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→ Study

How Fujitsu Siemens Computers contributes to the responsiveness of enterprise-level IT

Business Responsive IT enabled by the Dynamic Data Center™

Contents

Preface

The present study exemplifies how innovative infrastructure solutions can make enterprise-level IT significantly more responsive to sophisticated business requirements. In the presentation that follows, these requirements are defined in terms of IT business relevancy and agility on the one hand and IT efficiency and investment adequacy on the other.

Fujitsu Siemens Computers commissioned Accenture to carry out this study to demonstrate how important infrastructure capability can be when it comes to enabling business responsive IT. Accenture started out by defining what responsiveness will really mean in the context of the data center of the future. The change will represent a paradigm shift: Business responsive enterprise-level IT will support fulfillment of enterprise requirements with zero adaptation time and accommodate change with zero cost effort.

Working together with Fujitsu Siemens Computers enterprise IT specialists, Accenture then went on to develop an enterprise quadrant model to visualize the alignment of IT to meet these requirements. That provided a conceptual framework that contains four task areas—Business Process Engineering, Business Application Transformation, Information Technology Operations and, last but far from least, Data Center Infrastructure Provisioning. Infrastructure provisioning today represents the primary source of opportunity for acceleration of the tasks covered by the other quadrants and dramatic potential for improvement in overall IT responsiveness. This is illustrated by a presentation of the use of infrastructure provisioning for typical initiatives such as enterprise architecture planning and the introduction of service-oriented architecture.

In this context, the study shows that IT can be aligned to meet all enterprise requirements by adopting the Dynamic Data Center™ approach developed by Fujitsu Siemens Computers along with Adaptive Services Control Center (ASCC™) and the Processor Area Network (PAN) Manager. These two tools support IT solutions that enable executives to enhance business responsiveness across all requirement areas at the same time.

Our study addresses C-level executives and IT managers. It is intended to provide orientation in the ongoing discussions about recent trends and directions in the quest for business responsiveness. We hope you find our study helpful and informative as you navigate the issues involved, towards creation of infrastructure value.

Sincerely,

FUJITSU COMPUTERS SIEMENS

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Introduction

A study conducted by the MIT Center for Information Systems Research (CISR) found that enterprises with higher profitability over the long term have greater infrastructure capability than their less successful competitors. Research indicated that the more successful players not only had greater infrastructure capability but also brought their products to market faster, achieved higher growth rates and generated more sales from new products. According to CISR research, infrastructure capability involves a complex combination of technology, processes and human resources; it represents a sustainable source of competitive advantage because it is difficult and time-consuming to acquire.[1]

The cost dimension involved is also indicative of the importance of infrastructure capability. For example, IDC research discovered that infrastructure outlays and related personnel expense account for nearly 46 % of IT spending.[2] With today's average company spending approximately 3.7 % of its annual revenues on IT,[3] that means a typical company spends 1.7 % of its revenues on IT infrastructure.

The importance of IT infrastructure in terms of competitive advantage and its share of overall IT costs justifies the conclusion to the effect that IT infrastructure issues belong on the C-Level agenda.

However, the opposite is often the case. An internal Accenture study showed that a staggering 91 % of executives think it would be difficult to turn their infrastructure into a source of competitive advantage for their businesses and are unfamiliar with the infrastructures they have signed off on. It is by no means exaggerated to say that the typical C-Level executive views his infrastructure as a "black box", i.e., a consumer of financial resources, instead of considering it as an enabler that can help drive business responsiveness. For many executives who fail to see the strategic value of infrastructure, this is equivalent to writing a check for millions and not knowing where the money spent or on what. Many businesses fail to review their investments a year down the road, and post-investment measurement of ROI effectiveness is often neglected. Based on Accenture project experience, this percentage exceeds 50 %. This indicates that IT investment adequacy is severely neglected in the area of infrastructure.

The present study is intended to provide enterprise executives and IT managers with guidance to infrastructure value creation. We therefore explain the importance of enterprise infrastructure for the responsiveness of IT to business requirements. By filling in the gap between the average data center of today and tomorrow's Dynamic Data Center™ concept, we can acquire a deep understanding of the drivers needed to achieve this desired state of enterprise-class IT and the mechanisms involved. This is discussed both at the general level and in relation to the technologies and services Fujitsu Siemens Computers offers on its own and in collaboration with partners. We will provide in-depth answers to the following questions:

1. **How can data center infrastructure provisioning be used to achieve the to-be state of a business responsive IT?**

2. **How can Fujitsu Siemens Computers contribute to the responsiveness of enterprise-level IT?**

Enterprise Requirements for IT

Today's CIOs are frequently confronted with questions concerning the responsiveness of IT to the needs of their businesses. Enterprise requirements seem complex and diverse and the ability of IT to meet these requirements limited. This fuzzy understanding of what IT fails to deliver is not necessary. We will take a "green field" approach and start by addressing the issue as to how IT can contribute to the success of an enterprise. In general, there are four dimensions to the contribution IT can make to an enterprise's success:

1. IT can enable innovative business activities and thereby generate additional revenue, e.g., through expansion of the enterprise's online presence.
2. IT can help sustain existing business and stabilize revenues, e.g., by enabling 24/7 service availability for business processes.
3. IT can enhance the efficacy of business operations by reducing the cost of doing business, for example, through the use of service-oriented architecture to streamline business processes.
4. IT can contribute to the success of an enterprise by becoming more cost-effective, e.g., through data center consolidation.

We then go on to address the question as to what a desirable to-be state of IT responsiveness to enterprise requirements would look like. This entails abstraction of as-is inhibitors to responsiveness in everyday IT operational situations, e.g., the lack of discretionary scalable processing power. We therefore propose the following normative definition of business responsive IT:

Business responsive IT supports fulfillment of enterprise requirements with zero adaptation time and accommodates change with zero cost effort (target state of enterprise-level IT). In terms of agility, flexibility and scalability, this calls for a data center infrastructure that is as fast (or slow) as required to accommodate business process transformation.

This drastic postulate of what "real" responsiveness means opens the way for IT to achieve the ambitious goal of fully meeting enterprise requirements. These requirements must be fulfilled in the area of IT as well as in business-related areas, and demand must be met under normal business conditions as well in situations involving accelerated change. Combining these four factors in the form of a matrix assigns enterprise requirements to four areas for purposes of evaluating business responsive IT.

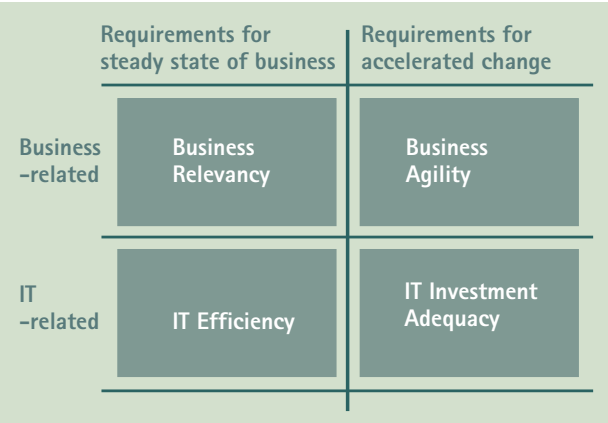


Figure 1: Enterprise Requirements Matrix

These four dimensions can be best described in terms of the key questions managers face in the context of their everyday business operations.

Business Relevancy

Business relevancy is a requirement that expresses the importance of enterprise IT for sustaining everyday operations. It is therefore a business-related aspect of responsiveness and can be best described with the following key questions:

- **What organizational measures can I take to make IT more relevant to my business?**
- **What disaster recovery measures should be implemented to ensure business continuity?**
- **How can I quantify the end-to-end quality of the services provided for my business?**
- **What does it take to scale to accommodate fluctuations in demand?**

The devastating impact of disaster recovery deficiency is an example that is often used to illustrate the importance of business relevancy. Downtime costs for a typical computing infrastructure have been estimated at $42,000 per hour.[4] But things can get much worse: irreplaceable loss of data may threaten the very existence of the enterprise.

Business Agility

Business agility is the term used to describe the ability to accommodate accelerated change. Flexible and agile adaptation to changing business environments is a major criterion for determining IT responsiveness and can be described with the following key questions:

- **What can I do to keep up with the increasing rate of change?**
- **How can I achieve the quality of service (QoS) required for new business processes?**
- **What is required to obtain a competitive advantage through the introduction innovative IT?**
- **What is the best way to go about architecting IT for flexibility/scalability/adaptability?**

Business agility has recently become an important requirement for responsive IT. Having the agility required to handle changing needs is a crucial advantage, but it should not be pursued at the expense of other requirements such as IT efficiency.

IT Efficiency

IT efficiency is a purely IT-driven enterprise requirement and is especially important during times of steady-state operation. It refers to both non-tangible aspects such as process efficiency as well as to tangible hard-cost elements such as total cost of ownership (TCO). Mastering IT efficiency can be best described with the following key questions:

- **How should my company transition to industry standards, e.g., IT Infrastructure Library (ITIL), to improve QoS?**
- **What is the best way to enact the proper governance and organizational structures to enhance productivity?**
- **How can I reduce the TCO of my current IT systems?**
- **With whom can I source/partner to obtain steady-state support?**

Accenture project experience shows that roughly 75 % of the world's total server CPU power is not in use at any given time. This drastic inefficiency is a typical example of as-is enterprise IT and is a result of trading efficiency for agility. A high degree of fluctuation in workload levels typically forces companies to maintain spare server capacity to ensure service availability during peak periods. This dilemma is a major challenge the Dynamic Data Center™approach will overcome.

IT Investment Adequacy

IT investment adequacy represents an important enterprise IT requirement, especially in times of accelerated business change. In order to keep pace with the increasing rate of change, management must find an adequate way to manage both past and present IT investments. This aspect is covered by the following key questions:

- **How can I manage my project/investment portfolio to increase business responsiveness?**
- **What should my company do to meet the time-to-market requirements of individual business cases?**
- **What is the best way to review projects/investments to increase their effectiveness?**
- **What metrics should I use to assess the value and impact of capital expenditure?**

It is possible to ask why investment adequacy represents a major and not a minor criterion for evaluating IT responsiveness. The answer lies in the peculiar nature of information technology: it is prone to age quickly. This is a universal law, a fact of life. However, since aging IT applications limit the ability to adapt to new functionalities (scalability, data models, etc.), the business adequacy of IT capabilities "naturally" declines with technical adequacy. This results in higher operational costs due to efforts to provide at least minimally acceptable business process support, which in turn leads to budget constraints that limit investment in IT capability for renewal projects.

Average Breakdown of IT Spending[5]

- On average, 65 % of IT spending is dedicated to "keeping the lights on" and ongoing business operations, including non-discretionary spending.
- A further 25 % goes to "sweat assets", i.e., to support organic growth, which is not aligned with strategy. This typically refers a "bolt-on" attitude toward upgrading.
- Only 10 % is spent on the implementation of transformation initiatives or the pursuit of innovative business models and new thinking.

The problems therefore increase significantly with time and necessitate compromises either in terms of cost or capability. Simple IT cost-cutting does not alleviate the effect of this vicious circle. As innovation investments are postponed, this actually worsens business responsiveness and accelerates the IT aging process. Instead, a strategic approach to IT investments is necessary, i.e., assessment of current capabilities to prioritize adequate value-creating investments in IT.

Enterprise Quadrant Model

Analysis of enterprise requirements has shown that business-responsive IT fulfills needs in four areas that represent the aggregate bases for an enterprise quadrant model. This model constitutes the core of this study because it provides a conceptual framework that illustrates the potential for action in pursuit of business responsiveness. The framework's four areas of focus are derived from enterprise requirements that describe what is involved in the achievement of business responsive IT: Business Process Engineering (BPE), Business Application Transformation (BAT), Data Center Infrastructure Provisioning (DIP) and IT Operations (ITO). In order to achieve business responsive IT, various key tasks must be assigned to each of the four quadrants. These tasks represent part of the conceptual model shown below that will be used to clarify both their significance and the interrelationships between them.

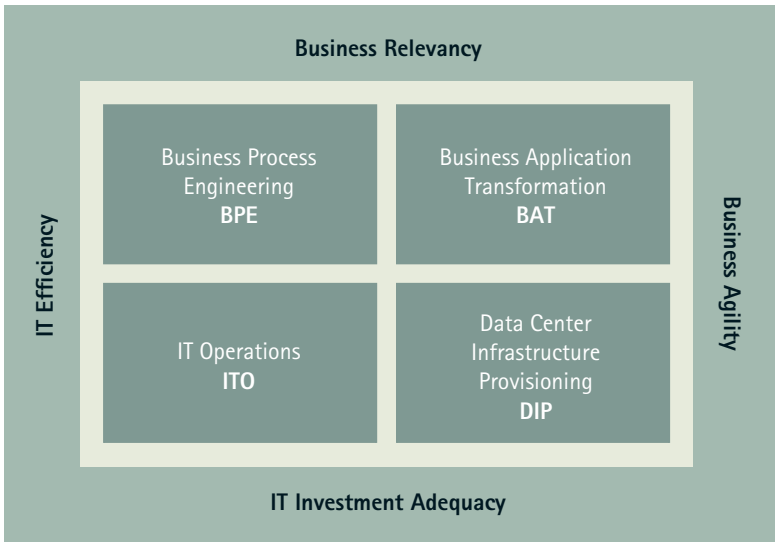


Figure 2: Enterprise Quadrant Model

Business Process Engineering

Enterprise requirements are addressed in the BPE quadrant by adapting strategy and processes to the enterprise ecosystem. This applies especially in times of accelerated change and should initially be accompanied by modification of corporate strategy. A subsequent change in business architecture is then required to pursue the modified strategy. In addition to providing the agility required to cope with the current business environment, the enterprise architecture and related processes should also be able to accommodate future changes in strategy.

Business Application Transformation

In addition to designing the required enterprise architecture, it is also necessary to provide the corresponding business application landscape needed to respond to changes in business processes. Timeframes, cost development and resources needed for transformation must therefore be planned in. In addition to providing support in the form of new functionalities, IT-fication of business processes frequently involves integration of new applications into legacy systems. These tasks are assigned to the BAT quadrant, which aggregates all tasks required at the level of application technology and represents a vital driver of responsive IT.

Data Center Infrastructure Provisioning

Another enabling technology is found beneath the applications at the level of the data center infrastructure. The corresponding tasks aggregated in the DIP quadrant are based on the know-how and expertise needed to translate requirements into necessary infrastructure changes. This involves both the design-and-build phase of the required infrastructure architecture as well as operation. In either case, responsiveness must be assessed by applying appropriate technology metrics. DIP is a major area in terms of enterprise IT responsiveness. The impact of DIP will be analyzed in the subsequent chapter.

IT Operations

Operation of the data center is covered by the ITO quadrant, which includes all related tasks. It is first of all based on a knowledge of what is needed to operate enterprise IT apart from infrastructure technology. This knowledge is derived from the BPE quadrant and flows into service catalogs and the corresponding service level agreements. At the internal level, responsiveness is ensured by having the right processes in place for enabling IT operations in compliance with these service level agreements. Selection and supervision of suitable partners required/desired for IT is another key task. Independently of the source of services, all operations must be quantified by applying appropriate process metrics. Service level measurement should go hand in hand with the corresponding technology metrics from the infrastructure level to form a holistic picture of IT responsiveness to everyday operational requirements.

Once the four quadrants are in place, we have a sound conceptual framework that connects enterprise requirements with a set of potential actions structured across the four quadrants. This permits in-depth analysis of the potential for increasing responsiveness in all quadrants. Furthermore, we can demonstrate the significance of interrelationship between quadrants. This is especially important for illustrating the significance of the infrastructure quadrant, which is the focus of this study.

Importance of Data Center Infrastructure Provisioning

A recent internal Accenture study found that 61 % of more than 300 senior executives polled reported an increase in IT spending in the course of the past three years. Even more significantly, almost 46 % of total IT spending[6] went for infrastructure investments and related personnel during the same three-year period.

Status of Infrastructure Provisioning Today

The average company spends approximately 3.7 % of its annual revenues on IT.[7] That means 1.7 % of annual revenues goes for IT infrastructure investments. Furthermore, non-discretionary spending dominates infrastructure budgets because this represents the lion's share of infrastructure spending.

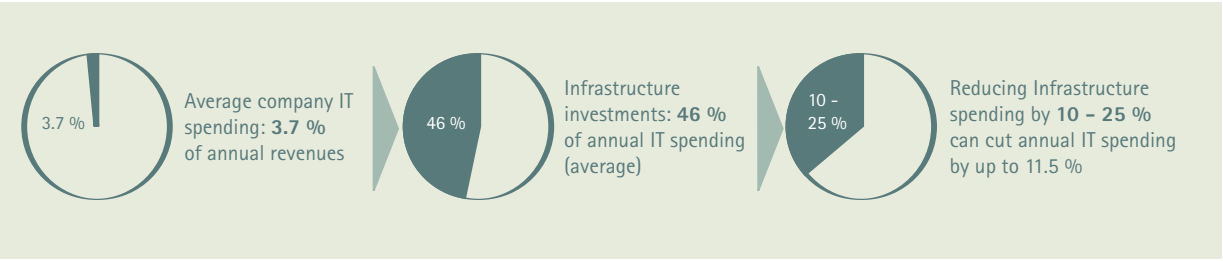


Figure 3: IT Spending on Infrastructure & Potential Savings

When budgets are used to ensure ongoing operation of a business, funds are diverted from discretionary IT initiatives that can improve competitiveness and add value to the business. This interrelation worsened during the last economic downturn. Since then, infrastructure has been neglected and primarily viewed as a cost center to be downsized rather than as an asset to be maintained and improved through appropriate investments.

As was seen above, infrastructure spending is by no means negligible. So why then, do so many organizations still think of their infrastructures as a cost of doing business?

This is actually not surprising since continued purchases of isolated infrastructure systems mean in many cases that most of the business's time is spent trying to reduce operating expenses and capital expenditure.

Client/server and Internet booms resulted from the deployment of distributed infrastructures focused on specific needs and applications, which resulted on overcapacity, underutilization and overall inefficient operation. When it came to meeting new business demand, the answer turned out to be alarmingly simple—just add more hardware to solve immediate tactical issues and worry about complexity later. This eventually led to stability and security issues and at the same time increased TCO for such businesses.

Many of today's infrastructures are simply not up to the task of supporting daily operation and delivering value through innovative technology. To make a long story short, they lack business relevancy and agility.

Infrastructure models have traditionally been built in "silos" of applications and services, which resulted in a proliferation of system platforms, where planning a server for each application came to be considered the "norm".

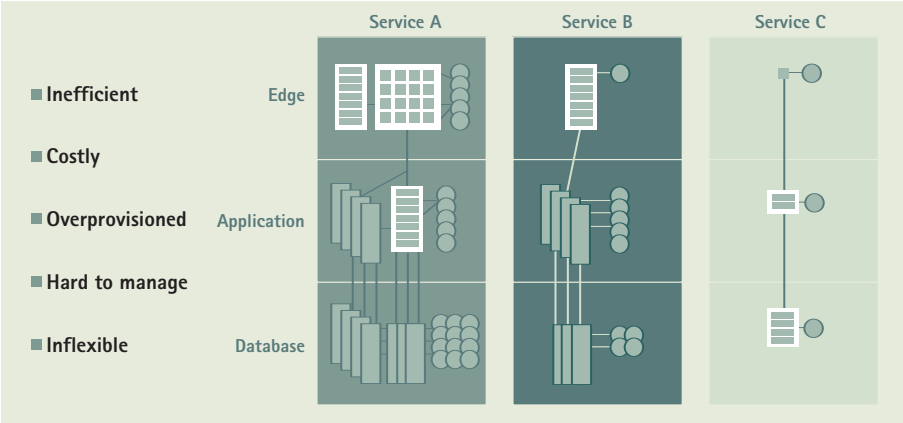


Figure 4: Today's Computing Geography—Static, Unshared Islands

Infrastructures have increased in complexity with time because they were built up as "silos" of both applications and services. Historically, new system investments have produced low returns because applications were implemented on separate, unshared server configurations that support only a single application workload. Such configurations result in low capacity utilization, high overhead costs and limited scalability. Management of such multiple installations reduces administrative productivity and raises overhead costs. Extra dedicated systems are often provisioned for individual installations to meet rarely used high-availability and/or peak-load requirements. However, the extra isolated systems used for single applications cannot be shared to handle other application workloads.

When businesses pursue a "bolt-on" investment strategy, the resultant infrastructures are designed to be stable but do not have the agility required to react to sudden changes in the business environment. This situation can be maintained by simply adding more hardware whenever required to resolve immediate tactical issues and worrying about the implications of the resultant complexity later. Infrastructures of the past were predictable because the number of applications was predictable. However, in recent years, this approach has led to a rapid increase in spending.

Potential for Delivering a Business Responsive Infrastructure

CEOs recognize the potential of competitive advantage when it comes to product leadership, customer intimacy, and brand mastery, but they often fail to connect these value disciplines with their infrastructures at the strategic level. Whereas each of these disciplines requires top-level business leadership, none of them can actually be pursued effectively without a business responsive infrastructure.

To achieve maximum return on IT investment, today's infrastructures are becoming more flexible. Companies are migrating from the previous "silo" approach to the use of modular entities. This increases flexibility substantially and makes operation easier and more efficient while at the same time maintaining infrastructure stability and functionality.

Today's infrastructures—and the same will hold for tomorrow's as well—must not only support extension of the enterprise to include remote sensors, RFID and wireless technologies as well as other innovations but must also provide the foundation for applications that can adapt to business environments as they evolve. In the same way that business processes and applications must be able to change to accommodate increasingly unpredictable demands, the underlying infrastructures must exhibit similar flexibility and be augmented by operational capabilities that align the configuration of the infrastructure with the needs of the business.

On the whole, two categories of capabilities are required to deliver a business responsive data center infrastructure. First of all, a business responsive data center must have the necessary technology and tools in place. Secondly, qualified experts are needed to provide the know-how required to align infrastructure technology with the other enterprise quadrants in a business responsive configuration.

Technology and Tools of the DIP Quadrant
Three core technological principles must be anchored in the infrastructure environment to achieve business responsive IT—virtualization, integration and automation.

Virtualization
Virtualization and dynamic provisioning technology are the key enablers of data center responsiveness because they abstract applications and/or databases from actual physical computation and storage. This makes it possible to abandon application silos in favor of a utility architecture model for infrastructure hardware planning. Significant progress has been made in the area of virtualization, but mainly with like devices. It will be possible to take full advantage of this technology only when many different types of hardware devices can be aggregated.

In addition to virtualization, another trend involves the move in the direction of hardware commoditization, which will lay the foundation for responsive IT in the form of a utility computing model. Storage, computation and communication resource architectures are now tending towards more dynamic IP-network-based scale-out software designs. Although inherently useful, virtualization will also permit integration of the orchestration of data center resources at the level of software tools.

Integration
Data center tools must be able integrate a range of capabilities: resource inventory management, resource provisioning management, software distribution and configuration management, service level monitoring and automated quality of service management based on defined goals. These capabilities must also span multiple hardware and software platforms because today's data centers contain numerous technologies from an even wider range of suppliers. As a result, infrastructure tools must make it possible not only to manage but also to control the various components of the infrastructure. This calls for integration of products from several vendors at the software, storage and server levels. Technologies such as XML web services help standardize integration of the software and infrastructure stack.

Automation

Automation of orchestration of the process, software and infrastructure levels represents the core of a business responsive data center. This results in a data center automation solution that adjusts resource allocation within a self-configuring infrastructure to maintain a defined quality of service. The mechanism is based on policy automation at the process-level layer. The key to such automation across process, application and infrastructure layers is a resilient infrastructure that is able to continuously expand and contract as a function of resource needs. Automation provides this scalability in a way that is comparable to breathing: it is an automatic reflex that requires no thought or intervention.

Instead of manually configuring a spare server to meet peak demand, the automation control unit automatically sets up the extra resources required. A task that can easily take 15 full-time equivalent hours in the case of a conventional data center can be reduced to a mere detail that takes only a few minutes and requires neither manual initiation nor human supervision. Central, automated monitoring combines with virtualized resources and automated deployment, decision-making, load-balancing and provisioning to permit better and less expensive administration and utilization of up to hundreds of pooled systems.

Enterprises can consolidate individual workloads from separate isolated systems so that they can share all available resources across a single automated, virtual pool. Applications share support from a single pool of virtualized resources automatically and as needed. IT managers set the utilization and load limits centrally, and monitoring and automation keep the running application services supplied with resources from the pool and use only what is needed. Unused capacity is automatically reallocated and made available to handle new applications or increased workloads.

On the whole, automation tools are replacing the manual administrative effort required to maintain quality of service with automated real-time policy-based responses without operator intervention. Monitoring and administration of hundreds of workloads and resource allocation decisions are automated to maintain stable service levels. This has an added advantage since automated policy implementation is more accurate and reliable than manual intervention.

Although the technologies presented above are powerful enablers of our vision, they must be implemented by experts who can supply the requisite know-how. These professionals are required to align the infrastructure with the other enterprise quadrants to create a business responsive IT configuration.

Exemplary Initiatives

We consider the following three enterprise-level initiatives to be exemplary illustrations of what can be achieved in the area of data center infrastructure by focusing on virtualization, integration and automation technology: Enterprise Architecture, Service Oriented Architecture and Predictive Operations. This selection is based on the fact that these initiatives contain significant potential for increasing overall IT responsiveness and illustrate the importance of the DIP quadrant.

BPE: Enterprise Architecture Initiative

An enterprise architecture (EA) initiative represents a link between corporate strategy and the processes and the technologies required to implement that strategy. It lays the foundation for all business capabilities because it provides the structural framework for the operation of complex enterprises. Sound enterprise architecture integrates IT within and across business capabilities to provide a seamless operating environment.

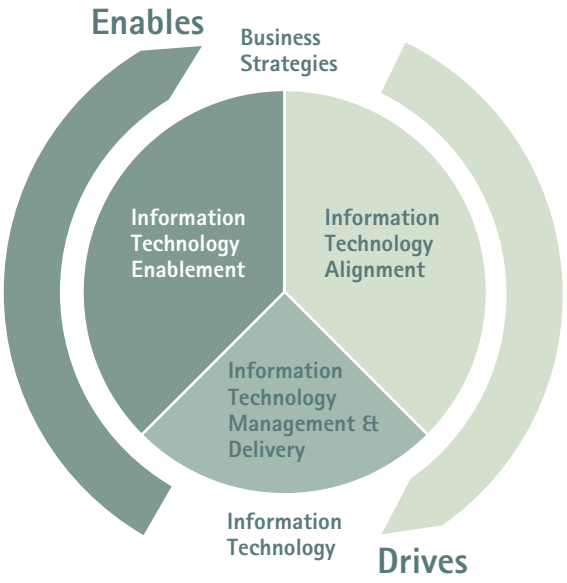


Figure 5: Feedback Cycle of Enterprise-Level IT and Architecture

IT alignment and enablement of business strategies through innovative IT play a crucial role in this initiative, and a profound enterprise architecture is highly dependent on IT responsiveness. This requirement is addressed at two levels—primarily at the application level and secondarily at the level of infrastructure.

Core Benefits of Enterprise Architecture Planning

- Shortened time to market for processes, which makes it possible to profit from new business opportunities because cycle time from conception to roll-out is considerably reduced.
- Reduction of IT costs by 20 % to 30 % through implementation of a robust enterprise architecture, which allows enterprises to lower the cost of application development and testing, data interfaces and application management.
- Minimization of operational risks through implementation of a robust architecture, e.g., through a significant reduction in IT downtime.

Significance of Infrastructure Technology

The infrastructure must be taken in account during the initial EA design phase since the potential quality of service, e.g., in terms of flexibility, availability and the cost of business operations, is a function of the quality of the architecture. Technical specifications, e.g., for the allocation and deallocation of infrastructure resources, must be defined in the form of service level policies. In addition, infrastructure technology must also be taken into account when transitioning from process architecture to application modeling, e.g., through a service-oriented architecture initiative.

BAT: Service Oriented Architecture Initiative

Accenture defines service-oriented architecture (SOA) as that type of architecture that specifies how individual business functions implemented by autonomous systems interoperate to execute a given business process. An SOA initiative bridges the modeling gap between the process and technology levels of the enterprise to accelerate transformation. SOA focuses primarily on how to build the enterprise architecture (see Figure 6). It is based on a flexible, service-centric approach to delivery of business processes without the typical costs and time associated with conventional enterprise integration efforts. SOA shifts the focus of the developer from software to business functions and thereby transforms installed software from an inhibitor into a facilitator of IT business responsiveness.[8]

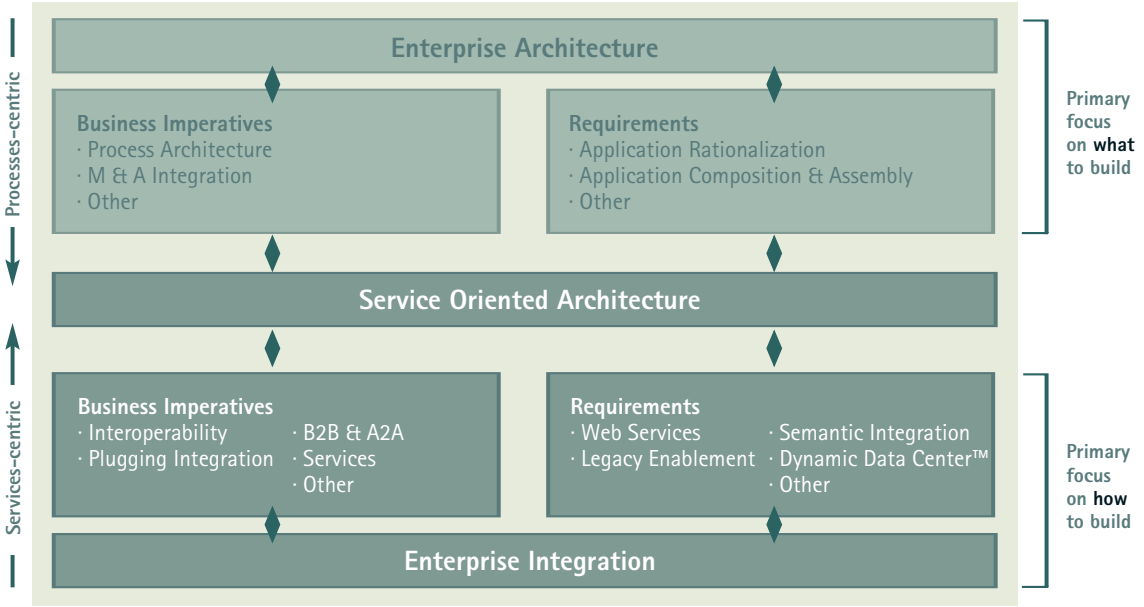


Figure 6: Role of Service Oriented Architecture

The achievement overall business responsiveness is highly dependent upon the effectiveness of BAT initiatives like SOA since the core advantages of such initiatives are significant.

Core Benefits of SOA

- ☐ Lowers the cost of application development, system integration, and application maintenance.
- ☐ Facilitates and speeds up integration of applications to ensure that current applications have the flexibility required to accommodate future changes in technology.
- ☐ Enables businesses to create and distribute new products and services faster.

In order to realize these benefits, both infrastructure technology and the ability to access infrastructure know-how from the BAT quadrant are crucial.

Significance of Infrastructure Technology
A responsive data center is required for implementation of SOA for several reasons.

First of all, SOA is typically based on Internet-standard web services and thus functions as a platform-agnostic application architecture that is ideally suited for abandoning silos and replacing them with low-cost commoditized hardware pools. This transition is considered an essential prerequisite for realization of the full cost advantage of SOA.

Secondly, a modern data center infrastructure provides architectural robustness that is crucial for scalability, high availability and simplification of application development through virtualization, integration and automation.

Thirdly, distribution of software and updates is accelerated by management through infrastructure service automation.

All in all, the advantages of SOA can be realized only if the initiative is supported by a business responsive data center infrastructure.

IT Operations: Predictive Operations
A predictive operations initiative constitutes a vital pillar of highly responsive everyday IT services and involves four areas of activity: IT Asset Management, Service Support, Service Delivery and Business Service Management.

IT Asset Management (ITAM) involves assessment, design and implementation of human resources, processes and technology solutions to achieve optimal use of IT assets. Service Support addresses client needs in terms of of human resources, processes and technology solutions as a function of ITIL best practices for Service Desk functionality, Incident and Problem Management, Change Management, Configuration Management and Release Management. Service Delivery encompasses assessment, design and implementation of ITIL best practices for Availability Management, Capacity Management and IT Service Continuity Management.

The last of the areas of activity mentioned above, Business Service Management (BSM), enables enterprises to manage and report effectively on the soundness of business systems and processes. It allows operations to monitor the health of services on a real-time basis and ensures that service levels are always in a state of compliance. BSM allows management and IT to define business needs in the form of a service catalog that permits joint prioritization and contains feedback on IT services.

Core Benefits of Predictive Operations

- Helps enterprises monitor their infrastructures and anticipate utilization patterns to predict and measure the impact of IT demand without disruption.
- Increases business performance and reduces infrastructure management costs.
- Enables business responsiveness through top-down improvement of IT processes and prediction based on preproduction performance and fault analysis processes.

Business Service Management is a fundamental prerequisite for responsiveness because it provides focus on management and definition of policies for the end-to-end IT service of the infrastructure.

The shift from a technical orientation to a business service perspective necessitates reorganization of IT. This is necessary to improve cross-communication between the IT resources providing the services defined in the service catalog. Unlike a technology-centric organization based on networking, server, storage, and engineering, operations, etc., predictive operations are oriented towards service provisioning.

Significance of Infrastructure Technology

The key contribution of infrastructure technology is to provide dynamic allocation and optimization of resources. The head of the data center must have the tools and processes in place required to collect and measure data, in particular performance data from users' perspectives. Monitoring at the process, application and infrastructure levels must be integrated into a single tool in order to enable responsive cross-layer impact and root-cause analysis. In general, IT organization must first have confidence in its data collection and analysis capabilities and can then commit to business-focused service levels. The resultant transparency permits prediction of future operations and the corresponding cost bases. This also makes it possible to transform IT operations from a cost center that is primarily controlled through technology metrics into a process-focused activity based on a market-oriented cost model.

Cost Transparency and Charging for Operations

Typical criticism today:

- **CEO:** "IT is just a cost drain, a line item in the budget that keeps growing".
- **CIO:** "I've submitted a project to reduce costs, but my IT costs have gone up".
- **Head of Data Center:** "Management wants to cut costs but they don't understand the technologies or true cost drivers".

Getting it right:

- As the link between costs and services becomes more obvious, the discussion of IT costs will shift from "This is what it will cost" to **"What do you want to spend and what service levels are you looking for? I'll see what we can do".**
- As a result, IT can become more service-focused and explain how costs vary with customization and availability. The enterprise customer can then decide what is actually needed.

This means that each service and corresponding service level is associated with charges based on actual consumption. The service provider can manage over/under-absorption of units, i.e., ITO can become a profit center. This requires monitoring software to provide a dashboard-style view of the entire infrastructure for global decision-making and monitoring as well as plug-in accounting & billing to automate allocation of charges.

DIP: Impact of Virtualization, Integration and Automation Technology

As shown by the exemplary initiatives above, the success of the activities covered by the various quadrants is very dependent upon the level of business responsiveness of the data center infrastructure. Although the impact of the DIP quadrant on the enterprise architecture model seems limited, we emphasized that business processes must be enabled at the infrastructure level. This becomes evident when it comes to understanding the needs of an SOA initiative because SOA is very dependent on modern infrastructure and application technologies. The same applies to Predictive Operations in the ITO quadrant—responsiveness in the DIP quadrant is a need, not something it's nice to have. We will therefore show how infrastructures are impacted by focusing on virtualization, integration and automation technology.

Fujitsu Siemens Computers: An Accelerator of IT Responsiveness

Analysis of the enterprise quadrant model shows that there is a compelling need for business responsive data center infrastructures. This is illustrated by the solutions and services that Fujitsu Siemens Computers offers as part of its Dynamic Data Center™.

The process of implementing the most recent virtualization, integration and automation technologies can be accelerated and the concomitant risks reduced by using TRIOLE™ to achieve Dynamic Data Center™ functionality.

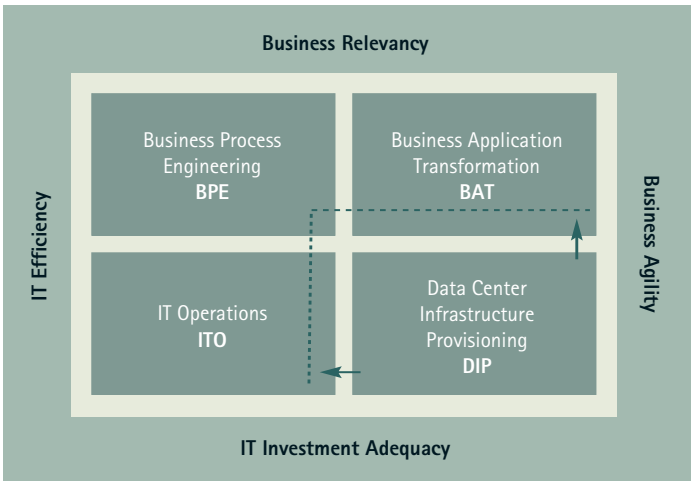


Figure 7: Expansion of DIP to Dynamic Data Center™ of Fujitsu Siemens Computers

Dynamic Data Center™ is based on the use of physical, virtual and service-based layers, the three foundational elements that are complemented by monitoring and automation functionalities. Adaptive Services Control Center (ASCC™) and Processor Area Network (PAN) Manager are important examples of the latter.

In addition to solutions and products, Fujitsu Siemens Computers also offers services such as ROI Consulting, Service Level Management and Infrastructure Architecture Consulting, which are covered below.

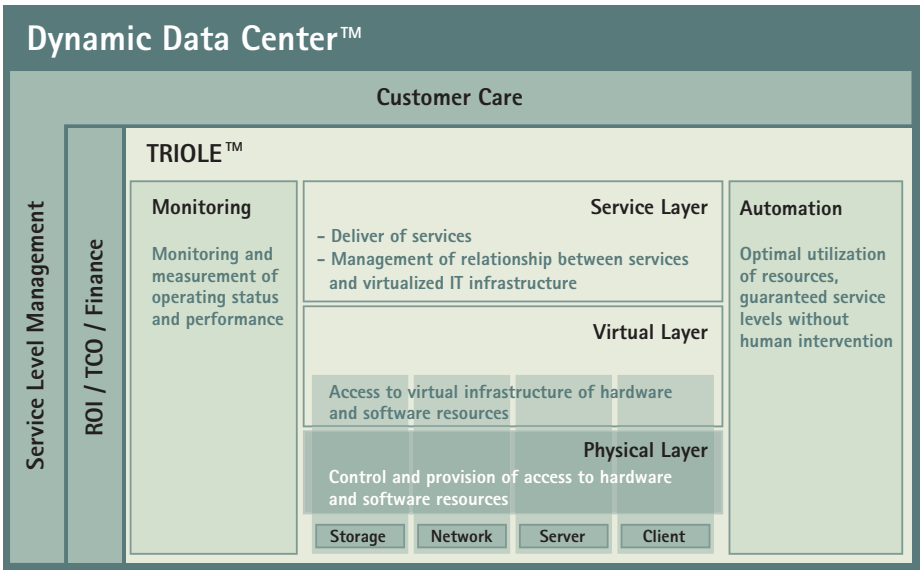


Figure 8: Dynamic Data Center™ Architecture

ASCC™ and PAN Manager are indispensable Dynamic Data Center™ components. However, in the context of expanding DIP to achieve Dynamic Data Center™ quality, the services of infrastructure experts also represent an essential aspect of the solutions offered. We therefore review the capabilities of Fujitsu Siemens Computers Architecture Consultants and explain how Fujitsu Siemens Computers partners with the players involved in the activities associated with each quadrant.

TRIOLE™—The Key to Dynamic Data Center™ Responsiveness

TRIOLE™ is a process that allows enterprises to implement business responsive infrastructures that no longer focus on "hard-wired" components but are instead based on SLA-driven on-demand allocation of resources. The ultimate result is Dynamic Data Center™, which leverages industrialized IT to achieve maximum business responsiveness. Industrialized IT involves replacement of manual execution of tasks by automated and standardized provisioning of resources.

How TRIOLE™ can optimize your IT— and how your confidence will grow with your needs

You may have started to think about the kind of solution that would fit your individual business model. The following is a scenario that could take place within virtually any company.

This scenario is based on Super Saver, a fictitious Internet shop. This online retailer sells consumer electronics and regularly features new special offers on its platform at the beginning of each week. This time around, the special is a multimedia cell phone that is on sale for half the normal price. In the virtual world, responses come pretty quickly. Visits to the Super Saver site double in no time at all—and the result is that the company's Web servers are overloaded and threaten to crash. Prospective buyers are surprised and annoyed by the sluggish response times. When such problems occur, it's up to IT personnel to take appropriate action. But how? TRIOLE™ provides the answer. Here's the solution.

PRIMECLUSTER, which distributes the increased workload over several servers. Is that all there is to it? Yes, but only if enough servers are available, which is the next problem. It normally takes at least four hours to install another Web server, but TRIOLE™ can speed things up. Using Adaptive Services Control Center (ASCC™), the Web software is uploaded to additional servers. This is an automated process that runs for several servers simultaneously and takes as little as 20 to 30 minutes.

Servers with low-priority applications are simply "switched over" Everything seems to be okay. Sufficient resources are now available for Web services. But the problem may be more complicated than it initially appeared. A bottleneck can occur in the SAP purchasing system, and that's the next problem the IT team is faced with since it would take an entire day to install a new SAP server. TRIOLE™ solves this problem too—with FlexFrame™, the solution for dynamic SAP environments. It makes SAP services available on additional servers in a matter of minutes. And that makes Super Saver's IT infrastructure e-business capable again. Well, almost anyway.

Once Web services and SAP are up and running, the database may present problems. But TRIOLE™ can solve that problem too—with PRIMEPOWER, which dynamically shifts resources during online operation.

How TRIOLE™ works

TRIOLE™ structures the various classes of resources involved to form homogenous pools that permit dynamic orchestration based on virtualization. Once the resources are pooled, automated provisioning of applications and services and autonomic resource management guarantee compliance with service level agreements. TRIOLE™ incorporates the generic technological principles of virtualization, automation and integration. This triad—TRIOLE™ is a musical term that denotes a group of three notes—also gives its name to this process.

TRIOLE™ Principles

- **Virtualization under TRIOLE™ means: every service on every system**
  Target—maximum flexibility for the use of IT resources and maximum system utilization
- **Integration under TRIOLE™ means: seamless integration of all building blocks**
  Target—reduction of implementation time and minimum risk at the level of the data center
- **Automation under TRIOLE™ means: IT manages IT**
  Target—reduction of manual intervention to a minimum

Using these principles, TRIOLE™ achieves IT industrialization through economies of scale. Instead of evaluating how a new technology can be implemented on an individual basis, this is done once and the results are made available to a large number of users. Server, storage, virtualization and automation software is pre-integrated and pre-tested to create end-to-end infrastructure solutions for key application areas. Fixed costs are therefore shared by many enterprises, which dramatically increases IT efficiency and investment adequacy and at the same time contributes to business relevancy and agility.

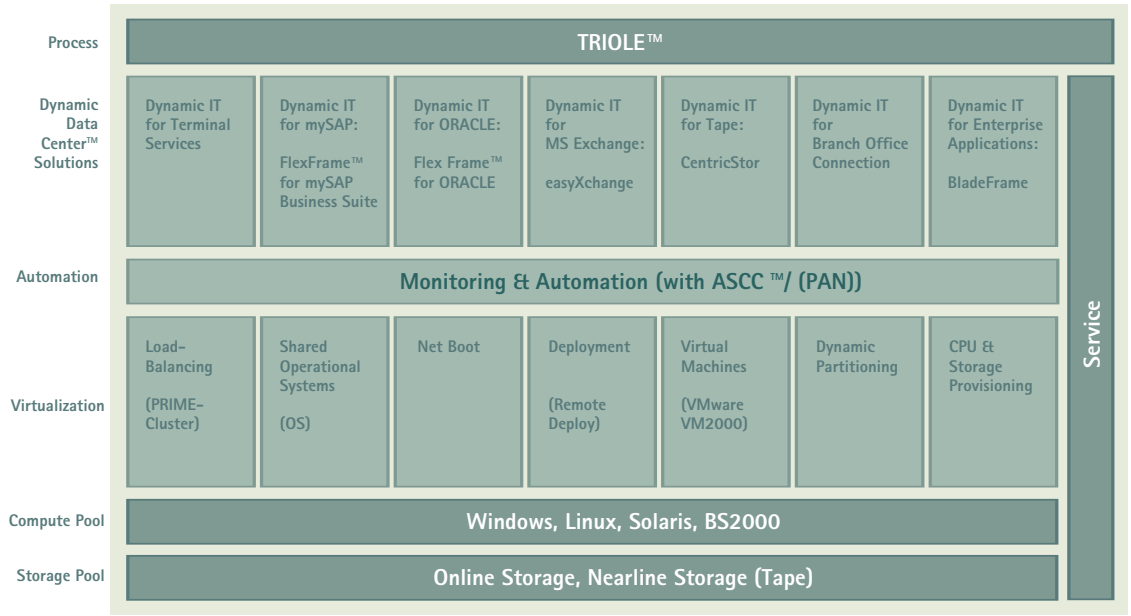


Figure 9: Components of Fujitsu Siemens Computers Solutions and Services

The TRIOLE™ process is based on the use of Fujitsu Siemens Computers solutions and services. It starts at the storage and server levels and extends all the way to pre-tested solutions like Dynamic IT for Oracle, e.g., Flexframe for Oracle. In order to achieve this kind of all-embracing architecture, Fujitsu Siemens Computers focuses on interoperability. In the case of the TRIOLE™ process, this is mandatory due to its explicit emphasis on integration since TRIOLE™ components must be able to replace or complement whatever an enterprise has installed on site.

TRIOLE™ supports dynamic, adaptive infrastructure solutions that permit allocation of resources to applications on demand. Examples include:

- FlexFrame for mySAP Business Suite—a virtualized infrastructure for mySAP
- FlexFrame for ORACLE—a virtualized infrastructure for ORACLE
- CentricStor—a virtualized infrastructure for tape/backup

TRIOLE™ represents the key to the Dynamic Data Center™ solutions, which offer maximum business responsiveness. This will be illustrated by presenting the main Dynamic Data Center™ drivers—Adaptive Services Control Center (ASCC™), the brain behind Dynamic Data Center™, and its backbone, PAN Manager.

ASCC™ and PAN Manager as Dynamic Data Center™ Drivers

Both PAN Manager and ASCC™ make use of virtualization technologies. PAN Manager virtualizes on a lower CPU and I/O component layer within a BladeFrame architecture, whereas ASCC™ features stronger integrational capabilities and is therefore predestined for heterogeneous system landscapes, in which it can function as the central Dynamic Data Center™ control element. ASCC™ and PAN Manager therefore complement one another and function as integrated tools in the context of Dynamic Data Center™ solutions delivered by Fujitsu Siemens Computers.

ASCC™

ASCC™ consists of a core of scalable, real-time autonomic control solutions that involve dynamic sharing of all resources by all applications. As workloads shift, ASCC™ responds automatically to provision new application instances and resources or reallocate those that are underutilized. As policies and priorities shift, users can also introduce the necessary changes at any time.

Adaptive Services Control Center

- Continuous service for the users of all applications
- Flexible repurposing of and upgrades for client and server applications
- Scales out services for active users, active sessions, connections and CPU load

ASCC™ represents an important Dynamic Data Center™ building block because it supports roll-outs of new and revolutionary IT solutions based on virtualization, automation and integration. With fail-safe ASCC™, Fujitsu Siemens Computers provides service-centric automation solutions for Quality of Service (QoS) management.

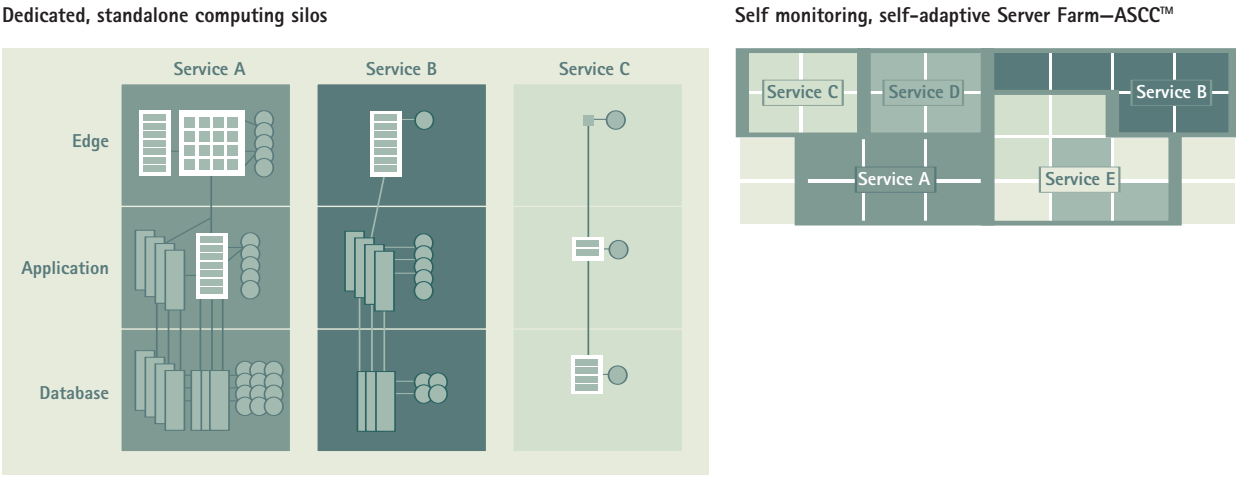


Figure 10: Principle of ASCC™ Architecture as Compared with Dedicated Computing Silos

ASCC™ software can convert a conventional server infrastructure that supports standalone applications on dedicated servers to a self-monitoring, self-adaptive server farm with all servers automatically deployed, managed and shared by all applications as a function of management policies.

How ASCC™ works

ASCC™ permanently monitors the availability and workloads of (real or virtualized) resources and automatically triggers adaptive actions as a function of pre-defined policies if QoS criteria are violated or changed.

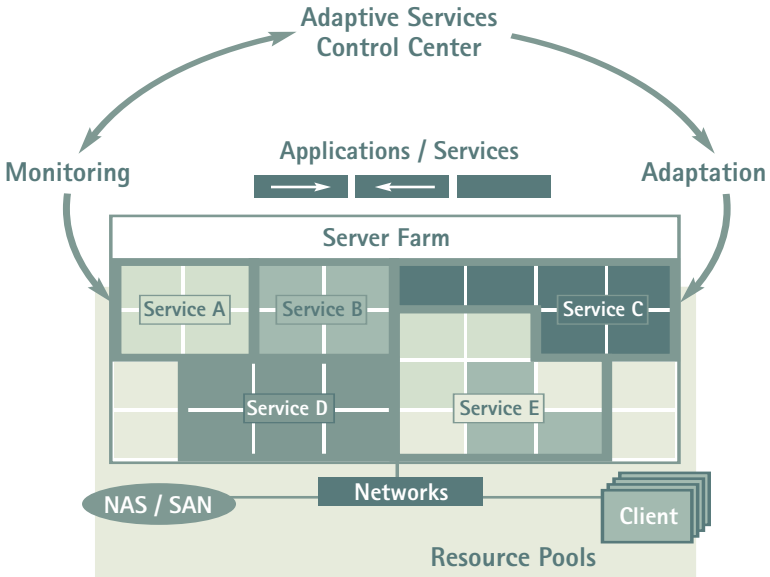
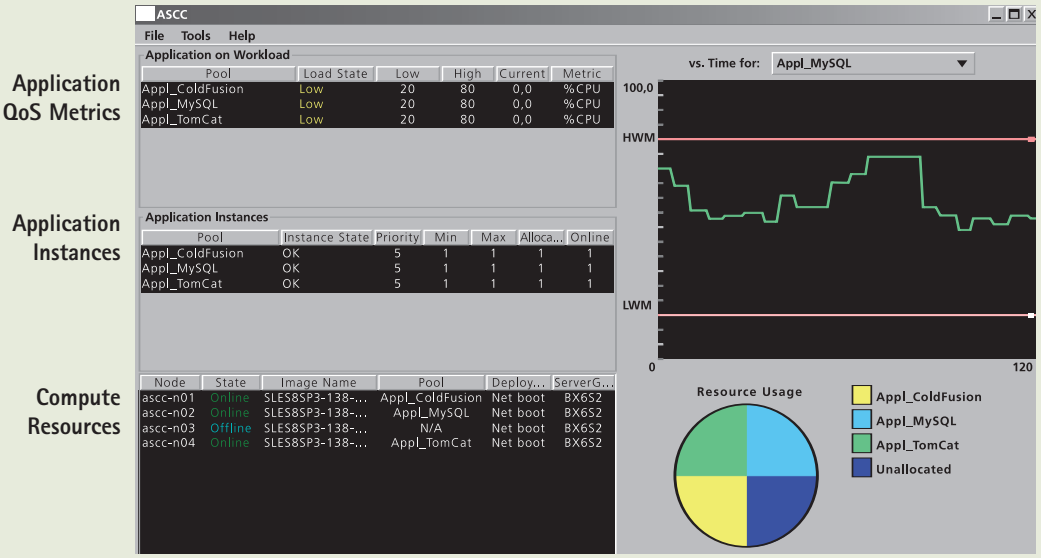


Figure 11: Monitoring and Adaptation Cycle and Main Characteristics of ASCC™ Solutions

- Automated provisioning of different application operating environments for a shared pool of servers
- Automated load-balancing
- Automated QoS monitoring, decision-making and control
- Automated sharing and redeployment of servers
- Automated administration and upgrades

With the monitoring and adaptation cycle shown in Figure 11, automation significantly reduces the administrative workload involved in the management of large, complex solutions.

ASCC™-based solutions offer users a graphical interface for monitoring and controlling QoS levels. The interface screen shows servers and applications in operation and also describes the system and application priority settings, allocations and load statistics. The administrator can view the performance of the entire infrastructure with a single interface. Although the system requires little manual intervention, the administrator can use the interface to monitor the system and dynamically adjust tunable parameters to change the QoS model as needed. ASCC™ solutions base decisions on QoS levels and permit automated adjustment as a function of capacity and application performance.



- Start or stop an application to increase or decrease capacity to meet a change in workload requirements or QoS parameters
- Substitute a new, high-priority application for a low-priority application to redirect existing capacity
- Provision a new server and operating environment for extra workload capacity
- Reprovision an existing server to add capacity for applications using a different operating environment
- Start an application to replace a failed application
- Start or provision a server to replace a failed server

Figure 12: ASCC™ Graphical User Interface and Examples of Autonomic Reactions

ASCC™ solutions also automatically monitor server and application availability, the number of servers and application instances online and workload statistics for all applications and servers. Whereas ASCC™ detectors monitor applications and resources to gather information, input from monitors of third-party applications and standard industry interfaces may also be used. In the case of ASCC™ solutions, a policy-driven engine provides autonomic QoS-based computing support for applications. This engine compares the actual monitored state and workload performance with the corresponding desired QoS parameters input by the user in the configuration. Additional information on state and user preferences can be added to the engine's analytical base through communication with third-party applications. If performance deviates from the acceptable range, an autonomic corrective reaction is triggered. ASCC™ customers can consolidate individual workloads from separate isolated systems to share all resources across a single automated virtual pool. Applications share support from a single pool of virtualized resources automatically and as needed. IT managers set utilization and workload limits centrally. Application services are automatically monitored and supplied with precisely the resources required from the pool. Unused capacity can be automatically shifted to be shared by a new application or an existing application with an increased workload.

Example of an ASCC™ Solution

Example: Security applications
ASCC™ scales out active security users, sessions, CPU workloads and connections. ASCC™ can provision, deploy, administer and load-balance security applications for virus scan, message security, web security and other functions as necessary. ASCC™ automatically scales to meet peak demand and response time requirements for quality security service. Continuous service is provided for all applications. Image management is centralized.

Example: Mail
ASCC™ scales out active mail users, sessions, CPU workloads and connections. ASCC™ can provision, deploy, administer and load-balance mail applications for getMail, sendMail, scanMail and other mail functions as necessary. ASCC™ automatically scales to meet peak demand and response time requirements for quality mail service. Continuous service is provided for all applications. All of these capabilities reduce the overhead and asset costs of these solutions to give users significantly better service and quality as compared with multiple standalone system and application installations.

Example: Process Work Flow Management
ASCC™ automates QoS levels for mission-critical transaction-touching applications across the entire "critical transaction path" of a business function. ASCC™ also ensures continuous service for these applications along critical transaction paths to avoid downtime.

Key Advantages of ASCC™

ASCC™ offers a host of benefits, including reduced operating costs, increased service availability and improved incident and recovery management. ASCC™ also automatically adapts system utilization to the workload. This improves IT responsiveness in all enterprise requirement dimensions..

Business Relevancy

- ASCC™ lays the foundation for meeting or exceeding user service level agreements (SLAs) with **high quality of service** (QoS). The final common requirement is to meet the needs of users in compliance with SLAs and contracted quality standards for application services. This results in more stable, predictable, reliable and consistent service levels. Potential penalties for non-availability of services are therefore significantly reduced, and satisfaction with IT services increases.

- By replacing error-prone human activities with quality-assured automated processes, both quality of service and **speed of execution** are improved at the same time. ASCC™ offers high speed, accuracy and error-free execution for routine IT processes such as adding and provisioning applications and systems, monitoring operations, upgrading, starting and stopping systems, operating environments and applications.

- Business relevancy of IT is also increased through coordination of Dynamic Data Center™ locations and resources. This simplifies backup and facilitates disaster recovery through centralized management via ASCC™.

Business Agility

- **New business processes** and applications can be **introduced more quickly** by using ASCC™ because infrastructure resources are automatically adapted to business needs. Servers and storage resources can be used for any service required and software upgrades distributed more quickly with the help of ASCC™. Local servers are not required, and software lifecycle management (patches, updates) is simplified considerably. This also facilitates the introduction of new business processes, e.g., because it is easier to control application versions and the corresponding existing and new business processes.

- ASCC™ provides **high responsiveness to changing needs in the case of established business processes** because it quickly increases capacity for application services that currently need it and automatically scales back the resources of those that do not. This is achieved without additional administration effort.

- Through its graphical user interface, ASCC™ allows for a better management control using a central, automated policy-based management system to oversee all applications and resources. ASCC™ allows manual intervention at any time if necessary and also features an interface for importing control information into other tools such as Fujitsu Siemens Computers ServerView to permit **quick reaction to unprecedented change.**

IT Efficiency

- ASCC™ contributes to an increase in IT productivity and a decrease in total cost of ownership (TCO) through better utilization of IT assets, lower labor and migration costs and reduced overall operating costs. As part of Dynamic Data Center™, ASCC™ can achieve a **decrease in total cost of ownership (TCO) of up to 60%.**

- **IT productivity** is increased through automation of typical administrative tasks such as monitoring, deployment and reallocation of resources with ASCC™.

- ASCC™ permits **more efficient utilization of assets** by eliminating the need to maintain excess unused capacity for different services in order to meet peak load requirements or ensure high availability. This helps enterprises keep their initial IT investment down or accommodate more future growth or changes in their business models with the same initial investment outlay.

- ASCC™ **reduces the labor and other operating costs** it takes to deliver the IT services an enterprise needs, which reduces TCO. Enterprises can achieve their TCO goals by lowering administrative labor and other operating costs and reassigning personnel resources to value-added activities, which is important because labor and other operating costs account for most (65-85%) of the total cost of IT ownership on average. More specifically, TCO requirements are

expressed in terms of the need for higher productivity and lower personnel budgets in order to deliver more and better service and support and help achieve enterprise's goals. ASCC™ also improves server-to-administrator ratios and contributes to support enterprise TCO reduction requirements.

- **Lower migration costs** represent yet another way to reduce TCO. This is achieved through the use of industry-standard platforms and readily available personnel instead of more expensive proprietary options.

IT Investment Adequacy

- ASCC™ helps overcome IT gravity by **streamlining infrastructure investments** since multiple applications share servers in a virtual automated pool consisting of fewer servers and at the same time continue to meet mission-critical IT requirements.

- The **open architecture** of ASCC™ and the combines with the interoperability of resources from different vendors to protect investments in existing systems. ASCC™ can complement whatever hardware a company has installed and also support integration of legacy systems, e.g., through the use of via VMware.

- In the case of investments in new resources, ASCC™ ensures IT adequacy at the technical level through the **use of standard commoditized platforms** in combination with off-the-shelf applications and operating systems without modification. That means IT personnel no longer have to be trained in the use of proprietary technologies and can instead be assigned to activities that support the introduction of innovations to strengthen the company's position in the marketplace. According to analysts, 75 % of IT resources are currently committed to sustaining IT architectures.[9] This is a figure that can be reduced indirectly by introducing ASCC™.

PAN Manager

The functional principle behind PRIMERGY BladeFrame involves the use of a Processor Area Network of distributed resources. These resources include dedicated processor units as well as the associated main memory (the so-called pBlades), virtualized I/O and network connections, virtualized keyboard/video/mouse interfaces and virtual hard disks mapped in real form on an enterprise-wide SAN. PAN Manager, which is a special virtualization and management software program, makes it possible to put these resources together to form virtual servers within PRIMERGY BladeFrame.

Since these processor units have no local I/O or hard disks, they lack the characteristics of specific servers, i.e., they are "stateless" and anonymous. They acquire the ability to function like "normal" servers through integrated virtualization and allocation of I/O and network interfaces. However, this is achieved with virtual components instead of physical components such as NICs, switches, FC adapters or local hard disks.

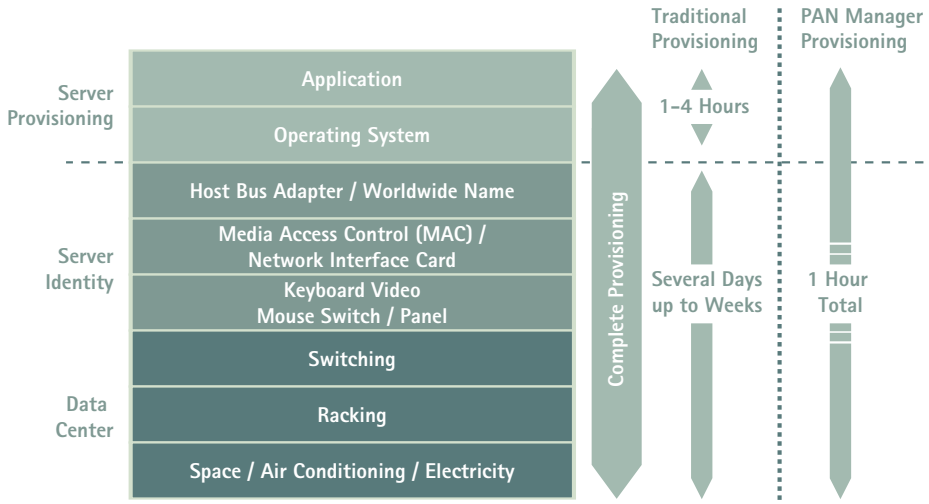


Figure 13: PAN Manager Provisioning as Compared with Traditional Provisioning

PAN Manager functions as integrated virtualization software to permit definition of "virtual servers" within the pooled resources at any time, and the requisite applications and operating system can be loaded and started by means of image transfer. Complete servers and applications can thus be installed and prepared for productive operation in a matter of minutes. After termination of an application, resources are returned to the pool for dynamic reallocation to other applications.

How PAN Manager works

PRIMERGY BladeFrame is not a conventional server but rather a complete Dynamic Data Center™ server solution. BladeFrame is a server pool designed for dynamic use with individual computing blades consisting of up to 4 CPUs. They are reduced to processor and memory resources and use shared and virtual software-mapped I/O interfaces for LAN/SAN/switches.

PAN Manager, which enables virtual servers to be put together from the pooled resources at any time, forms the backbone for operation of the dynamic server pool. Applications and operating systems are then uploaded to these servers and started, which means that a new application can go into production in a matter of minutes or, as the case may be, return its complete resources back to the pool upon completion of production. Complex configuration and integration of the I/O interfaces for the network/LAN/ SAN previously required for each individual server are no longer a problem since this is all handled through virtualized management within the pool by using software rather than a hardware-based approach. The configuration can thus be defined in a free and flexible manner without the complexity of actual physical realization.

BladeFrame is therefore a dynamic, internally consistent virtual server pool solution. It provides dynamic computing resources for business-critical applications and at the same time ensures rapid restoration of applications and resources in the event of a fault, and this is all achieved with an infrastructure that is far less complex. In addition, PAN Manager includes functions for continuous hardware-side monitoring of pBlades and can pass this information on to other management systems. Furthermore, it includes a functional layer to ensure high availability at both the hardware and application levels, i.e., if a blade fails, PAN Manager automatically detects the malfunction.

PRIMERGY BladeFrame is generally aimed at customers currently operating major enterprise-class data centers that handle "mission-critical" applications. BladeFrame is designed to be exceptionally suitable for distributed applications that demand intensive communication between various server instances. In such cases, data are administered in a central SAN or NAS storage network.

Key Advantages of PAN Manager

Through virtualization, which involves decoupling software from hardware, PAN Manager creates a BladeFrame pool of resources with high level of business responsiveness to permit superior fulfillment of all business requirements.

Business Relevancy

- PAN Manager facilitates compliance with service level agreements (SLAs) by ensuring **high quality of service** (QoS) because automation results in more stable, predictable, reliable and consistent service levels. This is especially true in the case of services that rely on applications that either call for high-speed communication with minimum latency in a local computer network or compute-intensive applications. The smooth use of distributed databases is also a significant advantage of PAN Manager.

- By replacing error-prone human intervention with quality-assured automated processes, both quality of service and **speed of execution** are enhanced at the same time. Business-critical applications call for the high availability that BladeFrame delivers without complex, cost-intensive clusters. Error reduction is also achieved through reduction of physical connections, e.g., the number of power and I/O cords/plugs is drastically reduced to preclude connection errors from the very beginning.

- The business relevancy of IT is also increased by **facilitating disaster recovery concepts**—even for complete data centers. The high-availability measures described above are frequently not sufficient to guarantee absolute availability of business processes. Mirrored data centers, which are often distributed across different countries, represent the only wall of defense against local disasters or acts of terrorism. With PRIMERGY BladeFrame, the required business processes can be easily restarted on another BladeFrame if it becomes necessary to switch to a completely different data center.

Business Agility

- PRIMERGY BladeFrame permits **drastic acceleration of the implementation of new business processes.** Enterprises have demonstrably saved up 90 % of the time it takes to go from the original idea to production maturity (as compared with traditional infrastructures). This can halve the time required to achieve ROI.

- BladeFrame offers **extreme flexibility in the case of established business processes** through rapid allocation of server capacity (elastic computer capacity) for everyday operations. PAN Manager quickly reassigns processor, network or main memory resources within the computer network. For example, applications that are subject to very sudden workload fluctuations at different times of day are automatically provisioned with the necessary resources. New servers can be deployed in minutes, not weeks, and the function of any server can be changed on the fly to accommodate urgent business priorities.

IT Efficiency

- BladeFrame enhances IT productivity and can achieve a **reduction of up to 60% in total cost of ownership (TCO)**. This is attained primarily through reduction of hardware components, improved utilization of assets and optimal IT operation.

- **IT productivity is improved** through automation of typical administrator tasks such as monitoring, deployment and reallocation of resources by PAN Manager. Accenture project experience also shows that processor utilization can be increased to as much as 80% and servers can be consolidated by 75% while maintaining at least the same level of availability for all applications.

- Enterprises that have implemented BladeFrame solutions have reported dramatic drops in TCO, primarily through **reduction of hardware components and better server utilization**. Many BladeFrame implementations have increased effective server utilization to 70-80 % from 25-35 %. TCO is also reduced by the use of implicit failover behavior instead of separate cluster software and a ratio of n:1 instead of 1:1 between production and failover servers. Additionally, BladeFrame leads to an impressive reduction in capital expenditure and management expense since the complete SAN/LAN/computing infrastructure is virtualized. On the whole, this can reduce the number of actual server instances by up to 60 %.

- TCO is also lowered by a **reduction in the cost of manpower and other operating expenses** required to deliver the IT services required to meet business needs. Increasing the level of automation allows IT personnel to provide the enterprise with more and better services. System administration requirements can be cut in half, and administrators need only set foot in the data center in the event of damage. Furthermore, fewer software licenses are required due to the decrease in the number of hardware instances, which also lowers operating costs. And since BladeFrame takes up less space, consumes less electricity and generates less heat, facility and occupancy costs are also lower.

IT Investment Adequacy

- PAN Manager helps overcome IT gravity by **streamlining infrastructure investment** since multiple applications can share a BladeFrame. In addition, Linux, Windows and Solaris can be run on the same high-availability infrastructure with only a single hot spare.

- By making an enterprise **independent of proprietary architectures** at the hardware and operating system levels, PAN Manager helps preserve the technical adequacy of IT.

- In the case of investments in new resources, PAN Manager ensures IT adequacy at the technical level through the use of BladeFrame as a **standard commoditized platform.**

Fujitsu Siemens Computers Infrastructure Capabilities

Fujitsu Siemens Computers expands the scope of the DIP quadrant with its Dynamic Data Center™ solutions by offering infrastructure capabilities that go beyond middleware products. In fact, ASCC™ and PAN Manager are regularly included in Fujitsu Siemens Computers infrastructure solutions, which consist of middleware, hardware and services. These services are particularly important when it comes to use of individual solutions to master enterprise-specific challenges.

In this context, Fujitsu Siemens Computers Professional Services (PS) and Product-related Services (PRS) offer proven infrastructure services. These include pre-sales services such as configuration and dimensioning as well as post-sales service and in particular implementation of solutions. PS creates value for the enterprise by building, optimizing and managing infrastructures around the core technologies involved in virtualization, integration and automation. PRS focuses on providing platform-independent services and platforms with solutions that address needs in the areas of high availability, consolidation, migration and lifecycle management.

Fujitsu Siemens Computers Architecture Consultants also deliver additional value, e.g., by holding infrastructure strategy workshops, providing investment business case support or documentation of infrastructure concepts. Fujitsu Siemens Computers Architecture Consultants use their Dynamic Data Center™ expertise to broaden the scope of the DIP quadrant, and we consider this to be of crucial importance for both enterprise clients as well as for the partners involved in all enterprise quadrants.

Impact of Architecture Consultants on the Business Process Engineering Quadrant

In the context of Business Process Engineering (BPE), Fujitsu Siemens Computers Architecture Consultants assume the role of advisors and provide guidance, e.g., in the area enterprise architecture initiatives. This also includes responsibility for enumerating requirements for process engineering to prepare for support in the Business Application Transformation (BAT) quadrant. At the application level, the transition from process engineering to application development is crucial because the defined architecture must be reflected in applications. The enterprise architecture sets standards at the application and database levels that must be observed in the BAT quadrant. If this is not the case, inconsistencies will require greater administrative effort, lower system stability, increase integration work and prolong transformation, and this will have a negative impact on business responsiveness. This same applies in the reverse direction: Fujitsu Siemens Computers Architecture Consultants look for opportunities and limitations at the application and infrastructure levels that should be taken into account at the level of process architecture.

On the whole, Fujitsu Siemens Computers Architecture Consultants consider the task of ensuring consistency across the business process, application and infrastructure levels as a crucial aspect of the services they provide for both partners and clients.

Impact of Architecture Consultants on the Business Application Transformation Quadrant

In order to increase IT responsiveness in the BAT quadrant, application developers and Fujitsu Siemens Computers Architecture Consultants must achieve a high level of collaboration. Both sides must understand the infrastructure requirements for the code that is created, which calls for thorough development documentation. Developers must abandon the notion that their deliverables can be simply "thrown over the wall" to personnel responsible for operations and infrastructure.

On the other hand, Fujitsu Siemens Computers Architecture Consultants provide automation and monitoring tools that can be interlinked with developers' tools. This permits an integrated overview in the requirements and design phase of application development. Flexframe for Oracle is an outstanding example of collaboration between an application provider and Fujitsu Siemens Computers. This dynamic IT solution was developed for the use of customized and standard applications based on Fujitsu Siemens Computers ASCC™ and database and application server grid technology from Oracle. Tailored to the specific needs of Oracle application servers and databases, this gives enterprise customers a flexible, pre-tested solution for consolidation projects they can rely on in this area.

Impact of Architecture Consultants on the IT Operations Quadrant

Fujitsu Siemens Computers Architecture Consultants generally advise enterprises that want an infrastructure tailored to their specific operational IT needs. If, for example, IT efficiency is the priority operational IT objective, Fujitsu Siemens Computers Architecture Consultants can help increase the utilization rate by designing an architecture that focuses on this goal. Fujitsu Siemens Computers Architecture Consultants can also assist in defining reasonable objectives for IT operations by initiating a dialog to examine business responsiveness as a function of costs, service level requirements, reliability, etc. ITIL-certified consultants may even evaluate individual business cases on the basis of infrastructure optimization, business continuity and recovery and management of processes, information and systems.

Fujitsu Siemens Computers Architecture Consultants therefore define relationships not only between infrastructure components but also between these components and applications and business services as well. This step is the key to performing an as-is analysis of an infrastructure and creating the to-be design of for its architecture. Fujitsu Siemens Computers Architecture Consultants can put the tools and processes in place required to collect and measure data, e.g., performance data from the perspective of users. This gives the enterprise IT organization confidence in its data collection and analytical capabilities so that it can then go on commit to business-focused service levels.

As-is analysis can be based on top-down root-cause or a bottom-up impact analysis, both of which are important for assessing an infrastructure, i.e., for understanding the consequences of changes for the business and IT organization. This support also includes advice on license management for automated infrastructures.

The overall impact of Fujitsu Siemens Computers Architecture Consultants is based on their capacity for collaboration and ability to work across quadrants. In order to collaborate across quadrants, Fujitsu Siemens Computers Architecture Consultants have acquired an understanding the languages of the different players involved activities that fall under the various quadrants, which means they can bridge differences and translate them into infrastructure requirements. Since this "multilingual" cross-quadrant expertise is extremely difficult to acquire, Fujitsu Siemens Computers Architecture Consultants are sought-after experts in their field and have a long track record of success in the area of IT consultancy.

The capabilities of Fujitsu Siemens Computers experts are crucial for achieving a data center with a high level of business responsiveness. These capabilities benefit both the Fujitsu Siemens Computers partners involved in the various quadrants as well as enterprise clients wanting to benefit from the advantages of the Dynamic Data Center™ approach.

Enterprise Benefits of the Dynamic Data Center™

As was shown above, the Data Center Infrastructure Provisioning (DIP) quadrant contains solutions consisting of software, hardware and services that make it possible to achieve a new level of business responsiveness in the area of enterprise IT.

By expanding DIP to create Dynamic Data Center™, Fujitsu Siemens Computers can achieve an unprecedented level of business responsiveness that impacts both the infrastructure level and cross-quadrant collaboration. The primary Dynamic Data Center™ enablers, ASCC™ and PAN Manager, permit superior fulfillment of all enterprise requirements. This is summarized by Figures 14 and 15.

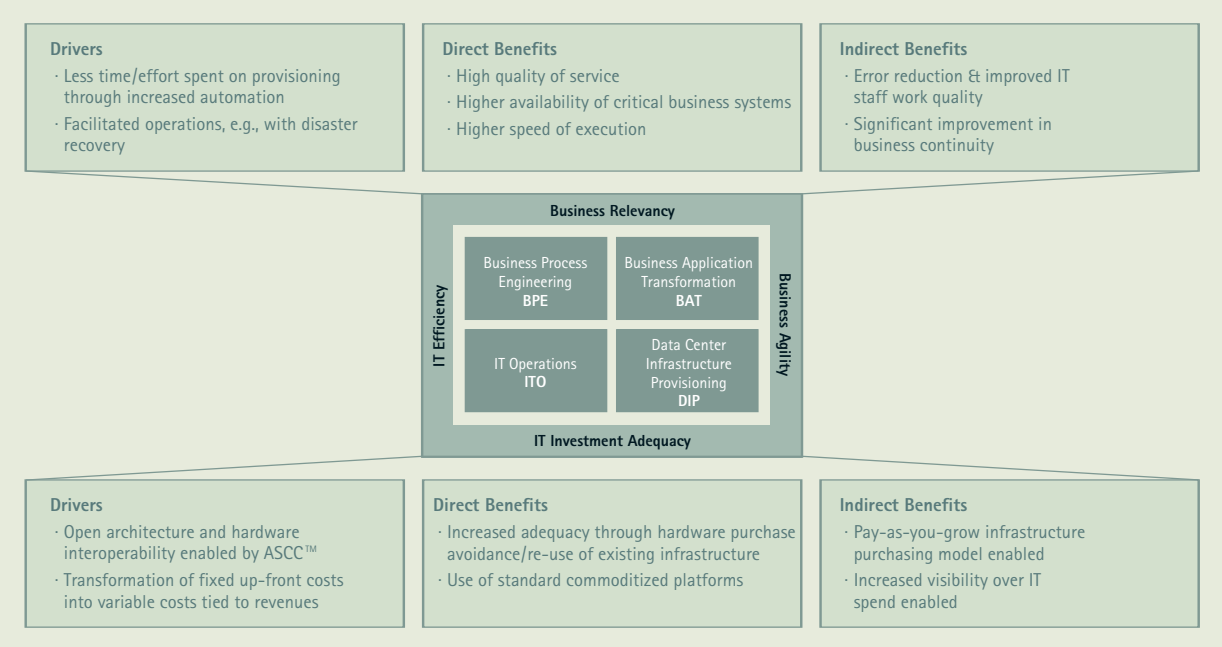


Figure 14: Business Relevancy and IT Investment Adequacy—Benefits Fulfilled

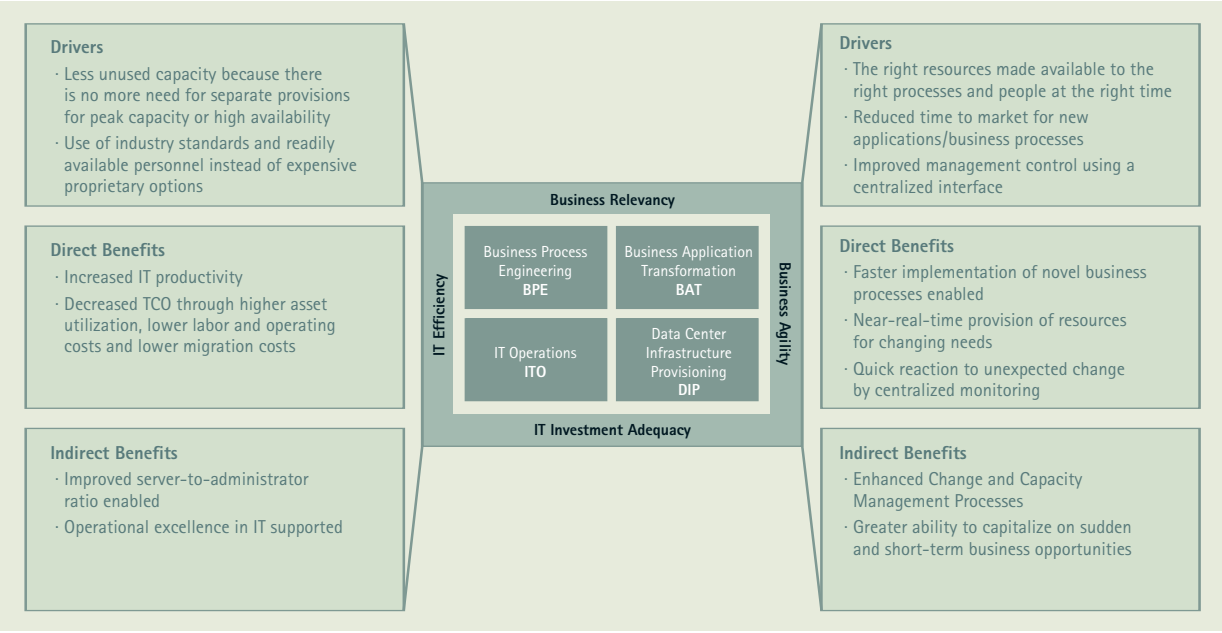


Figure 15: IT Efficiency and Business Agility—Benefits Fulfilled

Fulfillment of requirements produces convincing client benefits that should initiate a call for action in today's IT departments.

ASCC™ and PAN Manager are automated and integrated systems management tools for IT infrastructures. The tools and their concomitant technologies are highly integrated, i.e., they work across a multi-vendor and multi-platform environment due to (ongoing) standardization. Deployment and management of servers, for example, are greatly simplified when interfaces and tools are standardized like ASCC™ and PAN Manager. In theory, this allows enterprises to deploy and manage servers from any vendor in exactly the same manner. Intensive use of TRIOLE™ tools for proactive management also helps to migrate real-time and historical reporting from the service level to the business process level. Based on server/storage consolidation projects and the investigation and testing of further virtualization technologies, progress in the development of the data center of the future will continue in 2006 and beyond. A high standard of investment protection will thus also be achieved by integrating existing resources and improving technologies now in place.

Outlook

Today's typical data centers can be described as being slow to respond to business needs. In addition, they respond to business needs reactively and not predictively. Standardization of processes and tools has been and remains a way to address critical areas of operational instability on the one hand and enhance business responsiveness on the other hand.

Standardization measures alone cannot, however, create the highly responsive data center of tomorrow through comprehensive formalization of IT processes, which according to ITIL is of central importance. Given this situation, it is necessary to develop service catalogs that define IT services and anticipate changes in service needs. This will lead to service-orientated IT and significantly more predictive IT operation.

Business Responsiveness

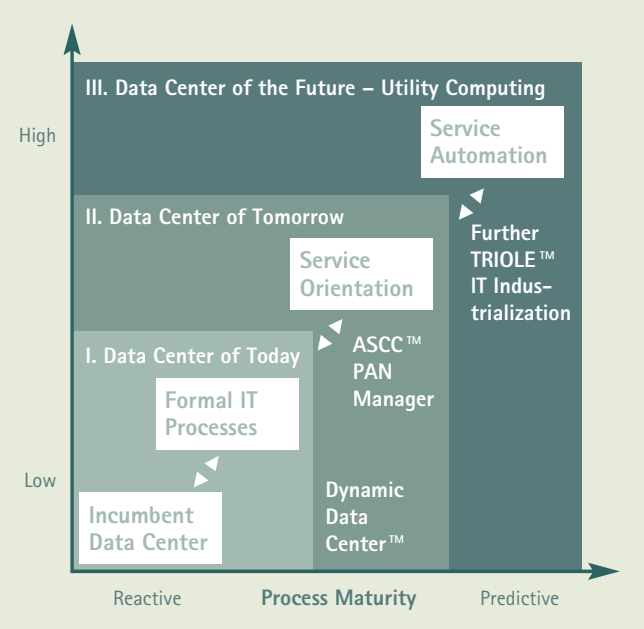


Figure 16: Three-Phase Data Center Roadmap

As was seen above, two important elements of the Fujitsu Siemens Computers Dynamic Data Center™ concept, ASCC™ and PAN Manager make this service orientation possible. ASCC™ allows for a data center-wide mapping of workloads to available compute resources across the network and represents a big step in the direction of centralized management of service-oriented architecture. On this basis, predictive operations to drive automated provisioning of servers and storage resources can be implemented and billing models established, e.g., through the ASCC™ plug-in for accounting & billing. This permits transformation of IT operations from a cost center predominantly controlled by technology metrics into a process-focused, service provider with market prices. In such situations, the PAN Manager complements ASCC™ by supporting the introduction of BladeFrame technology. This opens the way to greater flexibility for existing data centers because enterprise applications can be moved between blades. With PAN Manager based on PRIMERGY Blade-Frames, fluctuation in demand for computing capacity can therefore be addressed in a superior way. On the whole, Fujitsu Siemens Computers Dynamic Data Center™ paves the way to the future state of IT by integrating both existing resources and upcoming technologies.

At the same time, a high level of business responsiveness can be achieved today. Although significant progress is being made towards the data center of the future, there is still a long way to go before the IT industry will attain the ideal state, i.e., a self-configuring and self-optimizing data center. This especially holds true if one recalls the definition of business responsive IT:

An IT that is business responsive enables the fulfillment of enterprise requirements with zero adaptation time and accommodation of change with zero cost effort (target state of enterprise-level IT).

In order to achieve such a fantastic state of responsiveness, technologies will have to be developed to the point where true dynamic computing and resource allocation can occur. In this future state, systems will run on the basis of policies and procedures and monitor operation, allocate resources and manage systems as a function of these policies and procedures. IT services and business needs will be truly aligned, and IT services will adjust to those needs in real time through automated dynamic platform provisioning that expands/contracts resource availability to accommodate needs. Further integration and standardization capabilities are vital pillars in the context of the transition to utility-based computing, and, although unfortunately lacking for the present, innovation in these areas will prove particularly important. Product integration on the part of vendors will especially important because it will be necessary to allow cross-vendor selection. According to Meta Group research, the data center of the future will most probably consist of resources from diverse vendors and be defined by increasingly standardized interoperable interfaces. Vendors will therefore no longer be able to compete by marketing proprietary features and functions that stand in the way of interoperability. Infrastructure innovation will drive commoditization through ubiquitous interoperable standards, and proprietary alternatives will not be able to resist the forces of commoditization.[10] Coordination between vendors of resources and providers of middleware solutions will be required to ensure compatibility between the various layers of the reference architecture. ASCC™ and PAN Manager are two impressive examples of this trend toward innovation, and the use of the TRIOLE™ process to drive the industrialization of IT will expand the roles of ASCC™ and PAN Manager. This will be achieved through further development of ASCC™ and PAN Manager so that they complement each other and function as fully integrated and interoperable tools in the data center of the future.

Conclusions

This study is intended to provide enterprise executives and IT managers with guidance to infrastructure value creation. We therefore explain the importance of enterprise infrastructure for the responsiveness of IT to business requirements by providing in-depth answers to the following for questions:

1. **How can data center infrastructure provisioning be used to achieve the to-be state of a business responsive IT?**
2. **How can Fujitsu Siemens Computers contribute to the responsiveness of enterprise-level IT?**

The first part of the study is especially directed at those executives who view IT infrastructure as a "black box", i.e., a consumer of financial resources, instead of considering it as an enabler that can help achieve business responsiveness. We show that modern infrastructure solutions based on virtualization, integration and automation technologies can considerably enhance responsiveness to enterprise requirements. Business relevancy and agility plus IT efficiency and investment adequacy can be improved contemporaneously without a trade-off. This is illustrated by demonstrating the extent to which infrastructure capabilities can contribute to initiatives such as enterprise architecture planning, service-oriented architecture or predictive IT operations. Since infrastructure capabilities are both a source of competitive advantage and consume a major share of IT spending, this should be of high interest to C-level executives.

The second part of the study deals with the Fujitsu Siemens Computers Dynamic Data Center™ initiative, which provides a holistic approach to business responsiveness. Dynamic Data Center™ stands for complete infrastructure solutions consisting of services, middleware and hardware that permit fulfillment of enterprise requirements on an individual basis. It is shown that the process of implementing the most recent virtualization, integration and automation technologies can be pursued faster and with less risk using the TRIOLE™ model to achieve Dynamic Data Center™ levels of responsiveness.

ASCC™ and PAN Manager are shown to be vital Dynamic Data Center™ tools, and the as-is state of Dynamic Data Center™ reality is defined. We also provide an insight into the activities and capabilities of Fujitsu Siemens Computers Architecture Consultants, who can contribute to business responsiveness by delivering individual solutions to handle the infrastructure challenges of Fujitsu Siemens Computers clients. Overall, the second part of the study represents a detailed expansion of the first part and can thus be used as a guideline to modern infrastructure solutions from Fujitsu Siemens Computers.

[1] Source: Weill/ Subramani/ Broadbent: IT Infrastructure for Strategic Agility. MIT CISR Working Paper. April 2002.

[2] Source: IDC: Worldwide IT Spending 2004-2008 Forecast: The Worldwide Black Book, 2005.

[3] Source: Gartner: Worldwide IT Benchmark Report 2006, November 2005.

[4] Source: Forrester Research: How Much Security is Enough, August 2003.

[5] Source: Alinean ROI report: ROI for the automated enterprise, January 2004.

[6] Source: IDC: Worldwide IT Spending 2004-2008 Forecast: The Worldwide Black Book, 2004.

[7] Source: Gartner: Worldwide IT Benchmark Report 2006, November 2005.

[8] Source: Gartner: Gartner's Positions on the Five Hottest IT Topics and Trends in 2005, May 2005.

[9] Source: Gartner: Real Time Enterprise Demands a Real-Time Infrastructure, October 2004.

[10] Source: Meta Group White Paper: The Data Center of the Future, March 2003.

About Accenture

Accenture is a global management consulting, technology services and outsourcing company. Committed to delivering innovation, Accenture collaborates with its clients to help them become high-performance businesses and governments. With deep industry and business process expertise, broad global resources and a proven track record, Accenture can mobilize the right people, skills, and technologies to help clients improve their performance. With more than 126,000 people in 48 countries, the company generated net revenues of US$15.55 billion for the fiscal year ended August 31, 2005.

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About Fujitsu Siemens Computers

Fujitsu Siemens Computers is the leading European IT provider with a strategic focus on next-generation Mobility and Dynamic Data Center™ products, services and solutions. With a portfolio of exceptional depth, our offering extends from handhelds through desktops to enterprise-class IT infrastructure solutions. Fujitsu Siemens Computers has a presence in all key markets across Europe, the Middle East and Africa. Leveraging the strengths, innovation and global reach of our joint shareholders, Fujitsu Limited and Siemens AG, we make sure we meet the needs of customers: large corporations, small and medium enterprises and private users. The company is a member of the United Nations Global Compact initiative.

For more information about Fujitsu Siemens Computers, please visit: www.fujitsu-siemens.com

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