

Smart Bots: Solutions for the Networked Economy

White Paper

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1. Introduction

During the last decade we have witnessed a dramatic shift from a local economy, delimited by geographical boundaries, to a *networked economy*, in which geographical location has virtually no meaning. Internet-based communication technologies have made it possible to establish a global presence at very low cost. Furthermore, the Internet has virtually brought about an economic revolution, enabling brand new companies to establish themselves as world leaders by adopting new technologies with an extremely short time-to-market.

The shift to a networked economy has been highly beneficial for customers, who have turned to online shopping in great numbers, far exceeding even the most audacious forecasts of just a few years ago. There are many reasons for the success of online shopping, but arguably the most important is the instant access afforded by the Web. In the case of online stores, instant access means that customers can sample and compare a phenomenally broad range of products or services that would be impossible to sample through traditional means. It also means that customers can select their vendor of choice with little regard for geographical constraints.

The shift in customer preference from traditional to online shopping has been very advantageous for a few pioneering companies that positioned themselves as leaders in e-commerce and other Internet-based activities. However, the overall benefits for most companies have not been as clear cut as they have been for customers. Whereas a few years ago simply having a Web presence was a competitive advantage, today it has become a bare necessity. Furthermore, the rate at which new customers shift to online shopping, while increasing rapidly, is bound to saturate: Forrester Research predicts that the number and spending of online shoppers will plateau in 2004. This means that competing for new customers is simply not enough any more: companies that wish to achieve or maintain a competitive edge must find new ways to satisfy and retain their customers. How can companies benefit from their online presence? How can they attract new online customers and turn them into loyal customers? How can they gain the edge they need to stay ahead of the competition in the networked economy?

At Artificial Life, Inc., we believe that two crucial factors are often overlooked in the race to online presence: (1) many of the marketing, sales and customer relations techniques that work for physical store fronts do not work for online businesses; (2) the Internet offers entirely new ways of conducting online business that are impossible to use in real businesses.

1.1 The limitations of online business

In most companies, the task of creating and maintaining an online presence falls within the purview of the marketing department. What many marketing departments sometimes fail to understand is that their battle-proven sales, marketing and customer relationship techniques may not be suited for translation into the online domain.

One pervasive example of this problem is found in the design of Web sites, too many of which are little more than electronic copies of printed catalogs (e.g., “brochureware”). A printed catalog offers many advantages over electronic catalogs. For instance, suppose you are looking to buy a shirt. With a regular catalog you don’t have to worry about powering up a computer and connecting to the Internet. You can leaf through the pages, fold pages in half to compare different shirts, and move back-and-forth quickly and as often as you like. You can easily carry a catalog around, and if you should accidentally drop it, you would still have the money you need to buy your shirts.

There are also many *psychological* differences between physical and online shopping that are often overlooked. Consider the following simple example: a customer visiting a store in person may have spent half an hour driving there. If, upon arriving at the store, all the sales people are busy, it is extremely unlikely that the customer will immediately leave. On the other hand, a customer visiting a Web site that is slow because of a poor connection or because the site has too many images will leave that site and go somewhere else almost immediately.

1.2 The unique advantages of online business

The previous section highlighted just a few of the problems in trying to apply traditional techniques in an online setting. What is even more striking is how few people really understand the universe of possibilities that are opened up by an online presence. Some of the more obvious advantages that are unique to online business are quickly becoming widespread. One example is given by the price-comparison spiders and bots that allow online customers to find the lowest price on any item. Compared to traditional shopping, Internet shopping is like having thousands of stores within a shopping mall, with a Star Trek transporter that can take you to any store in seconds. There are other obvious examples of functions that are possible only in an online setting, such as being able to search an entire Web site using keywords.

Beyond these simple examples, there are some truly revolutionary ways of taking advantage of the Internet for business. Those who have had the brilliance (or luck) to find these ways have been extremely successful. One example is auction-based shopping as first introduced by E-Bay. Although the original idea was inspired by “physical” flea markets, the Internet is a medium that makes it possible to hold auctions anywhere, anytime. As another example, Artificial Life, Inc., in collaboration with the Swiss Bon Appétit Group, is launching the Net-tissimo.com site, where customers can make purchases using various dynamic pricing models that could not be implemented through a traditional medium. The Net-tissimo.com site is described in Section 5.2.

A bit of reflection might lead you to conclude that almost every aspect of traditional commerce is revolutionized on the Internet. What is difficult is identifying new ideas and technologies that take advantage of the unique aspects of the online presence afforded by the Internet. At Artificial Life, we are developing *smart bot* solutions that can help companies to tap into the power of the Internet in novel and exciting ways.

What are smart bots? What kind of things can they do? How can they help companies with their online presence? The next section answers all these questions.

2. Smart bots for Internet applications

As discussed earlier, one of the keys to online success is to identify technologies that take full advantage of the unique characteristics of the Internet. Smart bots are part of a technology, pioneered at Artificial Life, Inc., that creates entirely new opportunities for online companies.

This section describes smart bots and explains how smart bots can be used to tap into the power of the Internet for sales, marketing and many other aspects of customer relationship management.

2.1 What are smart bots?

Smart bots are intelligent software products that integrate computer interaction and natural language understanding to bring a human-like presence to the points of contact between your company and its customers, partners, suppliers and employees.

Smart bots give you a unique competitive advantage in two important ways. First of all, we believe that the networked economy makes it possible to offer customers an experience unlike any experience they can have through traditional shopping. Rather than trying to mold online sales, marketing and support to match standard offline models, our smart bot solutions let you take full advantage of the opportunities offered by an online presence, as described below.

Second, our bot-based software solutions address all aspects of your networked connections to your customers, from marketing to sales and support. The integrated approach of our products, coupled with our experience in giving companies the full power of online presence, can give your company the competitive advantage that it needs to attract and retain customers in today's networked economy.

2.2 What can smart bots do?

Smart bots were designed explicitly for online, distributed functionality. At the core of Artificial Life's smart bots is our proprietary SmartEngine™, which combines natural language processing, artificial intelligence and other state-of-the-art computational technologies. Smart bots offer many advantages, including the following:

- **Smart bots know what you mean.** The use of natural language processing makes it possible for your customers to communicate with your company through the Internet as if they were communicating with people—something that so far has been largely missing from the Internet. Customers can contact you by e-mail, through the Web, or even by telephone, without having to learn how to navigate your site, which department to send mail to, or the list of keywords that work best with your search engine. Now all your customers have to do is ask, *in plain language*.

- **Smart bots are tireless workers.** They can help your customers 24 hours a day, every day of the year. Your customers will appreciate receiving a prompt, friendly response to their inquiries whenever they contact your company online.
- **Smart bots are friendly and cordial.** Remember back when a friendly sales person recognized you as you walked into the store? Using a smart bot solution, the same sales person can always be there to greet your customer, and it can recognize customers whether they contact your company via e-mail or the Web. The friendly sales person has become ubiquitous, helping your customer with marketing, sales, service and all other aspects of your customer's interaction with your company.
- **Smart bots are patient and polite.** They never get tired of answering the same customer questions, over and over again. They can remain calm and polite even in dealing with the most difficult customer. And they won't put your customers on hold. They can even react to the emotional content of the customer's conversation.
- **Smart bots are good conversationalists.** They can listen to your customers and remember everything that was said. They can direct the conversation so the customers will learn what you want them to learn. They can ask your customers questions and understand the answers.
- **Smart bots are great business advisors.** They can tell you many things about your customers. You'll be amazed how much information your customers leave behind when they engage in a conversation with a smart bot: information that you can use for highly accurate customer profiling, and to get a much better sense of the efficacy of your online presence. No other customer-tracking tool comes close to offering you the power of smart bots in understanding your customer.

2.3 Who needs smart bots?

A better question might be: who doesn't? You can use smart bots as stand-alone tools to answer e-mail, to guide your Web site visitors, to train your staff or your clients, to manage your portfolio, to make highly targeted sales pitches and to handle many other tasks required for a strong online presence.

But even the advantages of individual smart bots are eclipsed by the benefits of using a full suite of smart bots to coordinate all aspects of your online presence. Imagine the following scenario. Mr. Jones has recently purchased a printer from your Web site. A few hours after receiving the printer, Mr. Jones sends an e-mail message to your tech support address, complaining that he cannot get it to work. Within seconds, he receives a friendly, polite reply from a smart bot that knows who he is, what printer he purchased and when, and offers detailed technical support without having to ask for model numbers or other basic information. And a few weeks later, when the print cartridges for Mr. Jones' printer go on sale, he receives a personalized advertisement through e-mail or through the personal bot that resides in his computer.

This is but one example of what you can do with smart bots. There are many other ways in which smart bots can be used, as stand-alone tools or as integrated solutions for the networked economy.

2.4 Artificial Life's tools for the networked economy

Since its inception, Artificial Life, Inc. has taken a broad view toward all aspects of e-commerce, focusing on a core technology that can handle all tasks for the networked enterprise. Central to this approach has been the development of ALife-SmartEngine, Artificial Life's core technology. The following is a list of some of Artificial Life's products that take advantage of the SmartEngine core technology:

- ALife-WebGuide™, a friendly natural language bot that resides on your Web site to help visitors by processing and responding to questions using natural language.
- ALife-STAn™, a statistical text analyzer that extracts useful information from conversations between your customer and ALife-WebGuide or other ALife products.
- ALife-CallCenter™, a smart decision-making tool that allows seamless switching between your ALife-WebGuide and a human customer support representative.
- ALife-Messenger™, an intelligent e-mail auto-response system that can generate prompt and accurate responses to e-mail inquiries, route e-mail according to content, handle Web-based forms, or even act as an e-mail based information retrieval tool.
- ALife-SalesRep™, a smart bot for sending highly targeted sales and marketing information to your customers.
- ALife-BotMe!™, a client-side avatar that acts as the customer's personal assistant and exchanges information with all other ALife smart bots.

Other members of the Artificial Life family of smart bots include ALife-PortfolioManager™, ALife-KnowledgeManager™ and ALife-PersonalTutor™. Before describing some of our smart bots and integrated solutions, we offer an overview of the SmartEngine core technology in the next section.

3. The ALife-SmartEngine core technology

All of Artificial Life's smart bots share a core technology that revolves around the SmartEngine, a sophisticated Java-based framework to process user input, interpret meaning through natural language processing, and generate appropriate responses.

The modular architecture of the SmartEngine makes it possible to consider a user's history and current emotional behavior, to track the context of a conversation, to handle erroneous input, to control the direction of a conversation, and to satisfy certain pre-determined goals about the topics to be discussed in the course of the conversation.

The SmartEngine's input and output can also be connected to speech recognition and other types of streamed information. SmartEngine responses can be plain text or multimedia content, they can be generated through e-mail or the Web, and they can lead to other actions, such as speech synthesis and telephony commands. This flexible structure creates a new paradigm for smart bots that will be able to reach beyond the Internet.

3.1 The SmartEngine's modular architecture

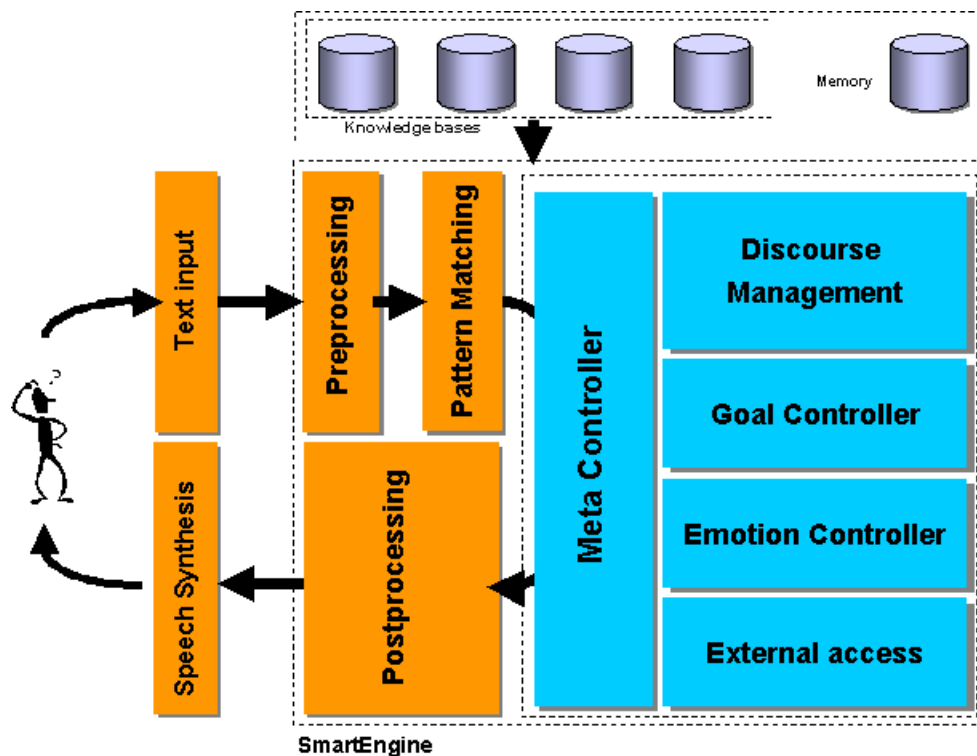


Figure 1: The SmartEngine architecture.

Figure 1 illustrates the main components of the SmartEngine. The figure shows, in addition to the modules comprising the SmartEngine's architecture, the interaction between the SmartEngine, the customer, and the customizable knowledge bases that contain the information used by the SmartEngine.

The SmartEngine architecture can be conceptually subdivided into three components. The Preprocessor (including the pattern matcher) is used to identify the content of the customer's inquiry robustly, handling spelling mistakes, synonyms, word normalization, and so on. At the opposite end, the Postprocessor handles the output that actually reaches the customer, for instance by replacing certain tokens with dynamic content, as might be the case when a reply should contain the customer's name. The real power of the SmartEngine lies in the MetaController, the SmartEngine component that determines

how user inputs are processed on the basis of the information contained in the customizable knowledge bases and many other criteria implemented by the DiscourseController, the GoalController and the EmotionController modules.

We now turn to a description of each of these modules, before describing the structure of the knowledge bases used by the SmartEngine.

The Preprocessor

The Preprocessor is a SmartEngine interface that enables the engine to be adapted easily to accept a potentially endless variety of input types. Most of the ALife bot products currently available work with typed text and streamed text input, but the Preprocessor can just as easily allow the SmartEngine to use human speech (including over the telephone), ergonomic input like mouse or joystick movement, and literally anything that an application requires.

The Preprocessor encapsulates input, so that other components of the SmartEngine can enact the behaviors derived from knowledge bases without requiring detailed, medium-specific knowledge about the input. The Preprocessor makes it possible to handle many different types of inputs, not only in terms of the format, but also in terms of the *style* of input. For instance, e-mail messages, Web forms and input from a WebGuide text box all tend to be different in terms of length, formatting and content. The Preprocessor can be configured to handle any of these types of input.

The MetaController

The MetaController is often referred to as the “brain” of the SmartEngine, although in truth the SmartEngine itself is composed of numerous specialized “brains.” It is the task of the MetaController to make the ultimate decisions about the course of action that the SmartEngine will take in any given situation. The MetaController is responsible for coordinating analysis by other modules of the SmartEngine, and for making determinations about the “best move” for the SmartEngine based on the activity of the other modules.

The DiscourseController

The DiscourseController is responsible for implementing high-level decision-making processes to influence the flow of conversation with the user. The DiscourseController uses a combination of methods derived from the field of discourse analysis and Artificial Intelligence (AI) models of behavior and macroscopic meaning in order to steer the dialog as appropriate. For instance, if a customer visiting a Web site asks a question that WebGuide does not understand, this module helps WebGuide steer the conversation back on track. This is a situation in which traditional “chatterbots” derail and ask customers to “rephrase the question.”

The GoalController

The GoalController is the SmartEngine module that endows a smart bot with active, goal-oriented behavior. The GoalController understands the aims and requirements articulated in knowledge bases, and works toward certain achievements—such as the successful

transfer of knowledge to a user, a series of sales pitches, and so on. The GoalController's logic helps to determine whether in fact a goal has been achieved, and can sort through the goal priorities specified in the knowledge bases.

The EmotionController

Perhaps the most intriguing aspect of the SmartEngine is the EmotionController. With the most exciting possibilities for customer relationship management, the EmotionController makes it possible to determine the emotional state of a user and cause a bot to behave accordingly. Of course, different contexts call for different behaviors, and it is here that the EmotionController's real power becomes apparent, because it can be directed to behave in a way that is appropriate for a particular business context.

The Postprocessor

Much like the Preprocessor, the SmartEngine's Postprocessor insulates the decisions made by the SmartEngine from the medium in which they are to be expressed. This means that it is possible for a SmartEngine-powered smart bot to produce responses in text, spoken language, animated gestures, control of robotic devices, etc.

Furthermore, the Postprocessor can be used to implement certain dynamic and just-in-time substitutions, for instance by inserting the current date and time, an order number, or the customer's name in the SmartEngine's reply.

3.2 The Artificial Life Knowledge Bases

If you think of the SmartEngine as the central processing unit of each smart bot, then knowledge bases correspond to the memory system of the smart bots. It is here that all the information needed by the smart bots is stored. The SmartEngine implements its sophisticated decision making based on the information it encounters in the knowledge bases. Once a given response is selected, the actual form of the response is also determined by the contents of the knowledge bases.

Figure 2 illustrates the structure of the knowledge bases used by the SmartEngine. Each knowledge base contains information organized in a hierarchy. In practice, the hierarchy is not strict, as it is possible to create connections between different elements at the same or at different levels in the hierarchy. The hierarchical structure is used to facilitate the collection and organization of the information to be used by the smart bot.

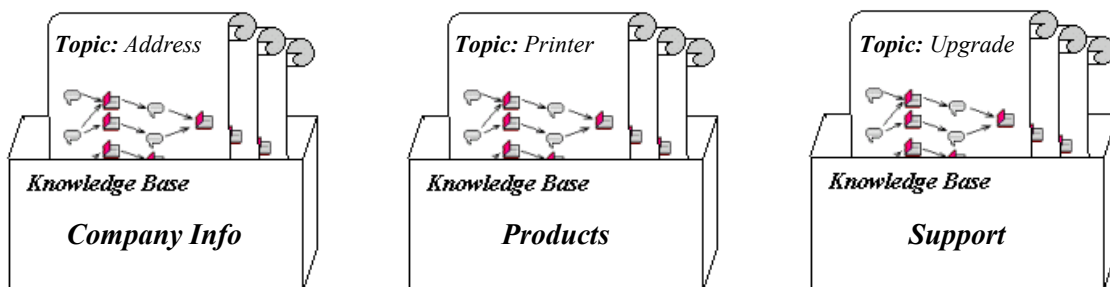


Figure 2: Structure of typical knowledge bases.

Knowledge bases are compiled into Java classes to ensure security and portability. The information available to each smart bot is typically contained in multiple knowledge bases, each focusing on a circumscribed domain of knowledge. Each knowledge base is further organized in topics, which are used to organize information and also to guide the SmartEngine's discourse management and context tracking.

Each topic includes an arbitrarily large set of *UserInputs* and *Scripts*. *UserInputs* are used to match the queries or sentences generated by the customer, while *Scripts* indicate actions to be taken by the SmartEngine. The SmartEngine, influenced by the modules described earlier, uses properties of *UserInputs* and *Scripts* to determine the best possible action to take in response to a given customer input sentence.

Scripts can specify the action or combination of actions to be taken by the SmartEngine. Responses can be in the form of e-mail, Web pages to be displayed on the customer's browser, attached documents, links to URLs, animations, or any combination thereof. Responses can be forwarded, copied or blind copied. In some cases, such as offensive or otherwise undesirable e-mail, responses can simply be suppressed.

Scripts can instruct the SmartEngine to ask the customer a question, and restrict the context of the next turn in the conversation to expect an answer. For instance, when used with ALife-WebGuide, the SmartEngine might select a *Script* that forces the question "Have you heard about our newest product line?" An answer such as "yes" or "no," which in normal circumstances is too general to be answered intelligently, is now understood correctly to be the answer to the WebGuide's question.

The structure and syntax of knowledge bases makes it simple to handle pronouns and other constructions that require context for disambiguation. For example, suppose ALife-Messenger is processing a customer e-mail containing the two sentences: "I bought a laser printer through your Web site last week. I got it configured properly but can't get it to print in color." In this case, even though the two sentences are processed separately, the SmartEngine makes it easy to understand that the pronoun "it" in the second sentence refers to the printer of the first sentence. The ability to keep track of context is shared by all the smart bots based on the latest generation of our SmartEngine.

You can find additional details about Artificial Life's SmartEngine in other documents. For now, we turn to a description of some of Artificial Life's products that are based on the SmartEngine core technology.

4. Artificial Life's family of smart bots

Artificial Life offers a full suite of smart bots, each designed to handle a particular task, all sharing the SmartEngine core technology. In this section we describe some of the products, providing specific examples of how they can be used to improve your company's online presence. Later sections describe how these smart bots can be combined to provide integrated solution for different types of online companies.

4.1 Intelligent Web navigation with ALife-WebGuide

Web site visitors and customers are often frustrated with the size and complexity of large and/or poorly designed Web sites. Locating information can be frustrating, resulting in a bad buying experience, and it can be time-consuming, resulting in a loss of business if visitors become exasperated and exit the site.

Many Web sites offer search engines, but this is not a satisfactory solution for many reasons. First, search engines can be daunting, especially for the large numbers of non-technical customers that are turning to the Web. Second, even technically savvy customers often have to learn what keywords to use in order to obtain satisfactory results. Third, most search engines return a large number of links, leaving customers with the unpleasant task of sifting through the results to find the appropriate link.

Enter ALife-WebGuide, the friendly bot that greets visitors to your Web site and guides them where they want to go, engaging them in a conversation using natural language (Figure 3). Instead of flooding users with multiple responses, ALife-WebGuide delivers the single, most appropriate response to visitors' inquiries. Rather than being forced to navigate a complex Web site or guess the correct keywords for a search engine, all your customers have to do is to ask—in plain language.

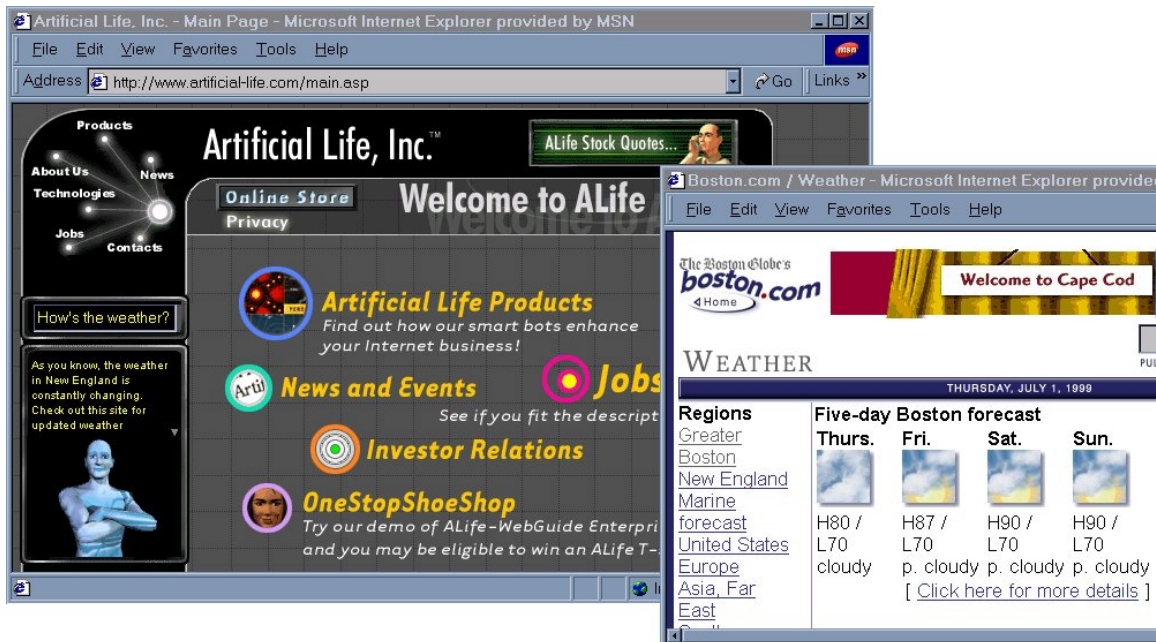


Figure 3: ALife-WebGuide on the Artificial Life Web site (www.artificial-life.com).

You can use ALife-WebGuide to create Web sites that are accessible, entertaining, informative and successful. ALife-WebGuide can engage visitors in conversations about their needs and interests. Furthermore, you can easily customize ALife-WebGuide, configuring the smart bot's appearance, knowledge, animation, frame size, windows, colors and text boxes, to create and embody the personality you want for your Web site—thus aiding your branding efforts while helping you to differentiate your site for a competitive advantage.

ALife-WebGuide can also act as an effective sales person, pushing the conversation where you want it to go. ALife-WebGuide can be configured to wait a certain number of turns of the conversation before switching to a goal topic that you want your customers to learn or talk about. You can choose multiple goal topics to ensure that customers see key pages on your Web site. You can even determine how aggressive ALife-WebGuide will be in directing the conversation.

4.2 Understanding customer behavior with ALife-WebGuide and ALife-STAn

ALife-WebGuide and the companion product, ALife-STAn, significantly improve your company's ability to understand the needs and desires of your customers by analyzing the content of conversations between your customers and your company's ALife-WebGuide.

Several products are able to track customers navigating through a Web site by monitoring the customer's clicks through the site. This approach to tracking customers suffers from one fundamental shortcoming: the only information that can be gleaned from customers is what links they visited on a Web site. This information is extremely poor because a typical customer will only "spend" a few clicks on a given Web site, and each page on the Web site may only have a handful of links. Hence it becomes nearly impossible to understand what a customer *really* wants, unless the customer actually makes a purchase or a clearly recognizable, goal-oriented action.

In contrast, when interacting with ALife-WebGuide, customers engage in interesting conversations in which they reveal exactly what they want—in plain words. ALife-WebGuide stores every single conversation it has with each customer, giving you access to a phenomenal amount of detailed information about what your customers want. ALife-WebGuide includes tools to report statistics about topic usage, page visits, and other information that is extracted directly from each interaction between the bot and your customers.

Your ability to analyze and understand user behavior is enhanced when you also use ALife's Smart Text Analyzer (ALife-STAn), an add-on tool that processes the conversation log files generated by customers visiting your WebGuide-enabled Web site. ALife-STAn uses a number of sophisticated techniques to extract the information you want from your customer conversations: What topics or pages on your Web site come up most frequently? What are customers asking? What comments are they making? How long are they staying on the site? How satisfied are they with their visit?

ALife-STAn is an essential tool for marketing, sales, customer support and any other customer-oriented tasks that take place through your Web site. You can use the data extracted by ALife-STAn to visualize trends over time, to determine with high accuracy what parts of your Web site are successful and what parts are not, or to improve your Web site in response to your customers' comments and suggestions.

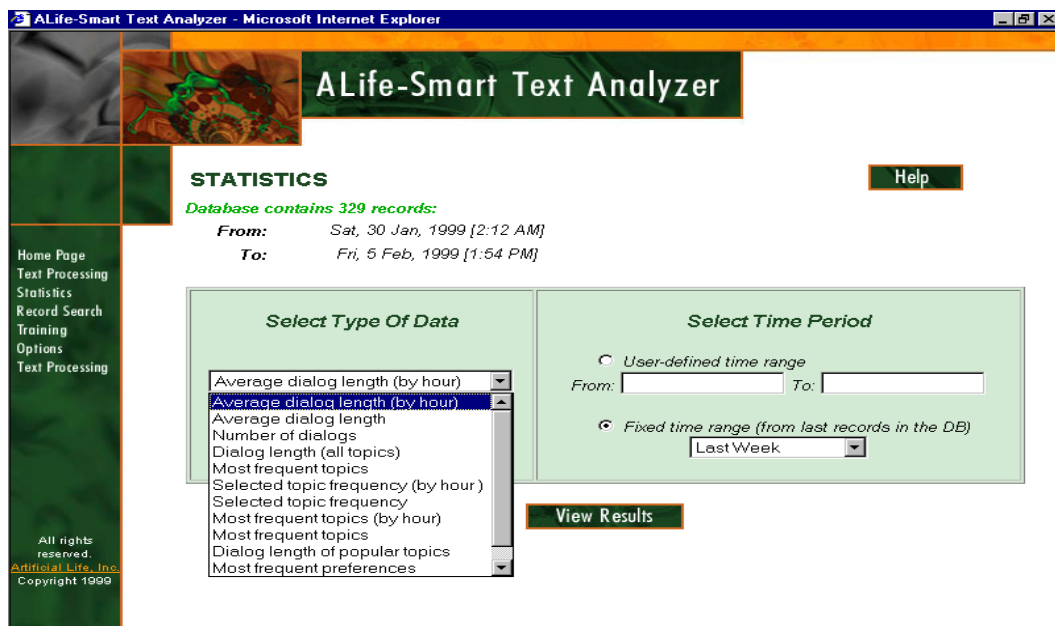


Figure 4: ALife-STAN enables you to understand what your customers want.

The detailed information extracted by ALife-STAN is also invaluable for highly targeted, one-to-one marketing, sales and customer support. For each page visited through the ALife-WebGuide, the customer is leaving behind much more information than could ever be accessed by tracking clicks or any other currently available technology.

Together, ALife-WebGuide and ALife-STAN increase the satisfaction of customers that contact you through your Web site, and they increase your ability to respond to customer needs and desires. However, there are some situations that are simply better handled by a human customer service or sales representative in a traditional call-center setting. The next section describes ALife-CallCenter, Artificial Life's solution to this problem.

4.3 Transparent customer service and support with ALife-CallCenter

Customer service personnel can be very expensive to train and to retain, especially in situations that require extensive knowledge of a highly specific area of expertise. The arrival of Computer Telephony Integration (CTI) implemented on low cost communication servers has removed some of the barriers that once prevented small and medium sized companies from offering competitive customer support, help desk, and telemarketing functions. Moreover, the call-center manager of today benefits from easy access to solutions that encompass every type of communication medium – fax, e-mail, Internet video, and of course phone.

However, even with the telephony server tools of today, one inbound/outbound call still equals one call-center agent. Large outbound campaigns and smooth inbound queue handling at peak hours require a vast commitment of resources. Furthermore, few existing tools truly integrate the Web and telephone components of a modern call-center.

ALife-CallCenter takes advantage of the complex decision-making capabilities of ALife-SmartEngine, the brains that power ALife-WebGuide and other Artificial Life products. Artificial Life offers a unique opportunity to reduce call-center costs and to improve customer satisfaction by combining ALife-WebGuide and ALife-CallCenter (Figure 5).

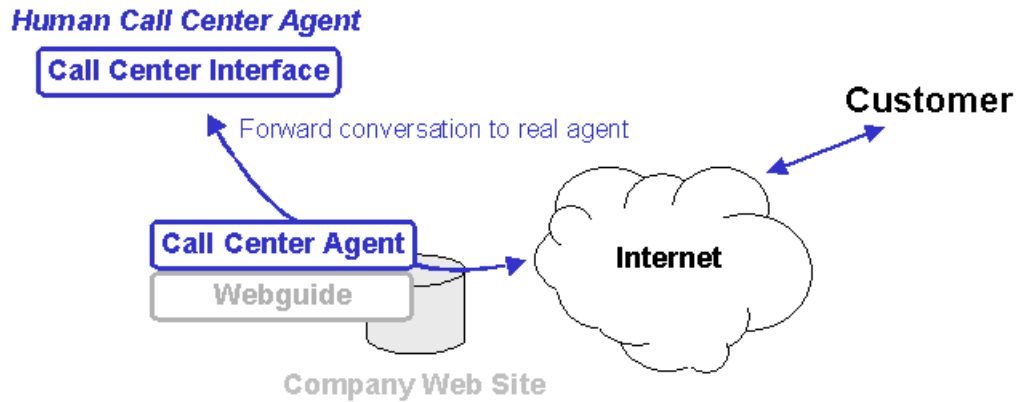


Figure 5: The relationship between ALife-CallCenter and ALife-WebGuide.

When a customer visits a WebGuide-enabled Web site, ALife-CallCenter monitors the behavior of the SmartEngine during customer conversations. If certain pre-determined conditions are met, ALife-CallCenter seamlessly switches control of the conversation to a live human agent. ALife-CallCenter provides to the human agent a succinct summary of the conversation that has already taken place, including any preliminary information provided by the customer during the conversation, as well as any historical and profile data stored during the customer's prior visits, if available.

Because of the SmartEngine's powerful decision-making algorithms, you can choose when and how to switch the conversation to a human agent. For example, you might base the criterion on the emotional content of the customer's sentences, giving prompt attention to an angry customer who just recently purchased one of your products, making the customer know that you really care. In addition, you can use the SmartEngine's discourse management features to make sure that the customer provides you with the necessary basic information before being switched to the human agent, thus maximizing the efficiency of your human call-center staff, freeing them from the tedious and repetitive aspects of customer interactions.

You can also change the behavior of ALife-CallCenter to adjust to your company's resources. For instance, if your call-center is not staffed round-the-clock, then you can select a different behavior for after business hours. During these times, the SmartEngine can be adjusted to a higher level of interactive inquiry for identifying problems and retrieving solutions. This is based on the assumption that someone will be willing to spend a little more time chatting with a software responder when they know they do not have the option of speaking to a live agent at that hour. If an answer still cannot be found, the SmartEngine can forward the call and account information to an electronic or voice mail system, so that it can be handled during the next business period.

Given the integration of computers with telephony, ALife-CallCenter can extend the SmartEngine's ability to understand language to a much broader audience than just the Internet. Some products that are now being offered give call-center agents the possibility of combining Web and telephony, but this does not reduce the cost of handling potentially heavy load. Using state-of-the-art speech recognition software, the Smart Engine can actually understand human speech and can be used to answer telephone calls, reducing the load of your call-center.

ALife-CallCenter can also be used as a front-end for automated outbound campaigns. The SmartEngine can initiate contact and chat in natural language directed toward a specific goal. It can either handle the entire conversation, or turn the call over to a live agent once it detects interest. A data-mining component increases the campaign's effectiveness, automatically generating leads from your data.

Because Artificial Life's smart bots share the SmartEngine core technology, they can share information about your customers. For instance, you can combine information from ALife-WebGuide and ALife-CallCenter conversations to improve your customer profiles and to make sure customers experience a uniform, high-quality level of personalized interaction regardless of how they contact your company. The next section describes ALife-Messenger, the smart bot that enhances your company's online presence by handling customer interaction through e-mail.

4.4 Intelligent e-mail handling with ALife-Messenger

The networked economy is forcing many enterprises to migrate rapidly from traditional business methods to Internet-based electronic commerce. As a result, many organizations are struggling to manage the influx of e-mail from their customers and suppliers.

According to Forrester Research, less than 40% of customer e-mail messages receive any response at all. Companies that do not respond promptly and accurately to customer e-mail will eventually lose a large portion of their customer base. Handling e-mail with accuracy, in a timely fashion, and at minimal cost has become a critical business requirement.

ALife-Messenger is an intelligent automated e-mail response system that provides immediate, round-the-clock response to customer e-mail messages, improved ability to respond to frequently asked questions, highly customized response content and format, flexible configuration for handling multiple e-mail functions, and increased ability to track performance and customer behavior.

ALife-Messenger is much more than a simple e-mail auto-acknowledgment system. Through its use of natural language understanding and powerful decision making techniques, our SmartEngine technology can make fine distinctions between e-mail messages that might look identical to a simple keyword-based e-mail processing system.

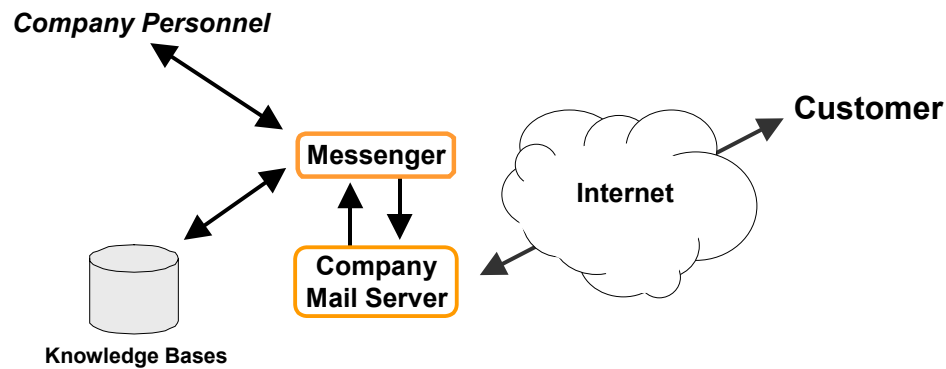


Figure 6: ALife-Messenger interactions with customer and company personnel.

For example, suppose a customer sends an e-mail message that refers to one of your products. A simple keyword-based system may identify the product name but not be able to extract the precise nature of the message. ALife-Messenger, on the other hand, can be configured to *understand* whether the message is an inquiry about the product, a comment from a satisfied customer, or a complaint from a disgruntled customer.

The ALife-Messenger knowledge bases allow you great flexibility in determining how to handle each processed e-mail message. For instance, you can select whether or not a response should be sent to the customer, you can list one or more addresses where the original e-mail or the response should be forwarded, and you can include URLs and attachments with a response. These features enable you to use ALife-Messenger for many e-mail tasks, far exceeding the capabilities of typical e-mail auto-response systems. For example, you can design ALife-Messenger knowledge bases to perform the following functions:

- Recognize and filter offensive and other unwanted e-mail.
- Route e-mail to the appropriate personnel based on message content.
- Act as an information server for your Intranet or Extranet.
- Maintain e-mail distribution lists.
- Process custom e-mail forms generated from your Web site.

ALife-Messenger decreases costs by reducing the workload of your customer support and service personnel. Rather than spending time answering routine e-mail and frequently asked questions, your personnel can focus on those e-mail messages that absolutely require human intervention.

Your customers will notice the difference in quality and speed of your e-mail support. No matter what time of day or day of the year, their e-mail will always result in a prompt and effective reply. These and other features of ALife-Messenger translate to increased customer satisfaction and customer loyalty. And especially when it comes to Internet

commerce, this translates directly into the advantage that you need to stand above your competitors.

Taken together, ALife-WebGuide, ALife-CallCenter and ALife-Messenger integrate many aspects of inbound marketing, sales and customer support. The next section describes ALife-SalesRep, the smart bot that closes the loop, offering you the same intelligent technologies to initiate highly targeted sales efforts.

4.5 Targeted sales with ALife-SalesRep

There are many factors that drive customers to online purchasing, but *convenience* is arguably the most important of these factors. Customer convenience is measured in many ways: it can mean not having to drive to the store, having a broad range of choices at one's fingertips, being able to compare price and availability in a single virtual trip. It can also mean being able to select what information to get, rather than being bombarded by generic marketing materials or being harassed by pushy sales people.

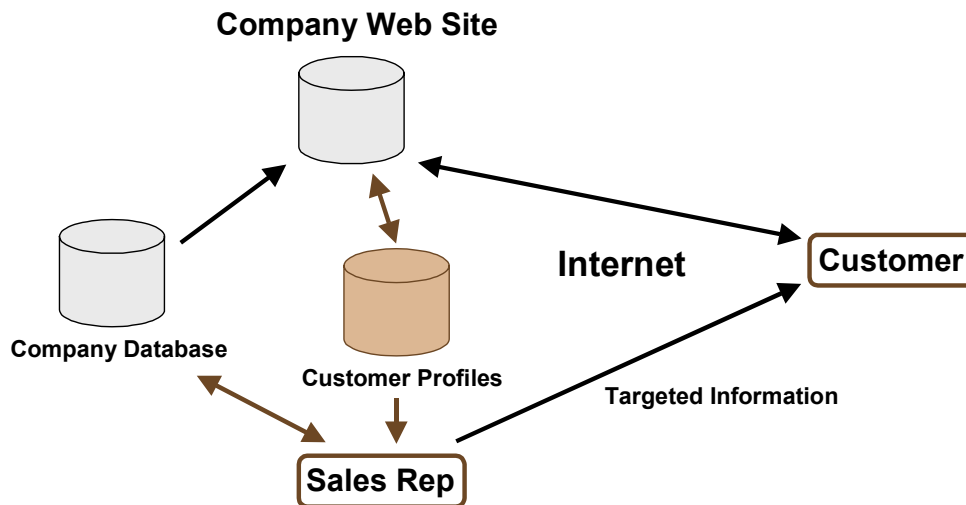


Figure 7: ALife-SalesRep creates micro-connections with your customers.

ALife-SalesRep is Artificial Life's smart bot solution for one-to-one Internet sales and marketing. By creating a highly customized *micro-connection* with each customer, ALife-SalesRep makes the online shopping experience more convenient for your customers, while increasing dramatically your ability to target customers and track their behavior. Figure 7 illustrates how ALife-SalesRep creates micro-connections by combining customer profile information with your company's product databases.

ALife-SalesRep can extract information from your company's databases and match it to customer profile information. Customers visiting your Web site can choose to provide profile information that will be used to improve dramatically the quality of information they receive from your company. The profile can be automatically updated whenever the customer visits your WebGuide-enabled Web site or sends e-mail to ALife-Messenger.

ALife-SalesRep maintains customer information and uses that information to provide customers with highly targeted, timely information about price changes, product availability, or any other marketing and sales information of your choice. Information can be delivered through e-mail or through ALife-BotMe, a customized “avatar” that resides on each customer’s PC (Figure 8).



Figure 8: ALife-SalesRep offers your customers up-to-the-minute information.

ALife-SalesRep and ALife-BotMe can work in concert with ALife-WebGuide to give companies an integrated marketing and sales cycle. Customers who have installed ALife-BotMe gain faster access and more targeted navigation on the company’s WebGuide-enabled Web site. Information gathered by ALife-WebGuide during each customer visit and by ALife-Messenger from customer e-mail is used to update the customer profile, increasing the accuracy of ALife-SalesRep’s targeted marketing.

We now turn to some examples of the integrated solutions that Artificial Life can offer to your company using our family of smart bots.

5. Integrated, bot-based solutions

In the previous sections you have seen what smart bots can do individually, and how in some cases they can share information. Artificial Life offers extensive experience in designing and implementing custom integrated solutions that leverage the full power of smart bots to help you increase your ROI and gain a competitive advantage in the networked economy.

In this section we present two general classes of integrated solutions, one for online retail, the other for electronic Customer Relationship Management. For additional examples and information, please contact one of our representatives.

5.1 ALife-RoboShop

This section describes ALife-RoboShop, an enterprise-class solution that integrates several ALife products for a complete online retail operation. The ALife-RoboShop brings together ALife-WebGuide, ALife-BotMe and ALife-SalesRep to work seamlessly

with our proprietary back-end e-commerce server, ALife-EComm. The section also describes Net-tissimo.com, an implementation of ALife-RoboShop was launched in October of 1999 in a joint venture with the Swiss Bon Appétit Group.

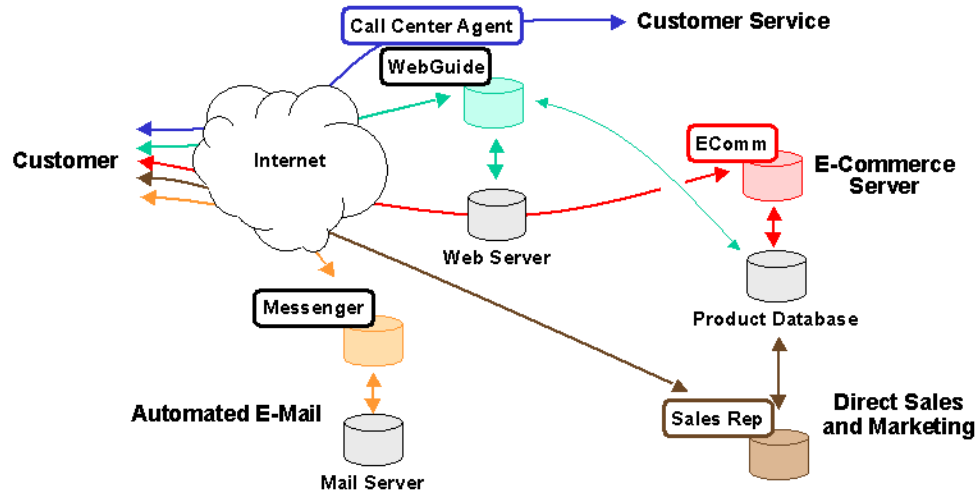
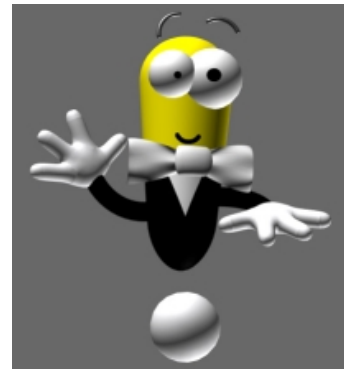


Figure 9: ALife-RoboShop integrates several ALife smart bots for a complete online retail solution.

Figure 9 illustrates an integrated ALife-RoboShop architecture that includes several ALife smart bots to provide a complete solution for online retail. ALife-RoboShop offers many concrete advantages for customers and for the retail company alike. In particular, ALife-BotMe, ALife-WebGuide and ALife-SalesRep are coupled with the ALife-EComm server to offer an entirely new way to shop online.

ALife-BotMe

Customers who register at the site have the option of downloading ALife-BotMe, the personal avatar that resides on the customer's computer. By registering at the site, customers can specify their personal preferences, ensuring that their shopping experience will be highly customized to their personal needs and preferences. The figure on the right shows *n.t.*, the ALife-BotMe character used for the Net-tissimo.com project.



ALife-BotMe acts as the front end to other ALife smart bots running on the company server. ALife-BotMe allows customers to stay in contact with your online company even without their browser being open. ALife-BotMe takes advantage of state-of-the-art, proprietary streaming technology to give a personalized animation to your company's sales pitches.

ALife-WebGuide

Customers visiting the company's Web site are greeted by a friendly and knowledgeable ALife-WebGuide that can explain how the site works, guide new customers through the registration procedure, or answer any questions that customers may have. ALife-WebGuide is always up-to-date on the company's products, prices and special promotions.

ALife-SalesRep

Every time a customer visits the Web site, the customer's profile is updated based on the customer's behavior and conversations with ALife-WebGuide. The profile is also updated if the customer sends e-mail to the company's ALife-Messenger smart bot. The up-to-date profile information is used by ALife-SalesRep to match the customer profiles with the company's databases. When a good match is found, ALife-SalesRep contacts the customer, using the customer's ALife-BotMe or regular e-mail. If the customer decides to visit the Web site in response to the sales pitch, upon arriving to this site he or she will be presented directly with the relevant information.

ALife-SalesRep's ability to match customer profiles with product and promotional databases is especially important when the retailer is making use of ALife-EComm. ALife-EComm is a new smart e-commerce server that offers a full range of flexible pricing models. ALife-EComm can be used for retail sales, offering secure transactions. You can also enhance the customer's experience by implementing complex bidding schemes, including many types of auctions and entirely new dynamic pricing schemes that are only possible through the Internet.

5.2 Net-tissimo.com

The Swiss Bon Appétit Group and Artificial Life, Inc., have developed Net-tissimo.com, an implementation of the ALife-RoboShop architecture aimed at the retailing of high-quality items that are in heavy demand through conventional retail channels. These items will be promoted on the Net-tissimo.com Web site for advantageous prices, initially using three different pricing schemes:

- **Catch of the day!** Under this model, each day one very expensive item sells at an aggressively low price. Only customers that are members of the Net-tissimo.com club can apply for "Catch of the day" products. These customers can apply for the product before a specified deadline shown on the page. Applying for the product does not mean that they have a right to buy the product, but that they participate in a lottery. After the deadline no more applications from customers are accepted. The price model will randomly select customers from all those who applied for the product. The Net-tissimo.com staff will notify the winners.
- **Get it!** Items offered through the Get it! price model are available in a limited quantity and for a limited time. At the beginning of the cycle, the item is priced at its full retail value. The price then drops incrementally at some arbitrary intervals. After a certain lowest value (unknown to the customer) is reached, the item is no longer

available. Because of the limited availability, customers will have to decide continuously whether to make a purchase, or take the chance that the price might decrease again before the item becomes unavailable. This model is well suited for items for which there is a fairly high demand.

- **Market Place.** The Market Place model operates like a stock exchange: customers place bids on an item, causing its price to fluctuate as the Market Place model analyzes all customers' bids and recalculates the price on the ground of legal bids at regular intervals. Customers whose bid exceeds the current (dynamic) price of the item will purchase the item at the bid price. The price can not drop below a pre-set minimal value unknown to the customers, and only bids above this minimum price are used in the price adjustments. This pricing model is designed primarily for hard-to-get items that are not readily available through traditional retail channels.

Net-tissimo.com is but one example of how the ALife-EComm server can be used for online retail using smart bots. There are many other ways in which the architecture of ALife-RoboShop can be adapted in a custom enterprise solution for online retail.

5.3 ALife-eCRM for Customer Relationship Management

The ALife-RoboShop architecture described in the previous section is ideally suited for a complete online retail solution. However, several of the elements used in ALife-RoboShop and other smart bots can be of great use for any company that wants to offer the best in electronic Customer Relationship Management (eCRM).

What is eCRM? In a literal sense, eCRM is simply the implementation of call-centers, help desks and other types of customer service centers using Intranets and Extranets. However, this is a perfect example of how an online presence offers opportunities that could never exist with traditional CRM. Integrated solutions based on smart bots take you well beyond anything possible in the offline world.

Artificial Life offers an eCRM solution suite consisting of ALife-WebGuide, ALife-STAn, ALife-CallCenter and ALife-Messenger. Our eCRM solution enables your company to improve customer relations in many different ways:

- Use ALife-WebGuide to move Web sites beyond simple content-driven material: enhance customer experience by simplifying navigation and adding a personalized, human touch to your Web site.
- Integrate your Web site and traditional call-center system with ALife-CallCenter to give your customers fast, efficient service and support through a single channel.
- Personalize your customer interactions using a unified customer profile that draws information from multiple sources: the Web (ALife-WebGuide), e-mail (ALife-Messenger) and telephone interactions (ALife-CallCenter).
- Increase the accuracy of customer classification and targeting by using ALife-STAn to update profile information based on natural language conversations from any of these sources.

- Give your customers what they want when they want it: allow them to learn about your company, to purchase from your company, and to obtain automated service 24 hours a day, 7 days a week.
- Reduce costs, handle peak request loads, and adjust to varying customer demand and personnel shifts by automating your marketing, sales and support force. And your customers will be happier because they don't have to be on hold during busy times.
- Understand the behavior of your customers and the effects of your marketing efforts using our analysis and reporting tools. Let the power of natural language processing take your understanding of customer needs and desires to a new height.

These are only some of the ways in which Artificial Life's eCRM suite can help your online business. Once you start using smart bots to manage customer relationships you will find many other ways of dealing with customers that would never have been possible without a smart bot, online solution.

6. The ALife Advantage

Artificial Life, Inc. (NASDAQ: ALIF) is one of the leading developers of smart bots for the Internet. Headquartered in Boston, the company has subsidiaries in New York, Switzerland, Germany and Russia. For more information, please visit our Web site at <http://www.artificial-life.com>.

Artificial Life, Inc. is developing a full suite of products that can be used individually or as part of integrated enterprise solutions:

- ALife-WebGuide, a friendly natural language bot that resides on your Web site to help visitors by processing and responding to questions using natural language.
- ALife-STAN, a smart statistical text analyzer that extracts information from text documents or from user log files generated by other ALife products.
- ALife-Messenger, an intelligent solution for automated customer e-mail response and other smart e-mail handling tasks. Your customers will receive prompt, accurate responses to e-mail inquiries.
- ALife-CallCenter, a smart decision-making tool that allows seamless switching between your ALife-WebGuide and a human customer support representative.
- ALife-SalesRep, a smart bot for sending highly targeted sales and marketing information to your customers.
- ALife-KnowledgeManager, a powerful tool for storing and managing your company's information in a variety of formats.
- ALife-PersonalTutor, a tool to develop interactive tutorials and other computer-based training (CBT) software.
- ALife-PortfolioManager, a tool to monitor an individual's investment portfolio according to the user's concerns and criteria.

Artificial Life, Inc. also offers consulting and professional services to customize existing products, or to develop integrated enterprise solutions. Please contact us at one of the address listed on the front page of this document to inquire about our products and services.