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A MESSAGE BROKERING APPROACH MAY BE THE BEST WAY TO GIVE IT DECISION MAKERS THE REALTIME INFORMATION THEY NEED TO MANAGE SERVICES EFFICIENTLY

The Perfect Balance

People, technology, and processes are the principal ingredients of any outsourcing business, and maintaining a delicate balance among them is crucial for success. Reducing inefficiency — lack of speed; waste of resources such as time, space, and bandwidth; or the sloppy execution of processes — is a common objective in managing those ingredients.

One solution is to give IT decision makers access to realtime information that will help them take timely business actions such as reorganizing processes and reallocating resources. In this article, we'll describe an architecture that enables realtime decision making for a typical IT outsourcing business as well as any IT department, taking into account complexity and size (the price-benefit ratio being the critical decision-making factor here).

OUTSOURCING BUSINESS LANDSCAPE

The estimated size of the outsourcing market today is between $120 billion and $160 billion, with business-process outsourcing having the strongest growth rate. The business takes three principal forms: management of IT infrastructure (networks, servers, applications, and help desks); leased processing services (transaction processing, email, payroll, and back office); and management of business processes (supply chain, logistics, and human resources).

The essence of outsourcing is to take advantage of economies of scale by sharing infrastructure and resources among many customers. Sharing infrastructure and resources generates interesting implications:

- It enables the virtualization of tools, systems, and resources, thereby aiming to create the illusion for each customer that he or she is the exclusive user of the services and is not affected by the presence of other customers. An analogy would be an operating system, which virtualizes

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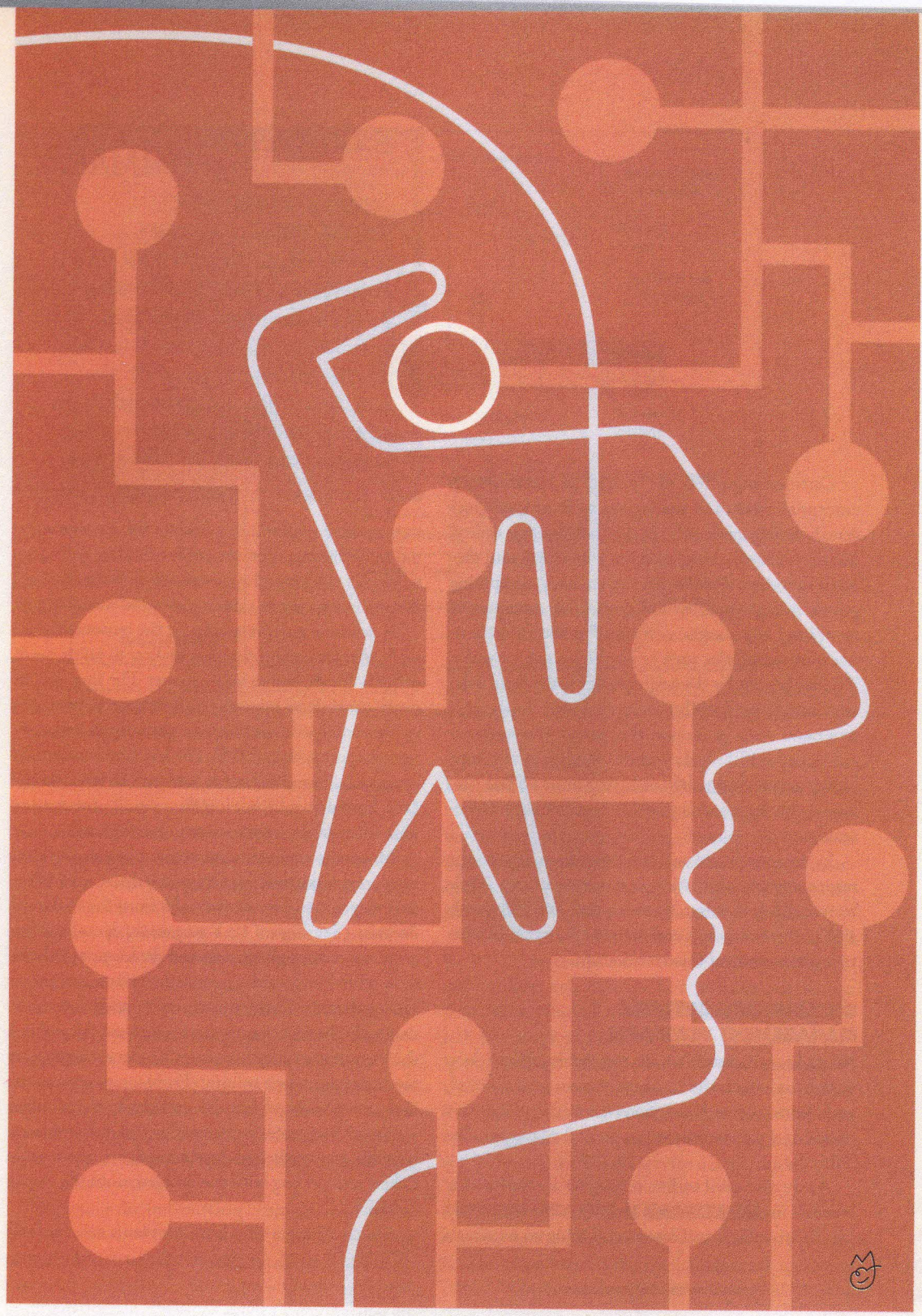

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hardware resources and enables the transparent provisioning of services to a multiplicity of users and applications.

- It requires balancing possibly contradictory deal and performance requirements; for example, the service must be both inexpensive and secure, or both inexpensive and scalable. Architecture decisions have to be made based on the size and requirements of various deals.
- Because direct competitors may have to be supported on the same deal, the protection of their intellectual property must be guaranteed. In particular, this goal requires that reverse-engineering of partners' services be disabled, and that the security of data and processes of the various partners be ensured.

EXECUTIVE SUMMARY

THE PERFECT BALANCE

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Maintaining a proper balance among people, technology, and processes ensures the efficiency of any IT function, whether outsourced or internal. One solution is to give IT decision makers access to realtime information that will help them take timely business actions.

Outsourcing offers the "magic" of transforming enterprise assets and goods into services (and vice-versa), thereby giving rise to the "information utility" industry. Outsourcing represents an important element of today's world economy, enabling computing power, storage capacity, and application execution to be offered and bought as services in the same manner as commodities such as electricity, gas, or water. The key benefit for the customer lies in the rapid business-rescaling capabilities (up or down). In the case of a rapid surge or drop in the market, the customer can easily fulfill needs without buying new equipment, more bandwidth, or hiring new, skilled personnel. Similar reasoning can be applied on the downscale side.

In this article, we will limit our discussion to the responsiveness dimension of the outsourcing architecture. Keep in mind, however, that reliability, scalability, dependability, and security are other important dimensions of this architecture.

OUTSOURCING BUSINESS MANAGEMENT PLATFORM

Managing any system entails establishing closed-loop control, in which the managed system is monitored, and optimal corrective actions are taken to keep key operational parameters within prescribed ranges. (See Table 1.)

As we discussed earlier, managing an outsourcing business involves efficiently and effectively managing people, processes, and resources. Doing so requires a management platform that enables the monitoring of the whole business domain, while providing the means to interact quickly and appropriately with the managed domain in response to various real-world circumstances.

A decision-support system for the outsourcing domain enables human decision makers to know more, to know better, and to know sooner. The first two aspects are tackled by using middleware to integrate various enterprise systems into an orchestrated decision-support system (DSS). The last aspect essentially introduces time constraints into various layers of the DSS aimed at minimizing the overall propagation time for relevant information to be delivered.

Most outsourcing business management platforms support operational centers and help/service desks that respond to events and calls from the managed domain. (See Figure 1.) Equipment, operating systems, servers, applications, and desktops are all instrumented in providing continuous data and information streams. These streams are captured in realtime databases. In addition to the operational data stores, data warehouses may be created for decision support, reporting, and data mining. Problematic events are detected, correlated, filtered, and finally transformed into workflow trouble tickets. Operation center analysts are responsible for closely inspecting the trouble tickets and dealing with the problem until the case is closed.

Similarly, users who have problems call the help

In 1999, Forrester Research estimated the cost of just Web site downtime to be $8,000 per hour.

TABLE 1 *Typical outsourcing parameters.*

Web Hosting Domain	Help Desk Domain
Average response time	Problem resolution rate
Number of visitors per minute	Misrouting rate
Number of transactions per minute	Problem resolution time
SLA compliance percentage	Phone call duration
Order rate and value	Number of calls per analyst

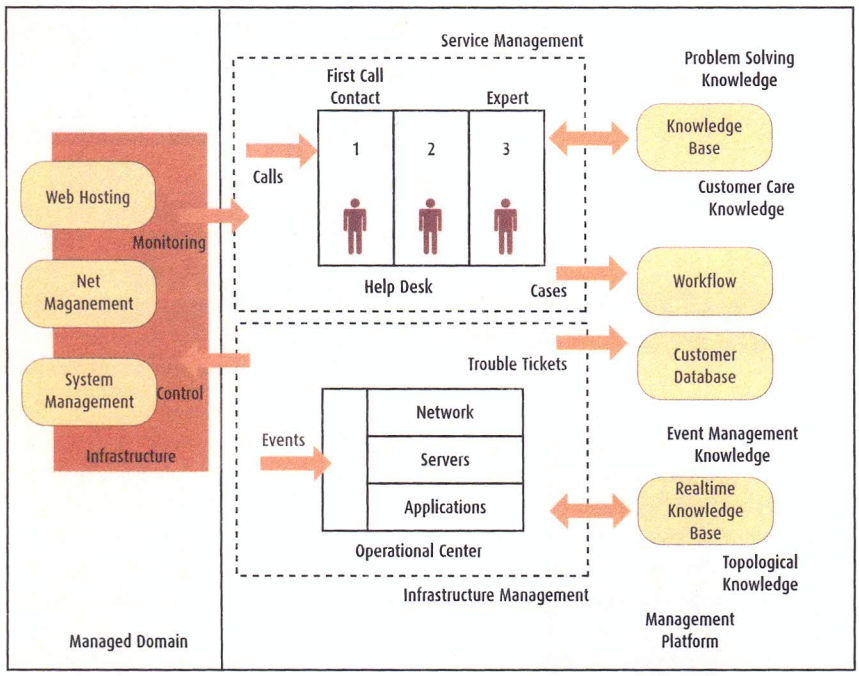

FIGURE 1 *Generic IT outsourcing platform. The two principal domains, Service Management and Infrastructure Management, are within the dotted lines.*

desk analyst, who creates a case in a workflow system, works on the user's problem until it is resolved, and then closes the case. These activities are usually supported with knowledge bases that contain solutions to the large variety of problems experienced by customers. Significant investments are necessary to create, deploy, and maintain such knowledge base systems. Customer information is typically stored in a centrally accessible database.

In the managed IT domain, the outsourcing vendor typically provides system and network management and hosts various applications such as Web servers, database servers, file servers, email servers, and so on. In certain cases, desktop management is outsourced as well, so that the vendor provides desktop software distribution, upgrades, daily maintenance, and troubleshooting.

Managing the outsourcing business involves deploying several intricate technologies and involving people who participate in well-established and well-managed processes. In this complex, expensive, and uncertain domain, decisions about IT architecture are critical. Within the conceptual architectural framework for IT outsourcing, the realtime decision-support system mediates between the running business and various decision makers. The complexity of the system derives from the nature and scope of the supported business and the information needs of the human decision makers supported by the system.

For example, consider a typical situation faced by the operations manager, in which the overall end-user response time deteriorates because of infrastructure problems (databases, servers, networks, applications); failure of e-services delivery components (networks, Web content servers, payment systems, shipping systems); and rapid usage growth. These causes could also be intermixed, masking the root cause of the problem or complicating proper diagnosis and decision-making.

In this case, the Decision-Support Console could track realtime compliance with the service level agreement (SLA), calculate the best possible compliance that can be achieved in the time remaining, and project future compliance (see Figure 2, page 38). Detecting an SLA failure, even if the conformance period has not yet ended, would allow the operations manager to take action such as prioritizing resolution efforts, assigning new support resources, and avoiding incoming traffic and service deterioration.

MESSAGE BROKER MANAGEMENT

Designing the management platform for the outsourcing business is a hugely complex task involving several difficult requirements as well as intricate technical challenges. An outsourcing vendor usually serves multiple enterprise customers with varying and (sometimes) contradicting requirements. Although the successful vendor will clearly address the majority of the requirements for responsiveness, scalability, reliability, and security, it will be very difficult to satisfy all these requirements simultaneously. We will address here only responsiveness to illustrate the importance of realtime decision support in a realistic situation.

The Decision-Support Console in Figure 2 illustrates a characteristic situation in which data and in-

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Eighty percent of unplanned downtime is caused by "people and process issues."

Source: Gartner Inc., January 2000

RESOURCES

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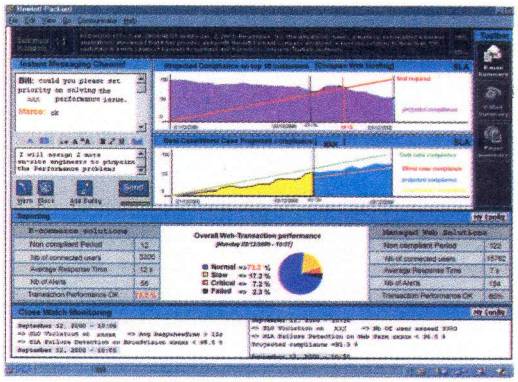


FIGURE 2 *Operational portal view.*

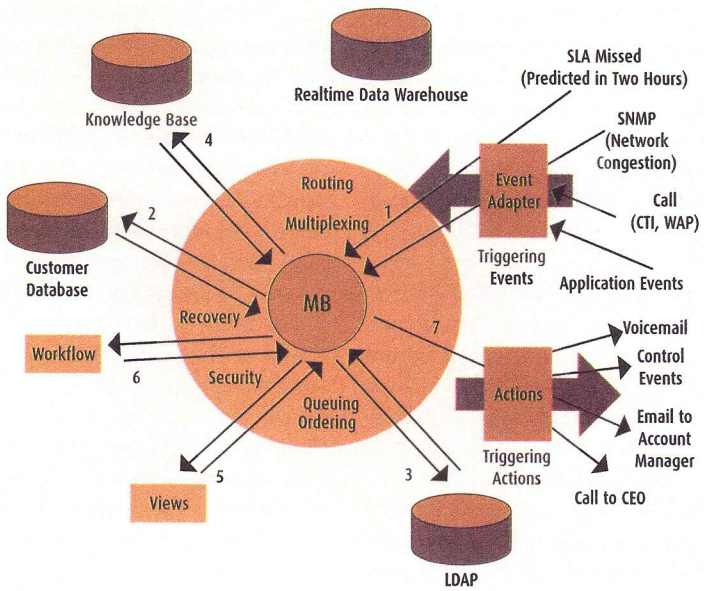
formation from different operational systems are fused into an operational portal view. News and various internal and external business tickers are integrated into the view. Summaries from various communication channels (phone, voicemail, and pager) are shown as well. Instant communication enables quick inquiry and reaction to the ongoing operational subjects.

This view is rendered through a message brokering architecture setup in which we suppose, for illustrative purposes, a business situation arises in which two key customer accounts are having problems: One account shows a forthcoming violation of an SLA limit, and another account is experiencing network congestion. (See Figure 3.) These two situations will create an inflow of events (1) from the infrastructure, which will be checked against stored business logic thresholds, and the necessary information about the customer account (2) retrieved. Directory information (3) will be used to combine stored knowledge (4) about customer procedures and problems into a coherent view (5) proposing standard remedies. On confirmation, a case will be opened in a workflow system (6), which will trigger several actions and activities (7). Instant messages will be sent to account managers, emails dispatched to an analyst, and calls will be placed to affected customers if necessary. Therefore, incoming problems will be detected in timely fashion, and a set of coordinated actions will be taken to prevent further deterioration of services.

At the lowest level of the architecture, heterogeneous and distributed data, applications, and business processes must be integrated. Everyone intuitively understands the importance of integration, but although several enterprises have tested the concept, only a few have accomplished the goal successfully in production environments. For example, one major airline company is using this message brokering approach to handle as many as 12 million events per day, and a major shipping and delivery company has integrated its whole business using the same approach.

There are two main architectural directions here: request brokering (such as CORBA) or message bro-

FIGURE 3 *Message brokering-based management platform architecture.*



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kering. CORBA is based primarily on the synchronous request-response paradigm, which is well suited to the domain of transactions. The asynchronous message brokering approach deals better with the world of events. As realtime decision support is more about event management, this approach has some advantages, although it remains to be validated in more realtime situations.

In this approach, a message broker (MB) serves as a mediator between various message (or event) publishers and subscribers, enabling the effective integration of heterogeneous components (whether they are databases, realtime data sources, resources, applications, or complete subsystems). It provides asynchronous queues for a variety of sources (network, middleware, and system) and resources (objects, database, and applications) and can be modeled as a service provider with two principal activities: publishing and subscribing.

Because this approach does not require applications to be session-connected, it directly affects scalability of the message brokering architecture. Furthermore, it enables many-to-many and any-to-any relationships, which makes it easy for you to connect diverse applications by publishing and subscribing to relevant messages (or events).

The MB provides "intelligent" routing, message transformation services, rule processing, message warehousing, directory services, adapters, and APIs. As such, it represents the central point of the integration paradigm. Intelligent routing means that the MB can understand who the originator of the message is, and it may transform the message on the fly according to predefined rules and forward the message based on the proper routing information.

Message warehousing implies persistency features of the MB (message archiving, auditing, integrity checking, and mining, for example). Thus, if the MB goes down, the message warehouse will still be preserved. Directory services are a natural part of the MB as it must know how to locate various systems using its services. Adapters (generally) are layers between the MB interface and source and target applications, and they contain application-specific logic for translating data formats between the source and the target data models, and for invoking the target application through interfaces provided by the application. APIs are typically defined as the means of direct access to internal MB services.

The brokering paradigm with an MB serving as the central integration axis is the best way to build realtime systems for the large-scale outsourcing domains. Without an MB system, it may take humans several hours to react. The message brokering-based architecture, in contrast, provides relevant data and information within a couple of minutes, thus enabling humans to shorten their decision-making cycle significantly. In addition to this time contraction, more data of better quality has been collected as well.

BEARING THE MESSAGE

The principal impact from deploying MB systems is quicker turnaround time from the triggering events in the managed domain to the reaction of the system or personnel with the actions and remedies. Besides shortening the decision-making cycle, this architecture integrates the outsourcing domain and maps the low-level infrastructure events and service events into high-level business events and decisions.

Considering that some of the hosted businesses are critical and that downtime is expensive or nearly prohibitive, the specific architecture of the management platform gives some distinct advantages inasmuch as human decision-making is supported by the efficient IT system.

Two difficult problems may lead to interesting future research issues: how to improve the efficiency of the view rendering and how to devise better business metrics for the outsourcing domain. Our experience has shown that between seven and 10 operational parameters are enough to monitor the performance of one subsystem (a help desk, for example), and these, in turn, drive five to seven financial indicators, enabling precise trending of business parameters.

However, which operational parameters and financial indicators to compute for the overall outsourcing business is not well understood. When these are defined, research will be needed to develop efficient incremental algorithms for computing and refreshing these metrics. Given the large volumes and inflow rates of data involved with widely distributed data sources, this problem is a difficult one. ie