CUSTOMER SERVICE, PART I
by Jerry Michalski

The back office is quickly becoming the front line.

A decade of automation, downsizing and acquisitions has left many companies out of touch with their customers. People no longer talk to tellers; they use ATMs and check their balances with voice-response systems, or they automate bill payment altogether. Boutiques and mom-and-pop stores have given way to superstores and high-volume, no-frills warehouses. Loyalty is low; churn is high. Eliminating labor and costs has exacted its toll.

Companies see their franchises in danger. They know that churn will kill them in the long run and realize that their key asset is the ongoing relationships they have with customers. Increasingly, products are commodities; support is the value. Phone companies, Internet service providers and cable-system operators know that they will thrive or fail based on their service and support, a lesson many retailers have learned already.

Companies also see competitors working to establish new channels to customers for a variety of new relationships. Banks watch Intuit's recent announcements in online financial services; retailers watch Amazon.com, the Internet Shopping Network and CD Now; media moguls watch Web startups that offer local classifieds and new forms of broadcasting; and everyone watches Microsoft. Of course, some of these competitors are potential allies, acquisition targets or even channel monopolists. It's hard to tell a friend from a foe these days.

Combating these threats and rebuilding links to key customers requires big improvements in mundane-sounding, back-office operations such as customer service -- a term that usually invokes visions of windowless call centers filled with aisle after aisle of poorly paid, cubicle-bound agents wearing headset phones. These hidden operations have become the key channels for customer contact. As a result, tech-support, help-desk, customer-service and telemarketing units are getting increased visibility and resources. Call-center consultancies are booming.

Shifting priorities

The surge of interest in customer service is well timed. Call-center strategists have reached the point
of diminishing returns for efficiency measures. They have wrung enough seconds from calls that more such efforts will have lower payoffs -- and may even backfire. Some cost-reducing measures can significantly worsen the customer's experience. So strategists are refocusing on making callers happy, leveraging the increasingly expensive agents' time and increasing corporate profitability instead of merely reducing call-center costs.

To answer customers' questions and solve their problems more effectively, developers are building detailed customer-data warehouses and offering "solution-centered support." To leverage agent time, companies must execute well, including

- figuring out when agents can be used most effectively (e.g., better call triage and more sophisticated call avoidance; more automation before, during and after calls);
- making sure agents have the skills, training and resources they need to solve problems (e.g., call-management, knowledge-management, remote-diagnostics and collaboration technologies); and
- arming agents with cross-selling and other profit-making opportunities (mined from the new databases).

This issue of Release 1.0, the first of two parts, examines customer service technology from the call-center agent inward. It covers how companies help their agents get customers' questions answered (and problems solved) more efficiently. It also addresses goals beyond efficiency, such as using service events as sales and relationship-building opportunities. The issue focuses on three areas: smart call routing, call management and solution information management.

These topics raise interesting second-order questions, such as how much to process product- or customer-support information (then how to represent, store and share it); where in the system architecture to put specific functionality (e.g., routing); how to measure satisfaction and performance; whether or not to outsource; and how to increase service-center flexibility through virtual call centers and dynamically expandable staffs.

Next month we will turn our attention outward, to the links between call centers and their customers as well as informal service relationships among customers themselves. The Internet is changing service in many ways, including customer self-service at Websites, call centers that use Internet telephony and remote diagnostics, and low-tech online discussions in which customers help each other outside the vendor-controlled support channels.

First, here is a quick overview of call centers and how they work.

**CALL CENTERS 101**

Four million US workers are currently employed in call centers. In Midwestern cities such as Sioux Falls, SD; Orem, UT; and Omaha, NE; call centers are the major employers. Call centers employ so many people that in many cities, employable agents are scarce. Canadian provinces and European, Caribbean and Asian countries are pitching themselves as low-cost sites for US service operations.
Two industries -- telecom service providers and financial institutions -- dominate, followed by retail (mail-order) and hospitality/transportation (reservations).

Call centers have four major application areas: customer service (which includes order taking and reservations), field service (with dispatch capabilities), help desks (for internal tech support) and sales (e.g., telemarketing and field sales). They cover a wide range of complexity, from simple order-status inquiries, which can be handled by junior trainees, to extended troubleshooting, which requires considerable expertise, and stock brokerage, which requires SEC-licensed agents.

Some call centers specialize in inbound calls, particularly 800- and 900-number services. Others are principally outbound services that do telemarketing, surveys or collections. Many use outbound calling to balance lulls in the inbound traffic ("call blending"). Call centers are expensive operations, so keeping resource utilization high is essential. The larger operations do sophisticated load balancing and queue management across multiple physical call centers. The 800 number you dial is usually converted into a different number on the fly in the network, depending on preset rules or real-time data from the call centers and the network.

Before you say "hello"

Companies are applying plenty of technology to handle calls more cost-effectively. By the time your call reaches an agent, the system has often:

- picked up your phone number from the phone system,
- asked you to enter your credit-card or account number using the phone keypad (or by speaking),
- looked up your record in its database and identified you as a "gold" customer or a deadbeat,
- tried to answer your question automatically by using voice-response prompts (the time-honored practice of call avoidance),
- decided which queue (or queues) to put you in,
- held your call in the phone network until the system decides to commit it to one of several distributed call centers and
- made any inferences it can about the information it has on you.

Whew.

With luck (and considerable sweat and skill), the call gets to an agent well-suited to answer your particular question and well-armed with information about you, your bill, your path through the voice-response system, your equipment or preferences, and so forth. Every time you have to switch agents or -- perish the thought -- call back, you get annoyed and the service center hemorrhages money.

When it's really humming

The best call-center operations are like holographic memory systems for their organizations. The agents know which customers are angry and which ones are happy, which products work and which don't (and which products are out of stock), which sales people are obnoxious and which ones are a dream to work with.
This is useful, because customers aren’t the only people who call customer-service centers. Account executives call in to prepare for sales calls or to track their orders. Managers call to monitor operating statistics or see which problems are causing the most trouble. Product developers call for new ideas or bug reports (or they should more often).

Service-oriented companies have made their systems highly efficient through waves of aggressive automation using technologies such as caller ID, voice response, computer-telephony integration (CTI), speech recognition, speech synthesis and advanced network routing. They are building sophisticated customer data warehouses that can recall not only what color blouse you ordered last time, but also your cat’s name and whether you like to be pampered or left alone. The technology-integration problem is daunting, but some of the most important work has to do with management and training.

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How many support technicians does it take to change a light bulb?

Please hold and someone will be with you shortly.

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Nuts, bolts, cables and software

The hub of all call centers is the automated call distributor (ACD), an expensive piece of telephony gear that handles large volumes of incoming calls, holds them, then routes them to agents as they free up. Call centers are practically synonymous with ACDs. The major suppliers of ACDs are Lucent (the company formerly known as Western Electric, and more recently as AT&T’s hardware division), Northern Telecom, Rockwell’s Switching Systems Division, Siemens and Aspect Telecommunications, a notable newcomer. Outside the US, Fujitsu, Ericsson, Alcatel and GPT have significant strengths in specific markets.

Some ACDs are single-purpose machines. Aspect took a huge bite from that market by offering an open, easily programmable system, a path other systems have taken, too. Most ACDs are high-capacity, low-function PBXes (Private Branch eXchanges). Almost half the worldwide PBX sales are from call centers ($2.3 billion last year). ACD software does routing, queue management, call and data-session transfer, staff scheduling, reporting and traffic analysis. Some of those features are migrating to other systems.

Outbound call centers often use predictive dialers, which automatically dial prospective customers based on telemarketing lists. The dialers can usually detect busy signals and answering machines, so that live callers are connected to agents as the agents free up. By law, the dialers must maintain and observe lists of numbers that they may not dial. For example, it’s worse than poor form to autodial the block of phone numbers assigned to a hospital; it’s illegal.

The device immediately downstream from an ACD is likely to be a voice-response system, which presents callers with recorded menus, detects responses (touch-tone or spoken), then branches through program logic until the caller’s question is answered or the system can assign the call to a queue for live agents. (These systems are usually called VRUs or IVRs, for Voice-
Response Unit and Interactive Voice Response.) Some vendor's systems can make the VRUs available to the hold queue, which allows callers to enter information such as an account ID or choose messages to listen to, or service operators to play advertisements tuned to the caller.

The major IVR vendors are Comverse, Periphonics, InterVoice, Syntellect, Voicetek and Brite Voice. Edify has been competing successfully with these established players. In fact, Aspect licenses Edify's application-generation system for its ACD.

IVR units are not always downstream from ACDs. In some cases, IVR systems perform important call-routing functions and use the ACDs as dumb switches to connect calls with agents. Where to do routing is a key question for system developers.

In a telling sign of the times, Microsoft’s customer-service hold queue has a disc jockey. If you call for help, while you wait for an agent to free up you’ll probably hear the DJ say something like: "There are 15 people waiting for PowerPoint help, with average waits in the five-minute range. Now, here’s a tune from Elvis." Clever indeed.

Call centers typically include specially designed phone sets or custom workstations for agents, although increasingly they use standard PCs running Windows. Developers add CTI capabilities such as "screen pops," which put information about incoming calls on agents’ screens quickly; autodialing, which saves time spent redialing; host access; agent feedback, which signals breaks and progress; and integrated voice and data sessions, which allow applications to use call-status information, access databases, run scripts and transfer callers more effectively (see Release 1.0, 12-92 and 1-93).

The workstations are typically networked. Large, multi-site call centers often have high performance wide-area connections and links into the long-distance carriers’ networks. Companies such as Genesys Labs, GeoTel, Nabenasset and NPRI specialize in sophisticated network-level call routing software (see page 11).

The workstations also run call-management software, much of which is homegrown. These systems are separate from and only loosely coupled with the call-routing software in the ACDs. These systems assign and track trouble tickets, manage workflow, escalate outstanding items and report on system performance. The packaged customer-service software business has been booming, led by four companies: Clarify, Remedy, Scopus and Vantive.

Module by module, these vendors are closely matched on features, which makes it hard to distinguish them from each other. However, each is implemented differently or has a distinctive capability or module the others don't have. For example, Clarify sells a feature-rich system which has inventory-tracking capabilities that most of the other vendors lack. This makes Clarify popular with companies that have physical goods and field-repair fleets and require sophisticated dispatch operations.

Release 1.0

25 September 1996
Remedy is practically alone in the help-desk market. Scopus' system is written in a high level language that makes its offering more malleable than most, which is good for vertical markets. Vantive offers the broadest range of modules, all well integrated, and pitches turnkey, speedy implementation (a profile of Vantive follows this section).

Scopus emphasizes sales, a frothy sub-market which includes two significant vendors not mentioned so far, Aurum and Siebel. Aurum used to dominate the customer service market, but it lost ground to the four vendors mentioned above and has relaunched itself around sales, where it is doing well.

Siebel Systems, a major force in sales force automation (SFA), is a favorite of consulting houses because it requires heavy customization. Siebel also offers telemarketing systems, and its growth in call centers is forcing other vendors to buy or ally with SFA vendors. Other significant sales-system suppliers include Brock Control Systems; Early, Cloud; Edge; and Trilogy Development. Another related market is performance support, with vendors such as Comware and Ariel (see Release 1.0, 8-93).

The lucrative call center and sales-force automation markets are attracting some of the largest business software vendors. PeopleSoft, SAP, Oracle and Microsoft probably won't watch from the sidelines for long.

Customer-service operations that deal with complex customer problems need an additional layer of software that helps agents find, record and re-use solutions. The two major vendors in this area are Inference and Primus. We describe them further below (see page 15).

Finally, call-center consultancies such as Technology Solutions Corp. (TSC) are booming, as are the phone companies' own consulting groups. MCI recently bought SHL Systemhouse, renamed it MCI Systemhouse, and has turned it loose on its client base. Call-center outsourcing units such as Softbank Services Group, APAC Teleservices and TeleTech are doing well, too.

VANTIVE: EXECUTION PLUS A BROAD PRODUCT LINE

Choosing a customer-service vendor is like choosing a surgeon or accountant: You want one who is solid and trustworthy, almost fastidiously square. Vantive is that kind of vendor -- a nice blend of discipline and insight.

Vantive pitches breadth and quality. It has a broad spectrum of modules that map to many functions and help service representatives communicate with other departments. The modules are highly integrated. Underneath they share a single data model, single client executable and single user interface. That makes it relatively easy to offer custom views for sales people, call-center agents and customers. It also means the modules are always at hand (as long as you have bought them). If you expect service agents to cross-sell, they shouldn't have to load a separate sales application.

The quality pitch includes reference to Vantive's over 225 customers in production, which include Anderson Windows, Deutsche Bank, GM International, HP, Home Depot and US West Communications. Marketing vp Bob Tate is particularly proud that not one has left Vantive for other solutions willingly (one was acquired by a company that uses a competitor's product).
The company’s principal offering, Vantive Enterprise, includes the modules Vantive Sales, Support, Field Service, Quality and HelpDesk. Each module is sold separately. It recently introduced two new access methods: On the Go for mobile workers and VanWeb for Web surfers. Per-workstation prices range from $2500 to $3500, depending on the number of modules and users. The system has text search, links to external case-based reasoning systems such as Inference’s CBR2, a development environment, customization tools, replication services and workflow. The server modules run on Unix and Windows NT with all the major SQL databases. The system supports all major clients and now full Web access to all modules.

The last point is quite interesting. When Vantive came calling last October to show its Webified front-ends, it was the first major application vendor we had seen in any category that had moved aggressively to make use of the Web, which could potentially make its own client modules obsolete. Complete Web access makes it easier for Vantive to offer telecommuting solutions, remote customer access and custom features.

Vantive’s other recent initiative is to develop remote-diagnostic capabilities for mobile workers, especially mobile sales people. Internal support of expensive revenue generators is a high-benefit application. Most help desks are simply cost centers companies have to run. Santa Clara, CA-based Vantive was founded in 1990 and went public in 1995. It has 220 employees. Its board includes Informix founder Roger Sippl and VC veteran Bill Davidow.

BACK TO THE CALL CENTER

Companies know how to handle high volumes of simple, repetitive queries such as directory-assistance (DA) calls (see Release 1.0, 4-93). This year, US residents will make approximately 7.5 billion DA calls, each lasting an average of 23 seconds. At this scale, every second saved adds millions of dollars to the bottom line. With this much at stake, it’s easy to see why these systems are already highly optimized.

"I don’t want my agents to have time to swallow spit."
-- airline call center manager

Taylor would be proud

Here’s how it works. When you call directory assistance, a recorded voice (usually the operator you’re about to talk to) asks you for the listing you need. Only then is your call connected to an operator, who works your request until it is resolved, then turns you over to an automated system that speaks the number slowly and audibly. The human operator is involved for only a few of the 23 seconds.\(^1\) Phone companies are now piloting systems that handle the most frequent requests without human intervention.

\(^1\) Anyone who has tried to fix a computer problem by calling a vendor’s tech-support line knows that 23 seconds is only enough to clear your throat and give your number. PC tech-support calls can easily run 30 minutes.
The prime directive: call avoidance

With few exceptions, companies would rather handle all customer calls without a person, which not only requires excellent call triage and plenty of automation, but it also requires a new emphasis on customer self-service. The Web has already become an essential and wonderfully cost-effective channel for self-service. Now companies are beginning to link it to their call centers. More on all that next month.

Call avoidance focuses on filtering out as many calls as possible through automation, while not alienating callers. Some customers will always prefer human agents, as will some companies, who feel that the human touch is the heart of their service offering.

It may seem obvious, but people can handle customer problems and fix them in a way that’s difficult -- if not impossible -- to automate. Call avoidance at all costs can be expensive in unintended ways (see box). Humans are uniquely qualified to do certain tasks, such as interpreting policy questions, explaining complex interactions, mollifying angry customers and just making callers feel good. As TSC call-center consultant David Isherwood puts it, "Nothing can be as apologetic and sympathetic as a human."

When call avoidance fails

AT&T recently began reclaiming its billing functions from the local phone companies. So now I get yet another bill to pay. I recently called AT&T to ask if it could move that new long-distance bill to my Universal Card. I have been waiting for AT&T to consolidate its billing for multiple services to a single bill for a few years, since it became evident that AT&T (and others) should do this. Makes sense, no?

Instead of getting to an operator quickly who could tell me what I expected -- "Sorry, we can’t do that yet" -- I ended up trapped in several voicemail labyrinths, unable to get to a human operator. (Several times through this process, I tried to hit "0" to drop through to a live agent, but to no avail.) So I gave up on AT&T’s main number and tried calling the Universal Card service number. That led me down several other paths and eventually to a very polite human operator, who confirmed my expectations. During the two calls, I was asked several times (by mystical recorded and synthesized voices) to enter my card and phone numbers into the phone keypad, a tiresome process.

I did have better luck registering for Web access to my Universal Card account. A week after I registered online (at www.ucs.com), my password arrived in the (physical) mail, and I was able to see my account balance and check for any outstanding charges. Well, it’s a start. With Intuit’s recent announcement that Quicken has been made more communications-aware, it’s easy to envision business relationships and interchange formats that will allow me to view all my charges within Quicken, then do much more.
Balancing forces and goals

The pressure to avoid connecting calls to agents is part of a more complex set of forces that drive the economics of customer service. Increasing complexity (of incoming questions, product interactions and profit-making opportunities) creates demand for smarter agents, solution re-use and more powerful software. Call centers are expanding, but it's already hard to find qualified agents, so labor costs are bound to rise. Keeping agents busy all the time is more important than ever.

The combination of labor scarcity, better and surprisingly inexpensive wide-area communications and more sophisticated call-center software is making companies shift to smaller, more dynamically configurable (yes, virtual) call centers. It is no longer unusual for a call to be routed to one of four or five call centers, some of which may be in other countries (or in prison). In fact, this allows for interesting load-balancing scenarios and "follow the sun" strategies. The Singapore call center might do night-shift duty for US callers, and so on. As one might imagine, agents in Ireland are being taught "American," and vice versa. Language support and cultural sensitivity are becoming essential.

Call centers may be small, but they need to scale quickly to handle peak loads. The traditional rule of thumb is to allow for capacity three times normal call volume, in case of special promotions or unusual bursts. But when the stock market runs amuck or natural disasters strike, volumes can spike much higher, and organizations need to be able to deal with the added demand. Sometimes, that means drafting office workers for customer-service duty, which requires software that will run on standard desktops.

Call-center developers are drawing from many sources, including AI, distributed database technology, application integration (especially with marketing and promotional systems), enhanced network services, workflow, wide-area routing and the technologies we described above. One of the key things developers can do is to match callers and agents better. This leads to fewer transfers, less frustration and perhaps even more profits. It's a function of knowing more about who is calling and doing more sophisticated call routing, which is the subject of the next section.
MATCHING CALLERS AND AGENTS

Getting callers to the right or best agent is complicated stuff. For starters, who is the "best" agent? The one who had the most recent break? The one who scored best on customer-satisfaction surveys? To make things worse, doing anything fancy runs counter to the second directive of call centers: connect the longest-waiting caller with the first available agent.

Imagine instead that you could pass high-value callers (or those you somehow identify as ready to buy) to the hottest salesperson at that moment. The system could tally sales stats all the time and route calls accordingly. That's the kind of system that Genesys Labs chief technology officer Alec Miloslavsky is building for his clients. (Six-year-old Genesys, based in San Francisco, specializes in software for high-end, multi-site, heterogeneous call centers.)

Once you have identified the inbound caller, you can do all sorts of things. For example, the database lookup may indicate that the caller has an outstanding balance that's 90 days past due. Why not put that call in front of the agent with the best collections skills?

If someone steps through a loan-qualification questionnaire on your Website, you could put them in front of agents qualified to deal with specific loan amounts or kinds of collateral. If someone tries to solve a problem using troubleshooting aids on your Website, you could connect them to a tech-support representative with a log of where they've been and what they've done. Better still, the agent could see what the caller is seeing on-screen and steer the caller to other pages (details next month).

Clearly companies want to treat their VIPs specially -- or at least let them cut to the head of the line. We begin this section by looking at how to tell if incoming callers are VIPs and figuring out how to treat them.

Who are you?

The best way to identify callers today is with CallerID and ANI (Automatic Number Identification), especially in call centers that use 800 and 900 numbers, because those systems were set up to deliver calling-party information automatically. But this kind of identification is quite fallible and it's never going to improve.

Speech recognition works well only when it is used in controlled ways. For example, once a person's identity is established, a recognition system could help identify selections from a list. Although nobody has developed a system that allows arbitrary callers to identify themselves simply by saying their names, TI has developed a clever system that asks callers to say an easy-to-recognize ID number, with which it can authenticate the callers.

2 In the incident described on page 8, the AT&T system greeted us with a phone number. However, that number wasn't our main office number, but rather one of our six trunk lines, which get randomly selected when we call. CallerID fails behind almost all trunked systems, which means it's useless for identifying callers inside company walls or on the road.
The Net offers the best opportunities to track identity, some quite invasive and some not. (See next month; for earlier thoughts, see personal data interchange, *Release 1.0*, 9-93, and identity online, *Release 1.0*, 4-96). For the moment, the best way to find out who is calling is to try CallerID... then just ask, either through IVR or when the agent connects.

**Intention and desire**

In the middle of assessing callers' net worth and purchase histories, it's worth examining their behaviors and preferences. Some people are transaction-oriented. They just want to do their business and leave. Others are into comfort and being cared for. They appreciate companies that take active roles in the customer's welfare or future needs, including suggesting options. You don't try to cross- or up-sell the former; you can make hay with the latter.

It is also worthwhile to enable users to express these preferences or to ask about them. During a call, an agent might take extra time to ask and note the point in the customer's record. There may also be a role for third parties to store and present the preference information. Several Web startups are doing this in a coarse way in the personalized-media and advertising markets. Developers must strike a delicate balance between nosiness and helpfulness.

**Routing's evolution**

As new technologies have emerged and call-center needs have become more sophisticated, call routing has evolved considerably. Two major trends are evident. First, the routing function is moving off dedicated hardware (ACDs) in several different directions: Some of it is moving into conventional applications and workflow systems; some is moving up into the phone-system "cloud." Second, the routing function is becoming increasingly flexible. Routing can be based on tables that contain practically any variables you care to track.

Call-center routing began as a deterministic function that was hard-coded into ACDs to optimize the use of agents, phone ports and expensive communication resources. Smart ACDs could balance long-distance costs with queue lengths and so on. Some call centers still have primitive ways to route calls before the ACD: They use separate 800 numbers or extensions to distinguish between different caller types, which offers only a coarse filter.

CallerID and voice-response technology led to skills-based routing, which used information about callers to route them to appropriate queues. Callers who needed company business hours or other simple information could go to a junior agent; those with tough technical questions went to senior reps.

Along the way, vendors learned to leverage the hold queue. They added music and announcements (including estimates of how long you could expect to continue holding), then voice-response, which allowed callers to enter more information or select from training messages. The latest systems use caller information to play targeted messages and cross-sell.

Technology advances aside, two terms describe the way to handle callers you can identify. **Continuity routing** means getting the caller to an agent along
with information about the caller's history with the company, or even just their last contact with the company. By simply routing callers to the same agent they had dealt with on a previous call, a mutual-fund company (that prefers to remain anonymous) saw transaction volumes rise by 10 percent. Web-based "call me now" services are a form of continuity routing.

Relationship routing goes a step further: You get the caller to the person who manages that specific relationship, whether it is a personal banker, personal shopper or travel agent.

Call routing is now connecting to workflow systems from the data and messaging world. Some call-management products already have workflow modules, or they launch trouble tickets that feed engineering change-order systems. This is a nascent area, but offers opportunity for systems such as Lotus Notes, which excels at solving routing problems.

Routing in the cloud

The final kind of routing, pre-call routing, takes place within the phone system, before calls are delivered to ACDs in call centers. It is used principally by the largest, multi-site call-center operators to maximize the probability of answer without a subsequent transfer.

The simpler part of that task is load balancing, which can be coarse- or fine-grained. Coarse balancing is done periodically, to deal with temporary overflow conditions in one center or another. Fine balancing involves near-real-time tracking of call-center statistics such as the number of active agents and average wait times.

More sophisticated routing decisions require closer links between the phone company and the client company. All of this raises complex issues about who makes the routing decisions, who owns the equipment and so on. Where to place the IVR system -- before or after the ACD -- is a crucial element in the power struggle between vendors of these systems and in the design of customer-service systems overall. One can envision interesting divisions of labor: Simple data collection might happen in the cloud, before the call is committed to a call center; voice-response scripts could kick in afterward. AT&T and MCI are making appealing pitches for call centers to move the voice-response function into the phone system entirely. This does more than lower communication, equipment and agent costs. For example, a simple "dealer locator" database and some automated routing can connect customers directly to local dealers, instead of making them hang up and dial again.

Pre-call routing is ideal for telecommuting: It creates the call center of one. Until recently, the problem was that call centers couldn't monitor or-

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3 AT&T has two pre-call routing offers: the Intelligent Call Processing service, which stores custom routing information within the phone network, and the Call Center Transaction Manager, which polls ACDs for information in real time on a customer's premises and gets queried by the phone system when a call needs routing. MCI has similar offerings with its Dynamic Routing Option 3 (DR3), MCI Call Manager and new networkMCI Intelligent Call Routing. Recently, MCI built a system for its MusicNow service that integrates the Web.
inary home phones, which meant they couldn't tell when agents were free, or feed them information. ISDN proved too costly to put in homes for agents with high turnover. That problem is fading. Recently, Lucent, Nortel and Aspect have developed full-function ACD phones that can be installed in homes and work over POTS (Plain Old Telephone Service). Also, Internet-connected network computers might be just the gear for telecommuting. The Web front-ends that Vantive has written for all of its modules would be ideal for such a setup.

The largest call centers are increasingly integrated with the phone system. In some cases, they have access to the SS7 (Signaling System 7) control channel using carrier-tested routing equipment and are allowed to direct switches to transfer calls. This is a big deal for phone companies, which are racing to offer functionality that its customers want while retaining control of their networks (see box).

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The role of phone companies

In corporations, IT (data) people are driving these innovations, not the telephony staffs. Applications are moving off specialized telecom gear and onto standard IT platforms. With SS7 access, companies can drive the public switched network the way they would a local database. They can instruct it where to hold calls and when to route and complete them.

Originally, phone companies resisted any initiative that would allow others access to SS7, a protocol that does not fail gracefully or self-heal. One node mistakenly spewing false SS7 messages could cripple the network. However, the close links that are formed when call centers are integrated with the phone system in this way make client companies far less likely to switch telecom providers. Phone companies now pursue this business aggressively, and are adding new features all the time. They need to. Standard applications outside the phone system are getting smarter all the time.

Interestingly, perhaps as a defensive maneuver, phone companies are raising the prices of SS7 access and lowering bulk long-distance rates, which changes the economics of working inside the phone system considerably. As we have mentioned, they are also moving quickly to offer facilities management, outsourcing, special equipment-lease arrangements and more.

We have railed on the phone system before, particularly on the limited power of the Advanced Intelligent Network architecture (AIN; see Release 1.0, 11-93 and 12-95). However, the combination of AIN and the Internet is powerful, as we will see next month. The top 50 customers really want it. We hope it works.

Call routing's strategic role highlights some of the more profound changes that are happening to call centers and customer service overall. Relationship routing is awfully similar to ordinary relationship building. Telecom consultant and entrepreneur Sue Rudd explains it eloquently: "Call centers are just a way to delegate routine service requests to a single,
specialized department. As organizations automate and flatten, routine requests will be automated. For more complex requests, all resources of an organization may be available to provide services to customers. Call centers move from being function-specific, low-skill operations to being an enterprise-wide way to deliver calls to relevant resources."

The past bites back

Most call centers are high-volume operations. ACDs assign calls to work queues that represent pools of agents, with no expectation of which agent might eventually take the call. This is quite different from routing to a specific extension, which many ACDs don't support. Most advanced-routing systems intercept and reroute calls after they have gone through the ACD.

This is a problem. If you reset ACD queues by pulling calls out or moving them around, you mess things up. You may not be able to get any stats out of the system. You also still want to make use of the tools you've built for the hold queue, which might be difficult if you sidestep the ACD.

It gets worse. The MIS reporting systems that come with ACDs today measure all the wrong things for a company trying to focus on relationships instead of cost reduction: busy factors, average hold times, time spent on calls. Companies will need to develop new measures of performance and new benchmarks for quality.

Also, adding other media such as e-mail or online chat will require changes to the reporting software. Companies will want to account differently for the answers given and the time spent there, especially since there might be six people in a chat session getting answers concurrently, and there might be others lurking whose questions are answered before they pose theirs.
Clearly, companies would like to avoid duplicating their expensive problem-solving efforts. Once someone has answered a question, why do the work again? Unfortunately, solving this problem is far more difficult than one would hope, though vendors are making great inroads.

Information that's created with lots of structure, as product documentation or expert-system rule bases, is expensive to generate and becomes obsolete too quickly. Besides, most documentation pertains to a single product, not the interaction between the many combinations of products that lead to today's problems. Predicting which combinations a system needs to cover a priori is all but impossible.

Another major barrier to processing relevant information collected to a higher, more useful level is that it's generally too messy for automated systems to handle. Agents don't always record incidents, and when they do, the descriptions aren't consistent. Yet it's the raw, immediate material that usually contains the hottest, most useful information.

Today, most companies use databases and text-retrieval systems for customer support, but even the best of these systems don't have good enough precision and recall\(^4\) -- the key measures of a search system -- to be effective aids. It simply takes too long to get to the relevant solution description.

Re-using knowledge

How much -- and when -- should one process information so that it is easily and accurately retrieved? Text-retrieval systems create inverted-list indexes, which are relatively easy to build but don't add enough value to the underlying information. Many early expert systems tackled customer-service applications. But the cost and delay of knowledge engineering, then validating, knowledge bases in problem domains that were increasingly dynamic often stalled these projects.

There are two more promising options. Each has a different twist on how and when it improves the structure of a body of information.

The first approach is to harvest information from ordinary event records automatically and infer relationships from them, as well. That's what Inference Corp.'s CBR2 (the second generation of its case-based reasoning tool) does. It requires experts to map the domain for the system first, performing a knowledge-engineering task similar to what expert systems require. But once the system is in use, it can have spectacular results. Inference, one of the founders of the US AI market, has undergone deep transformations. We will cover it and CBR2 in greater depth next month. (For more on Inference and case-based reasoning, see Release 1.0, 1-92.)

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4 Precision is a measure of search efficiency. It answers the question, "What percentage of all the documents I got were relevant?" Recall is a measure of search completeness. It answers the question, "What percentage of all the existing relevant documents did I get?"
The other approach is to enhance information as it is being typed in, which is what Primus Communications does.

**PRIMUS: SYMBOLS THAT SERVE**

Instead of separating the tasks of solving problems and creating knowledge bases, or relying on super-powerful software to make sense of poorly formed raw inputs, why not use the problem-solving process itself to improve, capture and share the solutions? That’s Primus’ principal premise. It also defines Primus’ market: complex problem domains that require technically astute agents. This is not a system that you want $5-an-hour call-center agents with a 65 percent attrition rate to use.

The principal benefit of using Primus’ SolutionBuilder is saving the expensive tech-support agents’ time. One company reduced its average call time by 53 percent using SolutionBuilder; another raised its first-call closure rate from 20 to 80 percent.

SolutionBuilder works by separating the significant elements of a solution so that they can be retrieved, combined and re-used easily. The system has symbols that represent facts, symptoms, goals, changes, causes and fixes. The fact that a caller is using Windows 95 and NetWare 3.11 is easy to note and view on-screen.
The process gets trickier when agents describe symptoms, because there are many ways to describe the same problem -- or even misspell it. A spell-checker and synonym dictionary help ensure agents enter information into SolutionBuilder consistently. The system has tools for refining searches and linking to support documents outside the system (including on the Web). The system doesn’t do document retrieval or call management; companies link to Vantive and others for those functions.

Unlike text-retrieval systems, whose most granular unit is the document, SolutionBuilder’s basic unit is the statement. A statement describes a single aspect of the problem or solution. The system uses a natural-language processor to interpret statements that agents enter and compare them to statements in the system, so it can retrieve similar ones. Agents then refine the search by selecting statements that best fit the problem, and searching across the database (e.g., "What other symptoms could this problem cause?").

By separating the elements of a solution, marking them clearly and keeping track of their interactions, SolutionBuilder makes solving problems much crisper than struggling with text-retrieval systems and reading through piles of irrelevant tech notes.

One of Primus’ major customers is the Softbank Services Group (SSG), which uses SolutionBuilder along with help-desk software from Astea. SSG was a major player in the launch of Windows 95; it uses SolutionBuilder to do tech support for ten of its top technology clients.

Symbolic roots

Primus’ other product, SolutionPublisher, dynamically renders the important elements of the SolutionBuilder interface as Web documents, making the system accessible to anyone with a Web browser, from technicians at partner firms to customers. As is true with most high-end solutions, Primus’ systems aren’t cheap. The undiscounted price for SolutionBuilder is $3750 per workstation; the average price for typical installations is around $2000. SolutionPublisher costs $40,000 and up, depending on the number of concurrent users. The servers run on Windows NT and Sun Solaris. The SolutionBuilder client runs on Solaris and all flavors of Windows.

Primus is a relative newcomer to customer service. It was founded in 1987 as Symbollogic to create knowledge-based applications on PCs. In 1992, when customers asked the company to modify its program, Adept, to do better solution support, Symbollogic’s management saw the market opportunity, sold the Adept product and renamed the company Primus. It now has 75 employees and is privately held, with about $20 million in private and venture funding, most recently from Oak Investment Partners and Norwest Venture Capital.

Primus has pioneered the term solution-centered support and has been successful in attracting other companies in the field to rally around the term. The main rallying point is the Customer Support Consortium, which we describe next, and which Primus founded, manages and helps fund.

5 SSG is a major call-center bureau. It was formerly UCA&L, the merger of Upgrade Corp. of America with Alexander and Lord.

Release 1.0 25 September 1996
Zoe is in her hotel room, trying to connect to her ISP to collect the 200-odd e-mail messages she has probably received during her day off-line, consulting for a client. Something's wrong, though: The connection is flaky. One minute it sounds as if the modems are happily shaking hands; the next minute her system has hung up. The few times it does seem to connect, it tries to log in and the ISP refuses her service, offering an indecipherable error message. This is no fun.

There are many possibilities. The line may be dropping because the DSP-based modem in her laptop isn't compatible with the software she's using with it, or with the ISP's modems -- or maybe the software is simply set to drop the line too quickly. It could be due to the hotel's phone line. Maybe the enhanced bookmarking software she loaded yesterday scrambled her laptop's network login settings.

It turns out to be something unexpected: The hotel PBX distorts her modem's carrier signal, making it impossible for her to get a good connection at 28.8 kbps until she finds a line that does not go through the PBX. For some unknown reason, the modems didn't negotiate down to a more robust connection speed. That may remain a mystery forever.

Who is responsible for helping Zoe out of this mess: the online service, the phone company, or the companies that made the modem, the laptop, the PBX, the connectivity software or the OS? The hotel? How do you think Zoe's tech-support staff feels about having to solve it? Or her accounting department, which will process a hotel bill with $20 in phone charges, in $0.50 increments for each attempt?

**The Customer Support Consortium: problem fixers**

Tapping into a broad concern about the increasing cost and complexity of problem-solving, Primus launched the Customer Support Consortium (CSC) in 1992. The Consortium's initial objective was to have a few select companies write a spec for the ideal product to help resolve complex problems and share the solutions.

Two years later, the member companies realized that a technology solution was insufficient. In a fit of pragmatism, they changed the Consortium's charter to allow for a variety of approaches, within the group's guidelines, and invited other companies to join. Now the CSC has over 60 member companies that collaborate on multiple interesting projects that range from business strategies to technical standards.

The Consortium has attracted different groups. Most member companies are traditional technology suppliers, such as IBM, Dell, Microsoft, Novell and Compaq. Some are service bureaus (e.g., GE Capital and the Softbank Services Group) or private companies with internal IT help-desk operations. Greg Oxton, the Consortium's executive director, would like to attract more customer-service consultants.
Primus is still the Consortium's major funder (it supplies approximately half of the annual budget), a situation that doesn't seem to hamper the group's work. Note that the Consortium includes companies that potentially compete with Primus, such as Inference. Oxton is pursuing a new funding model that will provide balanced sponsorship from the support community and allay fears of bias.

Goals and structure

The Consortium has set far-reaching goals for itself, building on the idea of solution-centered support. The goals range from making it easier for companies to share information in a more sophisticated way to exploring new economic models for support. The Consortium has formed four working groups:

- **Solution-centered processes**, which explores new ways to manage analysts and improve internal business processes;
- **Knowledge management**, which researches better ways to capture and structure knowledge;
- **Solution exchange standards**, which develops specifications to allow support organizations to share call and solution data across vendor platforms; and
- **Strategic issues in multi-vendor support**, which addresses how companies collaborate through the electronic exchange of solutions and if necessary analyst interaction.

The groups meet quarterly, with one annual meeting of the whole Consortium in the spring. Here's more detail on the latter two working groups, which are particularly interesting.

Exchange standards

The Exchange Standards Working Group has a concrete, practical, immediate goal: to get the Solution Exchange Standard (SES) implemented in the support community. The standard defines common formats and data definitions for the exchange of incident and problem-resolution information. The spec must be simple enough that it can be implemented quickly and doesn't favor any particular vendor, but sophisticated enough that it transmits information at a useful level of abstraction.

The working group has been working for the past 18 months on the data definitions and semantics for the standard. Recently the group agreed to use the Digital Document Transfer Protocol (DDTP), an SGML-based, Internet-friendly protocol that defines multi-part metadata structures specific to the interchange of solutions. The SES specification document explains it pretty well: "DDTP is based on SGML and is meant to work with and complement the Hypertext Markup Language...and the Hypertext Transfer Protocol (HTTP). A document may be transformed for presentation into HTML, and may be transported using HTTP."

The working group had been searching for a transport mechanism for some time. When Scopus joined the Consortium, it offered its technology, DDTP, which fit the bill. It is an open, extensible, vendor-neutral protocol. Scopus has donated DDTP to the CSC.
Net.Humor

True story from a Novell NetWare SysOp:

Caller:  "Hello, is this Tech Support?"
Tech Rep:  "Yes, it is. How may I help you?"
Caller:  "The cup holder on my PC is broken and I am within my war-
ranty period. How do I go about getting that fixed?"
Tech Rep:  "I'm sorry, but did you say a cup holder?"
Caller:  "Yes, it's attached to the front of my computer."
Tech Rep:  "Please excuse me if I seem a bit stumped, it's because I am. Did you receive this as part of a promotional, at a trade show? How did you get this cup holder? Does it have any trademark on it?"
Caller:  "It came with my computer, I don't know anything about a promotional. It just has '4X' on it."

At this point the Tech Rep had to mute the caller, because he could not stand it. The caller had been using the load drawer of the CD-ROM drive as a cup holder and snapped it off the drive.

Strategic issues

The Strategic Issues working group is developing business frameworks for collaboration among companies in the support community, though that definition is a bit more limiting than the total opportunity for this model. Member companies feel the concepts of the model are as applicable internally as they are outside, between vendors, partners and key customers.

Collaborating with your competitors is risky. It requires well thought-out rules of conduct. Companies have to be able to define how much access to information or analysts other companies can have. To make the system more robust, the working group is developing a hierarchy of trust relationships, where each level has different expectations and privileges. The structure is relatively obvious: Strategic-tier companies would have access to far more information than is available to the public. In many cases, callers wouldn't be able to tell the difference between support staff from companies with Strategic relationships. Selective-tier companies would have less access than Strategic ones, but still more than Basic-tier companies, which would access only publicly disclosed information.

What is less obvious is how such structures affect economic relationships. For example, any company might be able to establish a Basic relationship, but it might have to pay to move to a more trusted relationship. Or it might be handled the way Internet Service Providers handle peering arrangements (ISPs with relatively equal network presence and traffic swap packets, instead of counting them all and billing each other; see Release 1.0, 12-95). There may be other, organic models that work. Oxton, the executive
director, sees this field as a great opportunity to explore the kinds of economic ecosystems described in Jim Moore’s *The Death of Competition*.

Other groups

The Consortium has links to several other associations with complementary missions, most notably the Help Desk Institute (HDI) and the Desktop Management Task Force (DMTF; see *Release 1.0*, 7-95). The HDI offers training, conferences and newsletters to its member companies.

The DMTF’s goal is to help IT manage desktops and servers more effectively. It is working on a standard similar to the CSC’s solution-exchange standard, with emphasis on change management, problem management, remote information collection. The DMTF and the CSC have agreed to merge their work into a common standard. Intel plays a role in DMTF similar to Primus’ role in CSC.

Given the complexity of running associations and managing the politics between companies, it is refreshing to see steady progress within and among these organizations. Technology buyers should benefit increasingly from this work over time.

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**COMING SOON**

- Agents, personalization and advertising.
- Collaboration and conversation tools.
- Networked object graphics.
- Navigation.
- The analog world.
- And much more... (If you know of any good examples of the categories listed above, please let us know.)
RESOURCES & PHONE NUMBERS

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Customer Support Consortium (www.customersupport.org)

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23

Release 1.0 Calendar

1996

October 4-6 @2nd Annual Digital Storytelling Festival - Crested Butte, CO. With Firesign Theater's Peter Bergan, Abbe Don and the ever-funny Tom Rielly. Call Denise Aungst, (415) 285-8955; dabha@aol.com; www.dstory.com/index.html.

October 5-9 Software Publishers Association 12th Annual Conference - Atlanta. Organized by the SPA. Call (212) 452-1600 ext. 11.


October 19-22 @Agenda '97 - Scottsdale, AZ. Tenth Year Anniversary. Sponsored by InfoWorld Conference and Media Group. Call (800) 633-4312; fax (415) 286-2750; www.conferences.infoworld.com.


October 21-24 Ninth Annual Microprocessor Forum - San Jose, CA. Sponsored by Micro-Design Resources. How small is small? How fast is fast? Michael Slater and his associates reveal all. Call (800) 527-0288; fax (707) 824-4001; mpf@mdr.zd.com; www.chipanalyst.com.


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* Events Esther plans to attend.
@ Events Jerry plans to attend.

Lack of a symbol is no indication of lack of merit. The full, current calendar is available on our Website (www.edventure.com). Please let us know about other events we should include. -- Susanna Stromberg

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