeeBeyond, webMethods, Vitria, Magic, Axway etc.
- CPM/BPM specialists such as Business Objects, SAS etc.
- Business process vendors such as Siebel, CSK Software etc.
- Solution vendors such as PeopleSoft, SSA (Baan) etc.

Enterprises developing IT architectures will have to decide which basic platform to choose for this evolution and which additional best-of-breed-products will be required. The focus of this series of White Papers will be to assist any decisions in the described environment.

We'd like to encourage you to give all kinds of comments, critics as well as approval.

Munich, 12.8.2003

Richard Nussdorfer
Managing Director CSA Consulting GmbH

Annecy, 12.8.2003

Dr. Wolfgang Martin
Wolfgang Martin Team

The authors' biographies

Richard Nussdorfer

Biography

Richard Nussdorfer is working for more than 30 years in the IT-industry.

The current expertise covers Business Integration (EAI), Client/Server-Architectures (C/S) and strategic planning of IT-Architecures (RTE).

His technical knowledge is used for integration projects, modernizing IT-Architectures and re-centralizing Client/Server-Architectures to Web-Architectures.

He published 2 e-books: Information-Technology and the EAI-Book. He contributes articles to IT journals and is engaged as speaker for congresses and seminars like EAI, DataWarehouses and Web Services.

Provider of knowledge-base for EAI as Internet-platform: www.eaiforum.de

Richard Nussdorfer started his first job in 1970 at Siemens AG in software development. He continued as an expert for databases and project leader for database-projects, national and international, form London to Moscow and from Stockholm to Johannesburg.
He then continued as manager for Software-Marketing in Munich and Business Development Manager in South Africa.
From 1990 to 1993 he worked as a consultant for Plenum AG in strategic IT-projects.
In 1994 he foundend CSA Consulting GmbH where he still works as Managing Director.

Richard Nussdorfer has a degree in computer science from the Technical University in Vienna (Austria).

Dr. Wolfgang Martin

Biography

Recently designated one of the top 10 most influential IT consultants in Europe (by Info Economist magazine), **Wolfgang Martin** is a leading authority on Customer Relationship Management (CRM), Enterprise Application Integration (EAI), Business Intelligence (BI), and Business Performance Management (BPM).

After 5½ years with META Group, latterly as Senior Vice President International *Application Delivery Strategies*, Mr. Martin established the **Wolfgang Martin Team.** Here he continues to focus on technological innovations that drive business, examining their impact on organization, enterprise culture, business architecture and business processes.

Mr. Martin is a notable commentator on conference platforms and in TV appearances across Europe. His analytic skills are sought by many of Europe's leading companies in consulting engagements. A frequent contributor of articles for IT journals and trade papers, he is also an editor of technical literature, such as *"Data Warehousing – Data Mining – OLAP" (Bonn, 1998)*, "*Strategic Bulletin on EAI" (Munich, 2002), "Strategic Bulletin on CRM" (Munich, 2002), "Jahresgutachten CRM 2003", (Würzburg, 2002)*.

Prior to META Group, Wolfgang Martin held various management positions with Sybase and Software AG, responsible for business development, marketing and product marketing. Prior to this, he became an expert on decision support while with Comshare. His academic work included Computational Statistics at the Universities of Bonn (Germany) and Paris- Sud (France).

Dr. Martin has a doctoral rer.nat. degree in Applied Mathematics from the University of Bonn (Germany).

Wolfgang MARTIN Team
powerful connections

2

Contents

1 Management Summary

This White Paper is dealing with the evolution of existing IT architecture towards real-time enterprise (RTE).
RTE: Just another slogan, but a perfect expression for two important goals:

- Convergence of business challenges and IT-results
- Using real-time information as a basic for business decisions

Being a top-down-view this defines the targets to reach. Anybody agreeing to these targets and recognizing that these challenges should be realized in his/her very proper enterprise should switch to bottom-up-thinking and should define modernization of traditional IT architecture being a new challenge.

Moving to RTE means a) analyzing existing IT architecture and b) finding out about the need/urge of changing.

This White Paper defines the need of transformation by four main issues:

- **Cost pressure:** IT is too expensive or by investing into IT the enterprise will be able to save costs
- **Innovations:** IT architectures have to face modern tempo. "Real-time information" for business management is most important innovation.
- **Flexibility:** Lacks of flexibility when transforming are a major point of criticism. A solution will be the transformation of IT architecture: From application-centric thinking to integration-centric thinking.
- **Business Awareness:** The task of IT architectures is not just offering applications, but it should lead to delivering of business processes. "Awareness" means IT will come to understand business demands and will be ready rather to invest in business processes than in applications.

"7 steps to RTE" is the motto of IT evolution, and it should be implemented within a project of re-creating IT.

The result will be an IT offering more flexibility and transporting the needs of business departments more efficiently than it has been doing before. The main issues are a) introduction of business integration as a "business-process-hub" for the enterprise and b) analysis of business processes to implement the real time information as a decision base for business management.

The advantage will be a smooth IT architecture—generally based on one of the most important Applications Framework platforms—and real time information as a life decision base. Both facts will affect costs, so the ROI bill will show medium term achievable cost advantage.

2 Real-Time-Oriented IT-Architecture

IT architectures have been continuously growing for about 35 years in many variants, certainly more heterogeneous than homogeneous, united with one thing in common throughout all kinds of enterprises: These existing IT architectures make enterprises run well, very well in most cases. So the following question will make a lot of sense: What will be the future— stagnation or innovation?

Due to this realistic view there are two possible conclusions: Business management admits that IT people have done a smart job setting up a well-operating IT that will enable enterprises to bring in harvest throughout the years to come. Or on the contrary business management admit that there is no such a thing as stagnation—which means enterprises will have to keep up with innovation, which is existing in every business branch, especially in IT, of course.

As long as there is no retreat to an isolated island in sight, business management will have to consider indispensable innovations for existing IT architectures. Business management will come to the conclusion that there is a need for changes and, more than that, IT industry is able to solve major challenges.

This White Paper describes the evolution how to get in seven steps from the existing IT architecture to the point, which will mark the influence of IT for the years to come:

- New ways to supply business management with better and certainly more life information as a decision base
- Reducing costs by process automation
- Lowering risks by flexible, pro-active reactions in terms of market- and customer-dynamics
- Optimizing potentials and their optimal use

3 Real-Time Enterprise (RTE) as IT Architecture

Before transforming an existing and well operating IT-architecture, there is always the need for a penetrating glance at the aims to be reached by the next step of evolution. Glancing in the future will lead to various results; yet one of these results with a real chance of getting an important issue will be shown in this White Paper: The slogan is RTE—Real-Time Enterprise. And RTE is the model, which influence the aims of transforming existing IT architectures:

- Integration of business targets and IT operations
- More efficient decision base by real time information, which have to be synchronized throughout processes, departments and beyond the enterprise
- Business processes are defined by business strategy
- Business processes will be analyzed continuously and they are be the base for important information
- All kind of analysis should be close to real time and should be published instantly, slogan: zero latency. An absolute "must" is the synchronization of business metrics and the speed of business projects.
- Business integration is the technologic postulation to hit the target

And there are quite some new ideas in real time; one of the most important is event orientation. Traditionally enterprise architectures are based on an internal view on the processes. Basis for such a traditional architecture are a-synchronically run Question/Answer models with batch processing. That means, for example, within the ordering processes incoming orders were collected in a buffer. In order to get information about the incoming orders the employee in charge had to question the buffer, and only after having done so he initiated the further treatment within a workflow. Event orientation reverses the treatment. The incoming order itself gives sign to the employee; respectively it will be treated within the process automation. No doubt about the advantage: Speed and quality will boost.

Event orientation is technically supported by business integration, i.e. by messaging and publish-and-subscribe concepts. So business integration is the prerequisite to become a real-time enterprise. Remains the question what real-time exactly means. Nano seconds? Pico seconds? None of these, real-time in business is not at all related to the clock, but means synchronization.

Definition: Real-time in business terms means availability of right information at the right time at the right place for the right purpose.

So business integration builds up an "Information Supply Chain", as shown by the above definition. Important for "real time" is the availability of information within the requested speed. In this sense, monthly, weekly, daily support with information means real time, depending on the concrete business process (for example schedule-information when booking versus delay-information when traveling). Maybe the term "in-time" or "right-time" might have been more appropriate. Alas the term "real-time" has become the new buzzword meanwhile, occasionally leading to a couple of misunderstandings.

To summarize, RTE architecture means rigorous transformation from a traditional IT architecture to service-oriented architecture (SOA). Focus is no longer an isolated application but business processes which are executed in an integration hub. This hub is usually called EAI (Enterprise Application Integration).

Analysis of business processes in real-time is the base for competent fact-based decisions in order to optimize monitoring and controlling of processes.

Possible examples are:

- analysis of recent product sales, ranking according to volume, monitoring the sales cycle with real-time statistics
- analysis of visitors to a homepage, including analysis of frequently visited pages and real-time publishing of ranking
- analysis of merchandise on stock and its movements, same time monitored by suppliers, as soon as thread hold is reached, a collaborative business process initiates an order (VMI=Vendor Managed Inventory), in addition the enterprise itself receives a real-time report concerning the initiated orders
- There are a lot more possible business cases where the advantages of real-time are evident. The term "Real-Time Enterprise"—having been initiated by Gartner—has found international reputation. Real-time enterprise is a logical, consequent evolution of an architecture that has been started with business integration and that has found a temporary climate with RTE.

4 Transformation of IT Architecture — Critical Issues

- There is a general pressure to transform the existing IT architectures—even irrespective of the paradigm RTE. But with a target like RTE necessary transformations can easily be defined; they have been summarized in the present document as "Seven steps to transformation". Besides the general target of transforming the IT architecture there are additional criteria, which characterize the need for change.
- **Cost pressure**: Nowadays costs for IT are regarded as a block that should be minimized. To do so special initiatives will be requested; initiatives within procurement (for example achievement of TCO by homogenization), managing projects (more design, less code) as well as initiatives when reconsidering the cost block of IT in the view of value for enterprise.

  Possible solution: Judging IT as a mere cost block is not the fair way to regard it; IT is a productive tool that has been helping to minimize costs in enterprises for more than 30 years. This remains fact in present. One strategy has always been wise and will stay so: "Invest in IT to keep costs low in the enterprise". One of the most important innovations to minimize costs is integration tools to business process engineering and direct generation of executable codes (SW generator). Automation helps to lower costs up to 40% in any business process. 50% of the TOP100-enterprises in Germany have already understood the advantage of the (EAI) tools and they have started innovative projects to lower costs.
- **Innovations**: Starting to think about integration will consequently lead to topics as "Real-Time Enterprise (RTE)". On enterprise levels RTE can deliver necessary information and so it can present a new challenge to IT architecture. The innovations, which come along, will—first of all—change thinking. Introducing "business integration" as an enterprise process hub is the key to evolution, each transformation that has to be taken (for example analysis of enterprise processes) is depending on this hub. To support the actions, leading IT vendors offer so called "Applications Frameworks"; comprehensive SW packages with quite a number of functions. They allow a "One-Stop-Shopping" (IBM, SAP, Sun Microsystems, Microsoft, Fujitsu Siemens, BEA and Oracle). These general solutions can be supplemented by "Best-of-Breed" solutions, offered by special vendors for EAI applications, e.g. such as TIBCO or webMethods. Various applications can complete these platforms;

Various applications can complete these platforms; PeopleSoft is an example for an already existing RTE oriented ERP solution.

Possible solution: Within the years an IT architecture changes its roll and its meaning. In the future it will have to fulfill challenges set by the enterprise management regarding real-time enterprise (RTE) as well as "Just-in-time" regarding the speed of information. Anyone taking this challenge as important and significant will implement RTE innovations as designed by the "Seven-Steps-Program", as it has been visualized by the IT pyramid (see below). The existing IT architecture is and will be the base to move to RTE architecture. Protection of investments is the major goal.

- **Flexibility**: A critical matter when regarding the existing IT architectures is the lack of flexibility, the lack of adaptation to the changing demands in business. Introduction of new business processes or change within existing business processes require much more flexibility than it is possible today. Technical solutions to communicate new requirements are demanded, as well as new technologies within software evolution. The new requirements on functionality will need to be implemented much faster than today, usual long lasting development cycles have to be much shorter and faster.

  Possible solutions: Here the answer should be *"30 years of traditional IT will finally come to an end"*. In order to achieve flexibility, a new layer of "enterprise processes" should be introduced between the existing SW solutions such as ERP or legacy applications and the new business challenges. This will change the creation of IT architectures: Leave the ERP oriented thinking and join business process oriented thinking. It means, business processes are right in the centre of interest and a business process hub will be created. Normally it is not necessary to develop new business logics, the definition of new business processes should be sufficient. BPM functionality (BPM=Business Process Modeling) will be able to implement it rather smooth, because its modern technology will fit in the gap soon. In order to gain time when implementing, new requirement should not immediately lead to a new development of a new program code, but should be implemented by modeling new business processes. "Generating code, not writing code" is the key to more flexibility.

- **Business Awareness**: The gap between business challenges and IT solutions as existing software solutions is so huge because existing applications do not deliver needed information, and business processes are not engineered as they should. The term "awareness" stands for better comprehension for business challenges in the world of IT, and it stands for the expectation of the business department that the IT department will

deliver solutions, which are based on modern and affordable IT technologies.

Possible solutions: Demands of business can be defined as business process. Usually that means existent processes will change or new processes will be necessary. As soon as business department and IT department communicate on the base of business processes, both will take profit: business uses business terms in order to communicate with the IT; and the IT department increases its chances for a better understanding of the requirements and therefore for better transformation. "Business awareness" is the key part of day-to-day communication between business department and IT department, and this is one of the most important challenges to deal with.

5 Strategically Planned IT Architecture

As mentioned before, a modern IT architecture is a RTE architecture consisting of 7 supplementary layers that have to be arranged on top of the traditional architecture. The technological foundation is the availability of platforms, the so called "Applications Frameworks", for example WebSphere, NetWeaver, .NET, Sun ONE, openSEAS, Oracle or WebLogic platform. Alternatives are a) a Best-of-Breed approach or b) a combination of the quoted platforms with special Best-of-breed products.

Comprehensive Applications Frameworks are able to hide a great deal of technical complexity from IT and they provide an integrated tool set. The result is: Important parts of the employees' work are now the analysis of requirements and the challenge of implementation instead of technical problems as linking of applications via individual APIs or implementing a business process workflow.

Using Applications Frameworks should be based on a ROI calculation. The calculation should reveal investments as well as the advantages and cost cutting in IT and in business processes.

The rule is: "Think strategically, but act tactically", which means iterative, sliced actions. The needed business case to implement the Applications Framework will be found in business itself—not in IT. The idea is to look for the most lucrative financial capital-intensive process, to make improvements by process redesign (automation) and business integration. Cost savings are huge and saved costs should be used to finance the following integration process. So "Zero-Budget" will be sufficient for integration!

A concept for recreating traditional IT architectures is shown in the IT architecture pyramid (see below). The pyramid demonstrates the innovation via its 7 layers. This will be described in the following.

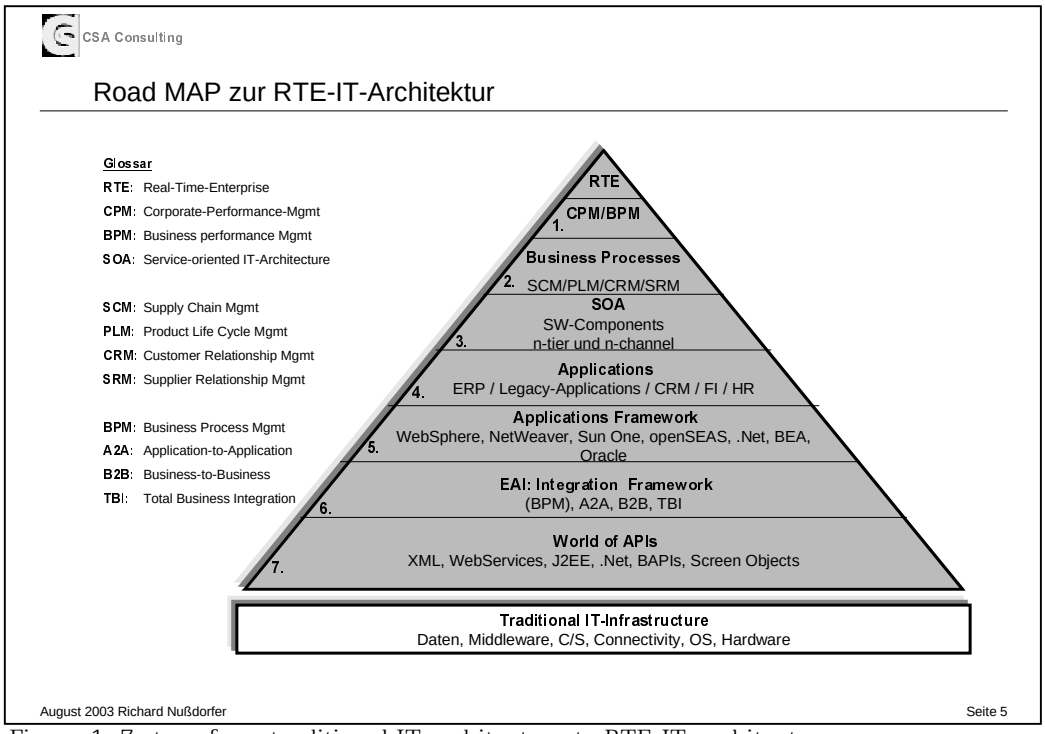

Figure 1: 7 steps from traditional IT architecture to RTE-IT-architecture

7 layers embedded between the ultimate business target—the RTE—and at the bottom, by the traditional IT architecture, depict the 7 steps.

There is a good reason for this approach: IT architecture is the classic service level for business. Actually business manager's need information that is fast, actual and comprehensive in order to act agile, dynamically and flexibly. That's why the general goal in transforming the IT architecture is: "Create the real-time enterprise". Two buzz words popped up, "RTE" and "CPM", which will be explained in the following.

6 Seven Steps to RTE

The paradigm to target such an IT architecture is real-time enterprise. Of course there will be various opinions about RTE being the optimal goal. Whoever is convinced it is the optimal goal should regard the future architecture as shown in the 7 layers below. Those who doubt will find sufficient criteria to make up their minds in this White Paper. And anyone who does not accept the RTE model should be able to define an alternative architecture.

Below the target of an RTE architecture is shown: up-to-date information to support decisions within business management.

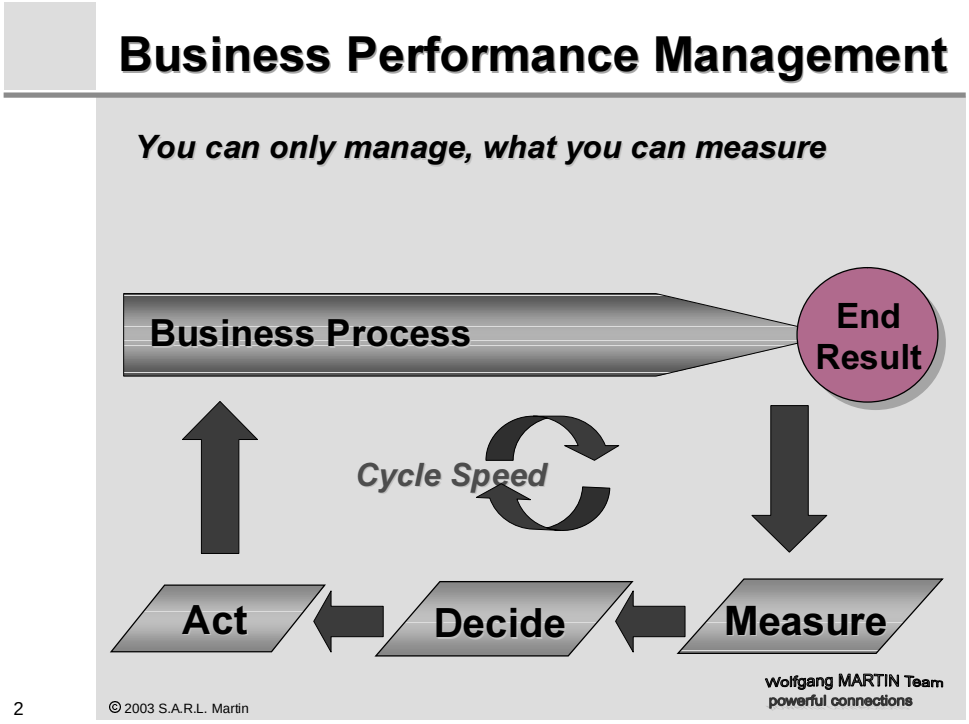

Figure 2: RTE means synchronizing business metrics with the speed of business processes. It follows the paradigm of a "supply chain": Deliver the right information to the right location to the right information consumer in due time to create added value.

Moving to RTE and to transforming the existing IT-architecture means introducing 7 layers—explained as follows—into the existing IT architecture.

N°	Subject	Comments
1.	**CPM (BPM)**	**Providing real-time information as a foundation for decisions for business management** Corporate Performance Management (CPM) is the first function within the RTE IT architecture. Actual business processes are to be analyzed in real time; resulting information will be presented to management in order to provide a framework for decisions for monitoring and controlling of processes. The alternate term BPM (Business Performance Management) is not used in this white paper in order to avoid misunderstanding. BPM is already defined as Business Process Modeling. RTE is the general philosophy whereas CPM is the implementation by several tools. CPM is based on a business process hub; this hub is instantiated on an EAI tool. Information is delivered in near real-time, as business processes are analyzed in near real-time. Reports and dashboards can be continuously updated and provide real-time information for monitoring and controlling time-critical processes. Example: A couple of questions can be answered instantly in a "just-in-time-environment", such as "How many orders did we get within the last hour?", "Which products have been sold supplementary to the plan since this morning?", "How many calls did we have on our hot line within the last hour?". This kind of service existed already in a Data Warehouse, but there is a limitation to certain time-critical questions. A strategic move to a business process hub is necessary to receive real-time information directly from the IT architecture.
2.	**Business Processes**	**Modeling business processes and workflow in an integration server** Mental change marks the start from present ERP-oriented to business process oriented thinking. The focus is workflow of business processes, across applications and platforms; defined, monitored and controlled by integration servers. These business processes can be a) standardized business processes presenting branch typical flows—for instance cash management—or b) individual business processes. Key point is to understand that we are now dealing with cross-functional, cross-departmental, and even cross-enterprise processes. Vendors offering such processes are: ▪ Vendors of standardized business processes: – ERP vendors as SAP, PeopleSoft, Baan etc. – Platform vendors such as IBM WebSphere etc. – Vendors of integration solutions such as Siebel, I2 etc. ▪ Vendors of process modeling tools. An integration server executes individually engineered processes.

		▪ Important standardized business processes are as follows: – SCM – integration of partners, customers and suppliers – PLM – definition and monitoring of product-life-cycle – CRM – managing customer relationship – SRM – optimizing supplier relationship – Infrastructure processes such as staff, finance, IT, etc.
3.	**Service-oriented IT-Architecture (SOA)**	**SW-Components and Business Processes. Services as business processes and standard-APIs** The mental change mentioned in step2 leads from applications to service-oriented SW components, easily to be called via standardized APIs. For any business process definition these existing SW components will be connected to a flow. That means, a business process has become either a service or a group of services. SOA is a multi-tier and multi-channel architecture and is integrated in the existing IT architecture. Standard APIs are prerequisite for smooth integration. A service-oriented architecture is the result.
4.	**Applications**	**Application Server** Vendors of Applications Frameworks are not necessary in the business of delivering ERP applications. Main element of an Applications Framework is the platform provided by an application server, in order to execute any kind of application. Basic architecture is either J2EE or .NET. The architecture has to be supported by any chosen application.
5.	Applications Framework	**Technological Basic Architecture** Centerpiece of the new IT architecture is a compact Applications Framework suite containing all necessary elements to instantiate the new IT architecture. It may be selected either among the seven vendors mentioned below, or it may be an individual best-of-breed solution. The 7 layers of an RTE architecture can be implemented with one of these platforms, but there are differences in the depth and breadth of an individual solution. That means a platform can contain any necessary tool (such as CPM tools, portal, applications, and various APIs) to implement the 7 layers with a "One-stop-shopping" The leading platform vendors are: ▪ IBM – WebSphere ▪ SAP – NetWeaver ▪ Sun Microsystems – Sun ONE ▪ Microsoft – .NET ▪ Fujitsu Siemens Computers – openSEAS ▪ BEA – WebLogic Platform ▪ Oracle – 9iAS You cannot bet the chance to find a vendor supporting all demands, as demands are far too diverse in applications, for

		example. It is realistic to take decisions within one of the leading platforms complimented by best-of-breed products in one or several of the 7 layers.
6.	**Integration Framework** **(= EAI-Framework)**	**EAI Component as Integration Server** The integration framework is the central hub for executing and controlling business processes within the Applications Framework. This puts the general interest to the integration server, which executes all business processes. Applications such as ERP are regarded as back-end systems delivering a service as evocable business functions. It is the business process that decides which kind of service will be needed. The leading EAI vendors provide a very comprehensive portfolio of functionality that is sometimes similar to the portfolio of the platform vendors. This is in particular true for BAM, where some of the EAI vendors have even taken the lead. But the big difference between the platform and the EAI vendors is the availability of an application server. Today, the EAI vendors do typically not offer application servers. Basic EAI functionality is provided by any of the mentioned vendors of the two camps. Sure, everybody could argue about the degree of maturity and completeness of the offerings, but this is not the scope of this White Paper. The leading EAI vendors are: ▪ TIBCO ▪ SeeBeyond ▪ webMethods ▪ VITRIA ▪ Magic ▪ Axway
7.	**World of APIs**	**Standard APIs for Integration** Today interfaces are available in large numbers and shapes. Applications Frameworks make sure that new interfaces will be implemented as standard interfaces uniquely. To offer a kind of standard to old interfaces wrapping technology is used. Here Web Services will be important in future. For the existing middleware- and applications world there are quite a number of connectors (with "old" interfaces such as CICS, MQSeries or SAP-BAPIs) capable to connect old and new interfaces in a satisfactory way. One of the most important challenges is the integration of the new 7-layers-IT architecture with the existing applications. The integration has to be instantiated without causing technological changes in the existing IT world, in order to avoid any problems in accepting the new architecture due to the potentially high amount of efforts and resources needed for any change.

The 7 layers are a perfect method to update an existing IT-architecture. Most important player is the Applications Framework; its built-in functionality really helps to run the project without causing exaggerations regarding products and effort.

The following road map depicts the process to instantiate the changes in IT architecture; the 7 steps correspond to a bottom-up-strategy. On the contrary, planning of the RTE architecture is a top-down process. To reach the goal it is necessary to find out about strategic demands before planning the pragmatic steps. A bottom-up-orientated step-by-step process already delivers intermediate results, which on their own will already deliver value for business. Never forget each step must target the goal and keep in mind: in the end of the evolution there is the RTE IT architecture.

7 Road-Map to the RTE IT Architecture

The existing IT architecture is the foundation for moving to new horizons. The first problem is the technological interoperability; this leads to a discussion about interfaces. On top of the interfaces more layers can be implemented step by step. It is important to accept that the steps have to be initiated bottom-up and that there are interferences between them. Never try to realize the 7 steps in a big bang; the model is built on a step-by-step iterative approach.

1. **Interfaces (APIs):** Existing applications can be up-dated by using Web Services. This becomes quite complicated as soon as a migration of source-code towards Web Service is necessary. There a two kinds of scenarios:

   a) Migration

   Transforming existent backend applications to SW components and implementing of standard interface: The efforts are gigantic—months if not years, depending on the project—but they can be worth while, given the backend applications are planned to have a long lasting life-time.

   b) Integration

   Linking the existing back end applications via existing interfaces in the implemented environment, usually it is using the CICS- or Screen interfaces. This solution is much faster than the migration solution because the source-code of the backend applications doesn't need modification. This creates modern SW components whose functions can be evoked via the interface. Screen interfaces have been improved. Former "screen-scraping" has been replaced by "screen-objects" with EAI-compliance. The functionality of these tools hides a lot of the complexity.

2. **EAI-Framework:** This term means introducing business integration via a central business process hub including all basic functions of an EAI-tool, B2B-functions to external partners as well as B2C functions within an enterprise portal. Key point is the change of thinking from application thinking to thinking in business processes. First, the spaghetti-architecture will be replaced by the hub-architecture, then the backend applications in question and the existing interfaces have to be defined. This is followed by a decision which interface technologies will be used; finally there will be the definition of business processes and flow monitoring. At that point, the EAI layer is ready to go. Real-time information for management is provided by EAI-tools with BAM (business activity monitoring)-functionality. Results will be delivered by the CPM (corporate performance management) layer. EAI framework brings the impor-

tant functionality for the move from the traditional IT architecture to RTE architecture.

3. **Applications Framework:** Basic box of every tool vendor contains all necessary functions and tools and can be complemented by 3rd-party products. The contents of these basic boxes differ between vendors, but their functionality is similar. The grade of integration within the toolbox also differs from one vendor to another. Important is that only three vendors—SAP, and within limits Oracle and Microsoft—are able to deliver "prêt-à-porter" applications.
4. **Applications**: In this layer application solutions are provided. They can be delivered by platform vendors as well as by 3rd-party vendors delivering vertical solutions. There are 2 models: Either all applications are running on one and the same platform, or certain applications require an alternative platform, which means that platforms have to be interoperable. As an example: The SAP NetWeaver platform contains several SAP solutions, and SAP NetWeaver can communicate with platforms such as Sun ONE by Sun Microsystems, WebSphere by IBM, or WebLogic by BEA.
5. **SOA:** A service-oriented architecture is the outcome of the efforts in steps 1 to 4. As a result there are SW components with smoothly defined interfaces communicating via business processes. The beauty of this approach is that you always evolve towards the targeted goal and you never loose direction.
6. **Business processes** This is the layer where flows are modeled based on business background. Technologically BPM functionality of the integration server of step 2 is used. Business processes are the future of SW solutions. Vendors with a strong affinity to business processes deliver libraries with defined flows or at least templates addressing special topics, such as Master Data Management, Cash Management, Order Management, etc.
7. **CPM:** Corporate Performance Management is the closed-loop system for monitoring the performance of all relevant internal and external business processes by applying business metrics for measuring the performance, deciding on the outcome of the metrics (automated by a rules engine or by manual interaction), and deploying actions for controlling the performance of the business process. Key point for CPM is to synchronize the metrics to the speed of the process: real-time information is needed. The difference to the traditional business intelligence based on a data warehouse is the time-factor. Formerly there has been an at least one-day delay. This is now reduced to nearly zero latency, an important

strategic fact for enterprises and management who have to take immediate decisions. Further more, business processes in real-time lead to further information that has not been available in the existing architectures, another strategic advantage.

An RTE oriented architecture—integrated via APIs into the existing IT-architecture—is the result of this pragmatic procedure. This guarantees protection of investment and upgradeability.

The second part of the White Paper is dedicated to the Applications Frameworks of the seven mentioned vendors, plus best-of-breed solutions for EAI-Frameworks, legacy integration, and integration solutions. Integration solutions are cross-functional, cross-departmental, and cross-enterprise business processes delivered by platform vendors as well as by 3rd-party vendors right now.

8 Summary

We believe that our 7 step model will become a standard for continuously evolving enterprise specific IT architectures. This White Paper helps to make strategic decisions on platforms and products.

RTE is the answer to different architectures and actual buzzwords in the market leading to a smoothly defined IT architecture, which is built upon solid existing IT architectures and which will lead enterprises into a successful future.

Munich, 12.8.2003
Annecy, 12.8.2003

E-Mail-Addresses:
Richard.Nussdorfer@csaconsult.de
Wolfgang.Martin@noos.fr

Literature:

Martin, W.: EAI 2003 – Von der Anwendungsintegration zum Prozeß-Management, Strategic Bulletin, IT Research, www.it-research.net Sauerlach bei München, 2003, 40 pages

Nussdorfer, R.: EAI-Buch – Nutzen und Architektur des EAI-Konzeptes, Marktüberblick, Eigenverlag als e-book: www.eaiforum,de; 2000, 200 pages

About Fujitsu Siemens Computers

Fujitsu Siemens Computers, Europe's leading computer company, offers one of the world's most complete product and solution portfolios. World-leading IT products answer the needs of personal computing and enterprise computing with Mobile computing products, PCs, Workstations, Intel- and UNIX-based servers, Mainframes and Enterprise storage solutions.

With the vision "Powering the Information Age," Fujitsu Siemens Computers pursues the goal of giving people free access to information anywhere and at any time. This ensures their success within a knowledge-based society – at work, at home and on the move. Fujitsu Siemens Computers views its role in the future of the Information Age as an enabler of personal mobility based on reliable IT infrastructures. Universal access will be key, governed by the relationship between mobility and the infrastructure that supports it.

The corporation operates in all key markets across Europe, the Middle East and Africa and has individual companies in most countries. About 7,500 employees are serving our customers and many of our products are developed and produced in extensive manufacturing facilities in Augsburg, Paderborn and Sömmerda (Germany).

Fujitsu Siemens Computers' customers include the largest European organizations in industry, banking, insurance, commerce, telecommunications and the public sector, the entire range of small and medium enterprises and the full spectrum of private users. The company ensures the highest level of customer support with a sales force of more than 3,000 IT professionals on the front lines and over 35,000 sales partners.

The EAI activities of Fujitsu Siemens Computers concentrate in the product suite openSEAS. openSEAS is the middleware offer of Fujitsu Siemens Computers, with which the strategic adjustment Mobility and Business Critical Computing can be converted into material, customer-fair EAI solutions.

About IBM

IBM is the world's largest information technology company, with 80 years of leadership in helping businesses innovate. IBM software offers the widest range of infrastructure software for all types of computing platforms, allowing customers to take full advantage of the new era of e-business. The fastest way to get more information about IBM software is through the IBM home page at http://www.ibm.com/software/.

About webMethods, Inc.

As the leading independent provider of integration software, webMethods, Inc. (Nasdaq: WEBM - news) delivers the industry's most comprehensive platform for enterprise-wide integration, including complete support for Enterprise Web Services. The webMethods Integration Platform allows customers to achieve quantifiable R.O.I. by linking business processes, enterprise and legacy applications, databases, Web services and workflows both within and across enterprises. Through this seamless flow of information, companies can reduce costs, create new revenue opportunities, strengthen relationships with customers, substantially increase supply chain efficiencies and streamline internal business processes.

Founded in 1996, webMethods is headquartered in Fairfax, Va., with offices throughout the U.S., Europe and Asia Pacific. webMethods has more than 950 customers worldwide including Global 2000 leaders such as Bank of America, Citibank, Dell, Eastman Chemical, Grainger, and Motorola. webMethods' strategic partners include Accenture, AMS, BearingPoint, BMC Software, BroadVision, Cap Gemini Ernst & Young, CSC, Deloitte Consulting, EDS, HP, i2 Technologies, J.D. Edwards, SAP AG, Siebel Systems and TCS. More information about the company can be found at http://www.webMethods.com.

About SeeBeyond

Drawing on 14 years of software innovation and real-world experience in integrating systems across Global 2000 organizations, SeeBeyond (Nasdaq: SBYN) delivers the industry's most comprehensive, standards-compliant network for the rapid assembly and deployment of enterprise-scale end-user applications built on existing systems and infrastructure. Going beyond eAI, the SeeBeyond(R) ICAN Suite helps organizations dramatically improve business operations resulting in reduced costs, increased market share and improved customer service. SeeBeyond has more than 1,825 customers worldwide, including ABB, ABN Amro, BHP Billiton, The Cleveland Clinic, The Dial Corporation, DuPont, Florida Power & Light, Fluor Daniel, Fujitsu, General Motors, Hewlett-Packard, Pfizer, Samsung, Sprint, Sutter Health and United Healthcare. For more information, please visit www.seebeyond.com.

About Magic Software Enterprises

Magic Software Enterprises, a member of the Formula Group (Nasdaq: FORTY), develops, markets and supports software development, deployment and integration technology that enables enterprises to accelerate the proc-

ess of building and deploying applications that can be rapidly customized and integrated with existing systems. Magic technology, applications and professional services are available through a global network of subsidiaries, distributors and Magic solutions partners in approximately 50 countries. The Company's North American subsidiary is located at 17310 Redhill Avenue #270, Irvine, CA 92614-5637, telephone (800) 345-6244, (949) 250-1718, fax (949) 250-7404, http://www.magicsoftware.com/.

The Formula Group is an international information technology company principally engaged, through its subsidiaries and affiliates, in providing software consulting services, developing proprietary software products and producing computer-based solutions.

About CSK Software

CSK Software AG is a vertically-oriented provider of integration and automation for business processes within the financial industry, with a successful track record over more than 20 years. CSK's portfolio comprises three segments:

- Enterprise Application Integration (EAI) – integration of IT systems & applications via a generic and vertical EAI-Engine to provide business process automation.
- Electronic Trading Systems (ETS) – electronic trading & market-making; order routing & management, and pricing & rates management
- Real-Time Data Distribution (RDD) – infrastructure for and distribution of real-time market data – to Applications, PCs, PDAs or Mobile Phones
- SWIFT Services – Consulting, Implementation & Support Services of SWIFTAlliance- and SWIFTNet products

Numerous renowned clients, including HypoVereinsbank AG, Commerzbank AG, Kreditanstalt für Wiederaufbau (KfW), Deutsche Börse AG, Dresdner Bank AG, ING BHF-Bank, Sal. Oppenheim and Citibank rely daily on the quality and reliability of CSK Software's solutions. CSK Software employs 150 people worldwide, in its headquarters and development centre in Frankfurt, Germany, and in its branch offices in London, Luxembourg, Madrid, Singapore and Zurich, and cooperates with partners in Japan, the USA and other regions. CSK Software is a fully-owned subsidiary of the Japanese CSK Corporation (Nasdaq, TSE), a global company with revenues exceeding US$ 3.4 billion and more than 15,000 employees. For more information, please visit www.csksoftware.com.

About Axway

Axway develops and markets Enterprise Application Integration (EAI) suites to quickly bring together the numerous systems found in today's typical enterprise. The reliable and secure information exchange environment provided by Axway helps companies get greater value out of their existing systems using the latest standards and best practice implementations.

Axway is a wholly owned subsidiary of the EUR 531,4m Sopra Group SA. With more than 6000 employees in 49 offices across 7 regions of Europe, Sopra is a major European Systems Integration company. Sopra pioneered the development of EAI products, introducing its first solutions in the early 1980's. Axway was established in 2001 to concentrate on the development and delivery of these products, building on Sopra's 20 years experience.

Axway grew to EUR 70m in 2002. The company has 500 employees servicing over 5000 customers in a diverse market made up of banking, utilities, manufacturing, public sector, telecommunications, retail and logistics. Axway re-invests over 20% of its revenues into continued research and development of its products, giving new and existing customers the confidence that they have an EAI platform on which all current and future integration needs can be met.

In April 2002, Axway acquired the EAI products of Viewlocity Inc., together with the company's European EAI operations. The acquisition increased Axway's presence in Europe whilst opening up the American and Asian markets to the Group. The move completed Axway's product offering, and reinforced its position in the manufacturing and retail sectors.

Axway offers a complete EAI solution through three key product suites designed to connect, communicate, collaborate and control business integration both within the internal enterprise environment and externally to trading partners.

For more information about Axway, visit www.axway.com.