

C O N T A C T C E N T E R S

An effective contact center design can reduce the overall service time and the number of end points with which a customer communicates.

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Multichannel Customer Contact Management

Contact center infrastructures use various communications and application technologies, including *customer contact management (CCM)* and *customer relationship management (CRM)* technologies. In a contact center enterprise, the CCM domain prioritizes and routes customer contacts. Continued development of consumer communications devices, carrier services, and supporting enterprise systems has put pressure on customer service organizations and product vendors to converge CCM on all types of contact media. Leading contact center infrastructure vendors have acquired companies and integrated stand-alone communications capabilities to support development of full product suites that manage all synchronous and asynchronous customer communications.

Further, in 2001, consulting groups predicted the creation of a universal queue for unified handling of customer contacts. For example, the Gartner Group predicted that by 2003, sales of universal queue servers with comparable functions would supplant conventional automatic call distributors (ACD) and computer telephony integration (CTI) servers (B. Elliot, *Universal Queuing: Successor to the ACD and CTI Markets*, Gartner Group, 30 January 2001). Contrary to

such projections, in 2002 AMR Research stated that 72 percent of companies didn't use a universal queue (A. Bednarz, "Revamped Call Centers Reduce Operating Costs," *Network World*, 9 Sept. 2002, <http://www.nwfusion.com/news/2002/0909specialfocus.html>) and that 90 percent of all contact center communication would be via phone and e-mail for at least the next two years (T. Kaneshige, "Greasing the Contact Center Machine," *ECT News Network*, 18 Nov. 2002). A Vanguard Communications study revealed that many organizations claiming to operate multimedia contact centers weren't using a universal queue (L. Bocklund, "The Multimedia Contact Center: Everybody's Doing It... Or Are They?" *ICCM Weekly*, editorial, 21 Nov. 2002; http://www.vanguard.net/DocLib_Docs/Multimedia_Contact_Center_11-21-02.pdf). These studies raise the following questions:

- Was the market overly ambitious in forecasting the use of the universal queue-enabled contact centers?
- Will organizations function effectively without integrating multiple contact media?
- How viable is a contact manager (CM) for organizations needing convergence?

Several challenges face multimedia, or multichannel, customer contact management design and deployment efforts, including industry agreement on the role of the CM, the key convergence tech-

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Glossary

Terms used in this article have various meanings in the industry; we define our use of them here.

- **Channel:** A medium of communication between two or more parties (human or machine) via a combination of networks, protocols, and devices or applications, such as phone, e-mail, or Web browsing (not to be confused with a logical or physical telecommunications channel).
- **Consolidated queue:** A virtual collection of midpoint resource queues that the CM monitors and manages. The term also refers to a CSR-perceived virtual queue that delivers contacts on various communication media.
- **Contact:** A delimited period of synchronous communication with a customer (usually half-duplex), such as a phone call, or simplex communication to or from a customer, such as an e-mail.
- **Contact manager (CM):** A component or system of components in a contact center that manages the inbound and outbound contacts on all channels.
- **Customer:** A consumer, supplier, partner, or employee that communicates with a contact center.
- **Customer contact management (CCM):** An implementation of a business strategy to administer customer communication on all channels. The term also refers to the information technology systems used to implement customer communication according to a CCM strategy.
- **Customer relationship management (CRM):** An implementation of a business strategy to capture, track, and leverage customer communications records and account information to maximize sales or optimize service; or, the IT systems used to capture, track, and leverage customer information records according to a CRM strategy.
- **Customer service representative (CSR):** A human who provides service to customers.
- **Endpoint resource:** A CSR or machine (such as a server) that communicates with a customer on a given channel.
- **Midpoint resource:** One or more components or servers in a contact center that facilitate communication between customers and endpoint resources.
- **Multimedia contact center:** A contact center that enables communication on multiple channels. Also called a multichannel contact center.
- **Routing:** The act of directing a contact to a destination, whether to a queuing mechanism or to an endpoint resource.

nology. (See the “Glossary” sidebar for definitions of this and other terms.) By clarifying CM concepts and terminology, we hope to create a common basis for collaboration among researchers, contact center product manufacturers, and customer service organizations in developing multichannel customer contact management designs.

WHAT IS A CONTACT MANAGER?

Historically, call center management has focused on phone calls to and from the public switched telephone network (PSTN). The ACD was the workhorse for routing and queuing calls and for working with interactive voice response (IVR), CTI servers, and predictive dialer components. To interconnect siloed, geographically distributed contact centers in large virtual contact centers, infrastructure designers used centralized call routers to interface with carrier networks and proactively negotiate each call's destination. By monitoring ACDs and issuing instructions to them, a call router initially leveraged an ACD's local routing and queuing functions. Other telephony systems, such as IVRs, CTI servers, and predictive dialing components, were integrated in the same manner.

In today's multimedia world, customer contact can take place by phone, e-mail, fax, voicemail, text-chat, and more. These various types of communication need a centralized component—a *contact manager*—to govern inbound and outbound contacts in the same way that call routers govern phone calls. The disparity of communications channels makes the CM task complex.

Several factors can increase the time and cost of servicing a contact, such as misrouting and rerouting contacts, the number of endpoint resources used in succession or used simultaneously, and any repeated questions or data entry resulting when a contact passes from end point to end point. Moreover, the customer experience (affected by performance, transaction workflow, transaction results, and so on) can vary dramatically from one channel to another.

WHY USE A CM?

A CM can provide consistent management, scalability, and extensibility to a large contact center operation spanning geographic locations or servicing multiple channels. Figure 1 shows how a contact manager improves multichannel communication: Figure 1a shows a communications center without a CM, and Figure 1b shows a center with a CM.

Multichannel contact management without a contact manager

- develops separate rules for each channel,
- involves complicated correlation of multiple logs,
- forces some customers to go through multiple contacts to accomplish a task,

- saturates some channels while others might be idle,
- relinquishes channel selection to the customer,
- might result in idle single-channel CSR groups, and
- locks contacts to a single channel.

In contrast, multichannel contact management with a contact manager enables rule development once for all channels, accurately reports activity on all channels, gives expedited service to customers, facilitates equal load sharing across channels, proactively directs contacts to the best destinations, keeps the CSR workforce busy at nonpeak times, and uses multiple channels as needed.

A CM leverages information sources, enables real-time visualization, and provides end-to-end reporting. It can access information sources to learn about customers, business rules, and the load on midpoint and endpoint resources. Examples of midpoint resources are e-mail servers, Web servers, and ACDs. Endpoint resources include IVR, Web application servers, and Wireless Application Protocol (WAP) servers. With such information, the CM can optimally prioritize and route contacts (collectively, these functions are sometimes called *intelligent routing*), significantly reducing the overall service time and number of end points with which a customer communicates.

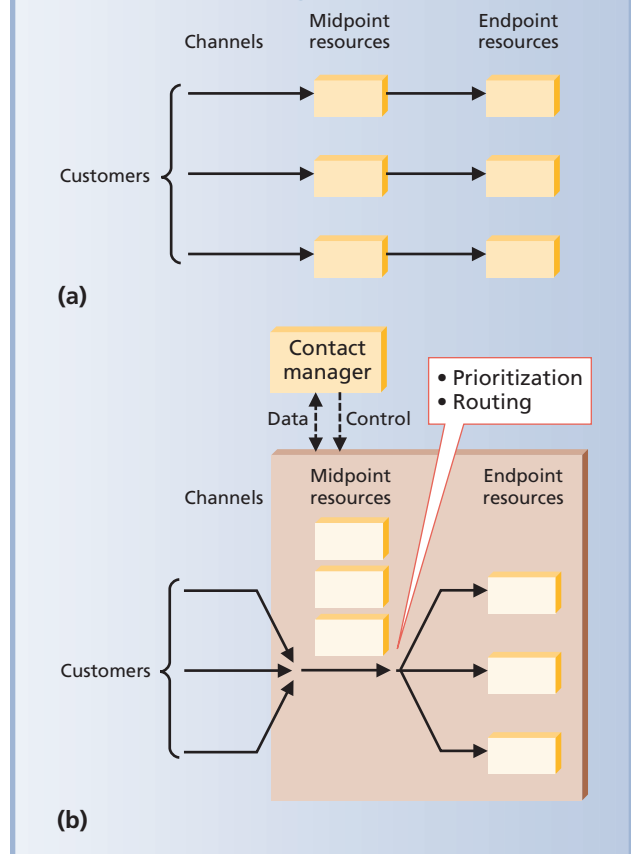
Prioritization includes channel consideration, customer class, and service type requested. *Routing* includes consideration of customer service representative (CSR) skills, self-service applications and transactions, resource availability, customer profiles, and accumulated understanding of a contact as it navigates the enterprise service space.

CMs use information sources to enable real-time visualization of contact center activity, allowing customer service organizations to respond to spikes or system failures by adjusting business rules or resource configurations. CMs enable end-to-end reporting of contact centers' native business intelligence. Centrally tracking contacts creates an end-to-end picture of all customer activity regardless of channel, which is more accurate and efficient than the conventional approach of attempting to artificially correlate a telecommunications circuit report with multiple channel logs. It also overcomes the multiple logging that occurs when a contact navigates from end point to end point or when multiple channels are used simultaneously to satisfy a single contact.

By elevating monitoring and management control above midpoint and endpoint resources, CMs also let the contact center scale to new contact types. A centralized CM system reuses routing business logic rather than re-creating it on new midpoint and endpoint resources, thus minimizing development and maintenance efforts and associated costs.

In addition, an open CM platform lets infrastructure designers add innovative solutions that enhance centralized routing for all contact types, such as customer profile lookups and integration with natural language contact-routing systems.

Figure 1. Multichannel contact center infrastructure without (a) and with (b) a contact manager (CM).



A CM can extend contact center resources beyond conventional tasks. For example, a single CSR could successively receive contacts on various channels. Although the industry calls this extension of capabilities the universal queue (Elliot), because the CSR appears to be receiving different types of contacts via the same queuing mechanism, we call it a *consolidated queue* (see the “Glossary” sidebar). Furthermore, a CM could unify other corporate workflow processes, such as leveraging contact center staff at nonpeak periods to assist with internal business processing.

IMPLEMENTING A CM

Implementing a CM involves converging and integrating resources and services. The “Contact Manager Structure” sidebar describes the major CM components enabling this integration.

An open CM architecture would include an open application programming interface (API) so infrastructure designers could add innovative capabilities or extensions,

Contact Manager Structure

An ideal contact manager (CM) incorporates all enterprise midpoint resources, endpoint resources, and customer relationship management (CRM) back-end services. A CM's major components—decision engine, middleware, and database—make it an all-governing, enterprise-wide controller. Figure A shows the CM structure.

The *decision engine* uses business rules to perform routing calculations based on contact and enterprise intelligence information. Information about a contact can be internal (the subject line in an e-mail, for example) or from an external source (such as automatic number identification information obtained through a telecommunications carrier). Endpoint resources can obtain external information via CRM information retrieval (including offline information extraction) or online language processing of the contact's audio or text. A CM can therefore integrate systems from various disciplines.

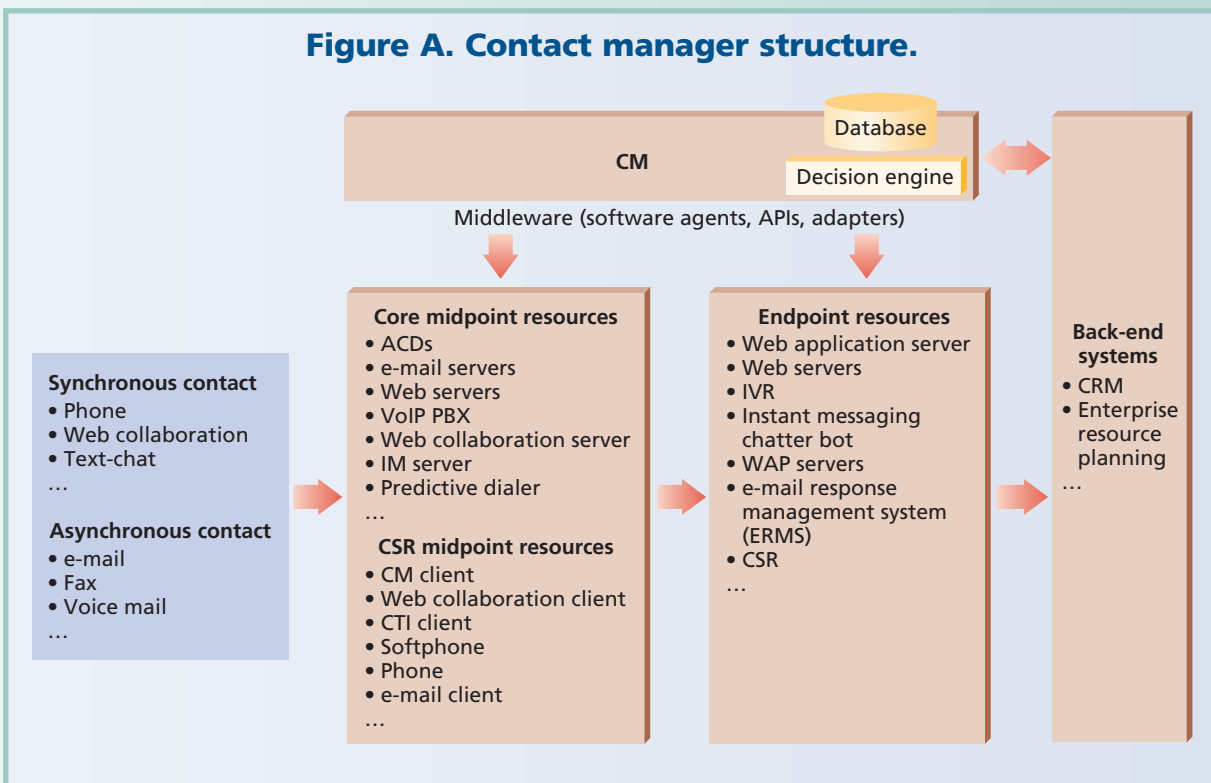
Enterprise intelligence information is obtained by middleware systems and includes the number of customer service representatives available in a given skill group, a list of CSRs ready to receive contacts, and the utilization on self-serve systems. Prescribed business rules then denote the procedures used to compute the

best routing decision based on available information.

Middleware provides a real-time interface with midpoint and endpoint resources. Designers implement middleware using software agents that periodically poll midpoint and endpoint resources locally (to avoid flooding the wide area network) and propagate intelligence up to the CM. The same middleware enables control of the resources. Hence, when a contact arrives at a midpoint resource, the middleware propagates a message to the CM, at which point start-to-finish management of the contact begins.

The *database* stores information about active contacts and enterprise intelligence information. The CM accurately tracks and logs contact activity in a historical database for later analysis. With its bird's-eye view, the CM can log a single contact record even when several channels are used simultaneously or in succession (for example, a phone call and Web collaboration or a switch from text-chat to phone call). The CM uses a combination of static information (such as CSR skills) and dynamic information (the availability of CSRs and the available ports on an endpoint resource, for example) stored in the database to construct up-to-date snapshots of the entire contact center operation.

Figure A. Contact manager structure.



such as CSR productivity tools. Depending on the implementation, CSR desktop applications are either native to a midpoint or endpoint resource, or packaged with the CM.

CSRs need information about the contacts pushed to their station, regardless of the contact channel. For example, CTI server middleware typically displays external information about a phone contact. CSRs also need to execute actions to service given contacts. During a Web collaboration session, for example, a CSR must transfer a contact, push a Web page, drop a caller, or complete a customer's log. An effective multimedia contact center CSR desktop application would consolidate screen-pop information and control functions for all channels in one client. Regardless of the CSR desktop application solution, a CM could implement a consolidated queue by controlling the routing on midpoint and endpoint resources.

Because CMs are tightly integrated with the enterprise, a CM implementation for a large, critical contact center would require significant redundancy. In case of failure, hot stand-by spares would take over for primary servers, or clustered servers would assume peer workloads. Communications links and systems should also be redundant.

CHALLENGES

Contact centers have made little progress toward CM implementations that truly replace comparable ACD and CTI server functions (Bocklund), leading some to question these implementations' viability for multimedia contact centers. Others have claimed that the need for CM consolidated queues is based on the deliberation of "vendors, consultants, writers, and speakers in the industry," rather than a study of operations (Bocklund). Providing additional channels is an appealing concept, and thereby fuels the development of unifying initiatives and encourages competitive contact centers to acquire converged, multichannel solutions. However, several challenges remain before contact centers can realize CM technology's full potential.

Gain consensus

The industry must reach agreement on the CM's role in multimedia contact centers and develop related standards. The open literature confuses the term "universal queue," describing it as both a new type of channel, and an implementation of a consolidated queue using a CM and a set of single channel systems. (R. Breslauer, "Beware the Vacuum: E-mail Management in the Age of Multichannel Customer Service," *Customer Interaction Solutions*, Feb. 2003; <http://www.tmcnet.com/cis/0203/0203ecrm.htm>). Consistent terminology to describe a CM's functions is essential to evaluating whether a given vendor implementation satisfies specific requirements.

The industry must develop open standards for CM com-

ponents. Because no single company offers all CM components, vendors use a network of partnerships and original equipment manufacturer (OEM) relationships to offer complete contact center product suites. This amalgamation results in complex integration of a CM with a disparity of existing enterprise ACDs and servers. In addition, a given CM's middleware offering should include adapters for a

large set of midpoint and endpoint resources, CRM applications and databases, and CSR desktop applications. A contact center can't build on its investment in midpoint and endpoint resources without such adapters, but finding a vendor with

all the components these systems need is difficult. Recent efforts to add software developer kits to CM systems will simplify adapter and extension development; however, maximizing CMs' potential capability will require cross-vendor interoperability.

Open standards should let the middleware layer function as a backplane through which a CM system, CRM system, and midpoint and endpoint resources communicate. In addition, open standards should enable CM-to-CM communication and ensure that external information about a contact passes from system to system during the contact's life.

Prepare the target infrastructure for CM technology

Contact centers contemplating implementation of a CM must first model the customer base to identify ways to improve the contact center infrastructure.

To ensure consistent customer service, a contact center should integrate back-end components before implementing a CM. The most basic multimedia contact centers use segregated CSR groups to handle e-mail and phone calls. However, a customer could contact on a first channel (e-mail, for example), and then within an hour (or simultaneously) contact on a second channel (such as a phone). To ensure consistent responses, the CSRs in both groups must work from common knowledge bases, and the systems they use must have equal access to data, with the same latency.

Process and culture can significantly affect channel unification. Not all customer service organizations are structured or have a business process to support multiple channels through a CM implementation. Before establishing a contact center, an organization should ensure that all midpoint and endpoint resources and back-end customer service systems (such as a CRM database) operate under the purview of a customer service executive or manager. An organization that doesn't use this management structure will need some organizational or process reengineering.

CM is further complicated when midpoint and endpoint resources cross charter or organizational boundaries, such

The industry must develop open standards for CM components.

as e-mail servers used for both customer service and corporate communications. This boundary crossing puts the integration effort under the purview of the centralized enterprise IT department, although the customer service organization drives the business requirements.

An organization must also be prepared to apply engineering discipline to CM deployment. From a systems engineering perspective, an organization should introduce a CM in phases. Assuming completion of the prerequisite back-end integration and organizational reengineering, CM deployment should begin with a pilot implementation. The pilot would focus on a subset of contacts on a given channel (for example, a subset of phone calls) and would expand later to all contacts—inbound and outbound—within the channel. A follow-on phase would add a second channel, and so on. Each phase would ensue according to the success and lessons learned in prior phases. The organization should develop a consolidated queuing strategy at the onset and implement it as a last step.

Deal with open CM design issues

CM implementations can only be effective if organizations address open CM system design issues.

Integrating a CM into a multimedia contact center requires significant investment in the deployment and maintenance of CM components and the ongoing development and maintenance of business rules. In some cases, analysis might show that managing channels in a segregated manner would be less expensive while providing adequate customer experience, which would argue against implementing a CM.

MITRE'S Contact Center of the Future (CCOF) Laboratory experience has revealed potential version interoperability problems—for example, adding a server might necessitate upgrading the CM, which might in turn require upgrading midpoint and endpoint resources. These resource upgrades might or might not be available. CM middleware must be designed to minimize such interoperability problems so contact centers can successfully incorporate new capabilities.

Although a contact center suite vendor might provide basic out-of-the-box adapters (between the CM and a specific set of midpoint and endpoint resources, a CRM system, and CSR desktop applications), configuring them can require considerable effort. When a vendor doesn't have a needed adapter, enterprises must custom-develop it—and periodically maintain the custom adapter code to ensure interoperability with commercial product upgrades. Although not reflected in all implementations, business rules and resource descriptions (for example, skill infor-

mation) should reside in one place, not at both the CM and mediating resources. The development of CM standards will likely improve version compatibility and minimize redundant data.

Innovatively integrating the CM with various technologies enhances CCM. However, such innovation depends on collaboration across vendor specialties. Furthermore, commercial implementations appear nearsighted, focusing on the push of information to and from CSRs. CM designs must graduate beyond basic routing functions native to conventional call routers. As new automation technologies emerge, such as dialog man-

agers, commercially viable instant messaging chatterbots (programs that attempt to simulate typed conversation), and multilingual machine translation, more thought is necessary into how these and other technologies will impact the CM role.

Much like dialog managers capture and reuse discourse, a CM should accumulate contact activity in real time, and should be able to leverage this data as the contact moves between resources. This capability will require each automated endpoint resource to log activity to a central database or peer system. CM design becomes more complex when multiple networks (that is, multiple organizations) are involved. The contact center vendor community must work together to evolve the multichannel CM role, the associated design, and the standards to foster innovative integration.

For economic reasons, CM design must also support outsourcing. Unfortunately, outsourcing exacerbates the already-difficult problem of providing multichannel contact management because

- transitioning a contact from one enterprise to another is a complex process, and
- relinquishing contact management functions to a third party with multiple clients can compromise security.

It's likely that the two enterprises (outsourcer and insourcer) could use entirely different CM implementations, midpoint resources, and endpoint resources. Because such systems must exchange external information as each contact navigates the adjacent enterprises, information exchange standards are essential for cost-effective development and maintenance.

In addition, a given CM design must clearly prove its return on investment. Before deploying a design, an organization should address the following questions:

- Does the CM strategy offer the organization a clear benefit?

CM implementations can only be effective if organizations address open CM system design issues.

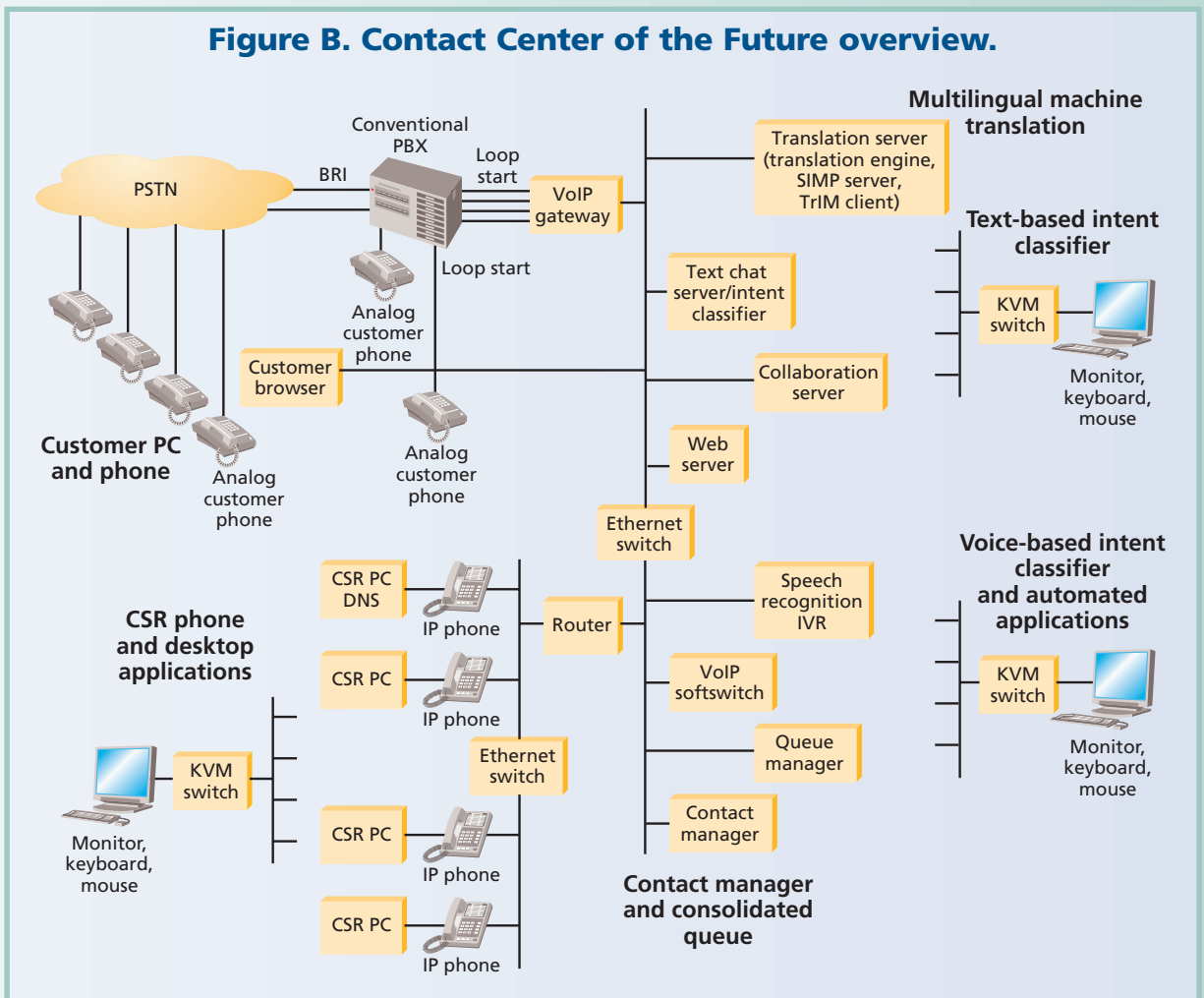
MITRE's Contact Center of the Future Laboratory

MITRE is a not-for-profit organization chartered to work in the public interest. As a national resource, MITRE addresses sponsors' critical needs in systems engineering, information technology, operational concepts, and enterprise modernization. To support research in the areas discussed here, MITRE sponsored the creation of a Contact Center of the Future (CCOF) Laboratory.

As Figure B shows, the CCOF Laboratory consists of commercial hardware (phone sets, PBX, servers, and so on) and commercial software components (contact and

queue manager, a Web server, and a speech-recognition server, for example) integrated with MITRE-developed capabilities (such as multilingual machine translation, CSR knowledge and question answering tools, text-based intent classification, and speech-recognition grammars). Through a consolidated queue and using automated intent classification, the laboratory can route disparate channels (voice, multilingual Web chat, and e-mail) to an appropriate CSR or automated application. The laboratory has conducted many multichannel, agency-specific demonstrations.

Figure B. Contact Center of the Future overview.



- How practical are a CM's seemingly endless features?

For example, a study could test the hypothesis that consolidated queues are better for contact centers with busi-

ness process-based skill groups than for those that segregate skill groups on business skill and channel, or that consolidated queues increase response consistency. Studies of multichannel queuing models could help determine opti-

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mal models. Furthermore, research could help identify solutions for managing contacts as they traverse the enterprise service space. In addition, industry consortiums should combine emerging technology and real contact center needs to determine the evolving functions and designs of multichannel CM-based solutions.

Despite the CCM industry's enthusiasm about the merging of channels and the ability to implement consolidated queues, multichannel CM implementation isn't widely accepted. Significant obstacles still hinder the development of a CM that can control multiple channels. Once these obstacles have been overcome, CM systems will likely surge as a critical enterprise resource. ■

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