

# An Agent-based Network Consultation System using Cooperation between a Sales Organization and Multi-Agents

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## ABSTRACT

We have developed a consultation system that assists in the communication between salespeople and their customers. It uses interaction and an information sharing function. The system provides a special information service for sales organizations that use of multiagents. We propose a concept for coordinating the consultation system. In this system, a sales expert and multiagents provide service as one body. Moreover, we have developed an effective communication method in which a salesperson and a manager cooperate with their agents to perform N Customer: M expert communication with their customers.

**Keyword:** Synchronous communication, agent, customer information service, consultation system

## 1. Introduction

2.

It has become increasingly difficult for salespersons in a company to keep abreast of information concerning their newest products. As a result, sales people find that explaining these products to customers and leading customers toward buying decision is quite difficult. This is partially because product lifecycles have been shortened, and also partially because new products are often designed with a customers focus. Because of this new focus, products often cross over traditional classification categories

Deal with these difficulties, remote consultation systems using videoconferencing has been developed [1][2]. This system compensates for a lack of product knowledge on the part of salespeople, also empowers customers so that, by using self-operated terminals, they can find the product information that fits their needs [3][4]

Unfortunately, the remote consultation systems

currently in use have two weaknesses; the first is that customers are sometimes unsure of the proper steps to take during self-operation. Customer may become lost when using the prefixed menus because they do not understand the classification or structure of the product categories.

The other weakness is that, because of shortened product lifecycles, revising the menus in the system requires substantial effort. When new products are developed, the menu structure may need to be changed. If products are changed frequently, this becomes expensive.

In this paper, we propose a customer support method for a remote consultation system that corresponds to customer types. This method dynamically generates product explanation scenarios that fit the need of individual customers. In it, human expert are coordinated with agents.

## 2. Current Consultation Systems

### 2.1 Remote Consultation System

Remote interactive consultation systems provide customers with a wide range of high quality services in a variety of fields (Fig. 1).

These systems provide three types of services:

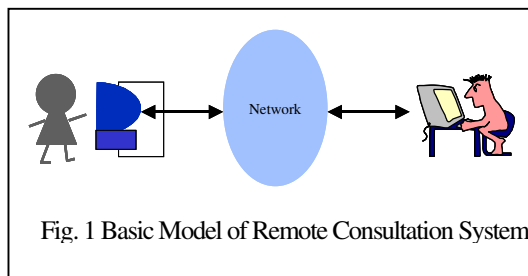
- a) Information services via local client and remote servers,
- b) Transaction services via remote servers, and
- c) Consultation services via expert staff at distant locations.

Customers usually receive unmanned service through special terminals or PCs at their offices or homes. When they cannot find what they want, the customers contact experts that are located at a distant central office and connected through a network. By communicating with

these experts, the customers find out what they need to know.

To illustrate, an insurance company provides catalogs and information on procedure and locations. Through self-operation, a customer can obtain information regarding acceptance and processing procedures, and then “tele-consult” with an expert clerk if this information is unsatisfactory.

We analyze each step in the process of consultation. Roughly speaking, the consultation process consists of four steps (Fig. 2).



They are (1) Information Provided by Self-operation, (2) Self-operation Pre-Consultation, (3) Consultation by Expert Clerks, (4) Processing Procedures by Servers / Clerks (Fig.3). In the first step, the customer searches the information by self-operation at the customer terminal. If

Here the customer operates a terminal in a local office, and obtains information by using a menu and communicating with an agent (this is usually done at the customer’s own pace).

(2) Dialogue with an expert at a distant office.

In this mode, the customer and expert speak directly by using a videoconferencing system. The customer explains any difficulties that he or she has found while operating their terminal. This mode usually proceeds just like face-to-face communication, so the pace tends to be forced for both parties. That is, both customer and expert interact and respond to each other.

## 2.2 Current Remote Consultation System Issues

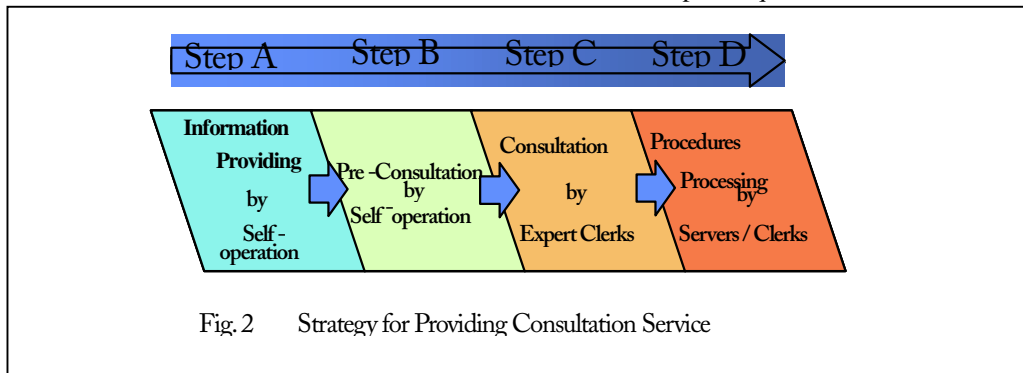
To improve remote consultation systems, the following two problems must be overcome.

(1) On the customer side.

Usually customers’ vocabularies and methods of proceeding into the system are different from those of the company. [6] As a result, customers encounter three kinds of difficulties [1].

a) Not knowing suitable field-specific words that are needed to explain requests or orders.

b) Not



there is any problem, the customer uses tele-consultation by expert staff. Our system sets the intermediate step between these two steps, that is, when the expert staff intervenes in the customer operation. Our system supports a smooth transition among different tele-service stages.

In conventional remote consultation systems, customers get information about services through the following two communication modes.

(1) Self operation

knowing how requests or orders are classified and categorized within the company (i.e. the customer may expect product 1 to belong to category A, when it actually belongs to category C).

c) Not knowing how to operate terminals.

In conventional remote consultation systems, problem c) has been solved. In current remote consultation systems, customers who have limited information in a given field tends to use videoconference system right away, and

much of the expert time is used to answer simple questions that can be stored and retrieved in the system.

(2) On the company side:

a) Because salespersons do not have sufficient information regarding the newest products, they find it difficult to explain products to customers and lead them to the specific buying decision.

b) Frequent product changes necessitate frequent menu revisions. This is expensive.

c) Remote consultation is less efficient than face-to-face consultation. This is because, there is a big difference between information flow when communicating face-to-face communication and when videoconferencing [7]. Communication quality using videoconferencing is lower than face-to-face one communication.

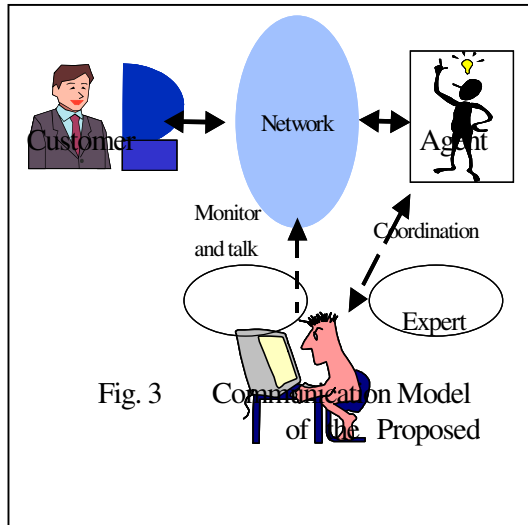
### 3. Customer Support Method in Remote Consultation System

#### 3.1 Basic Concept

In this paper, we present the following three innovations.

(a) The experts in a sales company behave as if they were one agent.

(b) During the first stage of consultation, customers are classified into one of four types. These are listed below.



(c) New products are added to the menu incrementally, and related products are linked.

Point (a) means that a customer does not know that he/she is talking with a real person during interaction. So, the customer feels that the interaction in the remote consultation system is different than face-to-face

consultation (Fig. 2). To achieve (c), expert and agent cooperate each other to generate and provide a menu scenario specific to a customer needs.

To overcome two problems in remote consultation systems mentioned in the previous chapter, we propose classifying customers during the first stage of consultation, according to their characteristics. This is because we believe that the main system problems stem from a lack of customers' information.

Usually, we can assess customers by asking the following questions.

a) Does the customer have a clear goal for consultation?

b) Does the customer have field knowledge and understand the menu?

c) Does the customer know how to operate terminal?

Usually, question c) is not a concern because most people are sufficiently computer literate.

We classify customers into one of the following four types (Table 1).

Type A1: Those customers know their subject and field knowledge, so, they are able to retrieve the necessary information.

Type A2: Those customers know their goals, but are not familiar with keywords in the field. In addition, these customers may be unable to decide which menu button should be select because they do not sufficiently understand product categories or have the necessary field knowledge. These customers tend to wander the menu and search for required information.

Type A3: These customers have unclear goals, but understand the product categories and have sufficient knowledge in the field. These customers tend to wander the menu, and probe for the necessary. Sometimes these customers find combinations of products that salespeople never imagined. Type three customers are interesting to experts and managers because they may offer new ideas for filling customer needs.

Type A4: These customers have unclear goals; they are accustomed to keywords in the field.

Support methods for each type of customer are shown in Table 2.

	Field Knowledge	Available	Not Available
Subject Knowledge			
Clear		A1	A2
Not Clear		A3	A4

Table 2 Support Methods for Four Customer Types

	Field Knowledge	Available	not available
Subject Knowledge			
Clear		Information retrieval with keywords in pull-down menu	Display of entire menu and keyword retrieval with thesaurus
Not Clear		Customer support with coordination of expert and agent	Guidance by formal menu

32. Support Method for Type A3 Customer

These customers have no clear goals when searching for product information. To help them, the expert talks first with the customer as one type of agent through voice communication. By doing this, they can determine the information needed by the customer and any interesting sub fields. Using this information, a scenario agent searches for related products and creates a scenario to lead the customer to possible sales products.

While walking along the scenario, the customer can always determine his or her position by using entire-scenario map.

We developed three functions to make this possible.

Function1: Speech-right control function. To quickly

determine customer needs, agent restricts the customer’s talk time. When a customer talks too much, the agent intervenes, and gives the right of speech to the expert.

Function2: Remote intervention function. When a customer wishes to make a search which does not correspond to the menu, the expert gives the customer alternate guidance by showing a branch of the menu and remotely changing the customer’s display by remote control. At this time, the agent stores the information that the customer has input and also asks the customer to input necessary information.

Function3: Adaptive menu-creation function (Fig.3)

After assessing the customer’s needs by using keywords (or a set of keywords), the agent retrieves a document database of all products and decides which would be interesting to the customer. In addition to catalogue information about products in the menu, this database contains specification documents and information for the salesperson.

Then agent classifies these products into subsets using the keywords mentioned above.

Finally, the agent generates an explanation scenario by arranging the keywords in the priority that the expert decides.

4. Customer Support Procedure

The entire customer support procedure is shown in Fig.4.

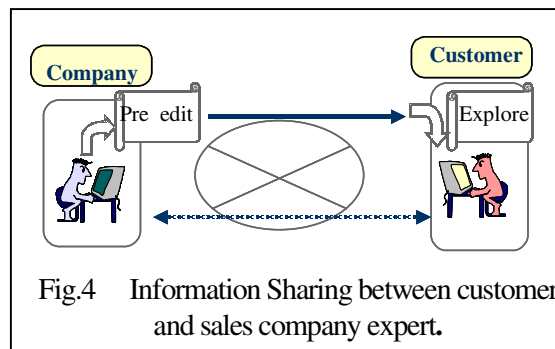


Fig.4 Information Sharing between customer and sales company expert.

At the first stage of the menu, customers are classified into four types. If a customer is classified into Type 3, the expert talks to the customer, and the customer receives the information about his/her needs. The customer can then browse these new generated scenarios.

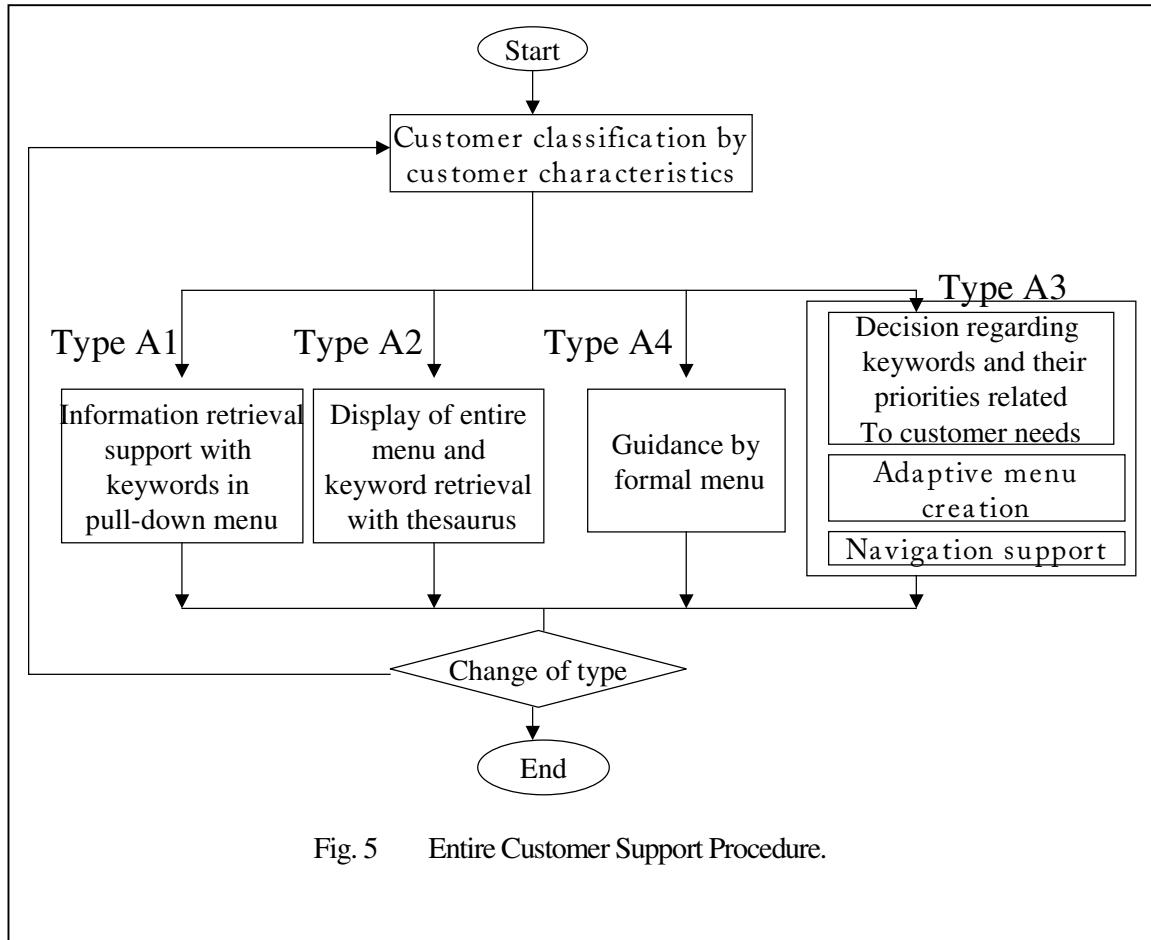


Fig. 5 Entire Customer Support Procedure.

Customer Support Procedure for type 3 customers consists of 5 steps.

**Step1: Communication phase**

Through communication with customer, expert analyses customer problem and selects suitable keywords that relates to customer needs. In this step, function 1 is used.

**Step2: Related information gathering phase**

Using the key words that expert decides, the agent retrieves a document database of all products and decides which would be interesting to the customer. In addition to catalogue information about products in the menu, this database contains specification documents and information for the salesperson. Then agent classifies these products into subsets using the keywords mentioned above

**Step3: Scenario generation phase**

Agent generates a customized explanation scenario by arranging the keywords in the priority that the expert decides and by adding product information and product planning documents selected in the basic scenario.

Several basic scenarios are prepared beforehand.

**Step 4: Customer navigation phase**

Customer wonders along the customized scenario, and agent supports customer navigation by showing key words related to the menu. In this step, the changing function of customer's display by expert was used

**Step 5; Restart phase**

When customer cannot find satisfactory products after consultation, customer terminates the scenario, and goes back to customer classification display.

**5. Experiments and Evaluation**

To make the effect of the proposed method clear, experiment at laboratory was performed. Four customers are all male and in the thirties. They are supposed to be type 3. In the experiment, customer's needs were made clear at the step1, so generated scenario was simple

In the step1, customer was puzzled with the function1

because their talks were intervened with system at the first stage of experiment. But, in progress of experiment, they began to utilize the function because they are accustomed to game interface. Degree of customer satisfaction has changed by the number of interaction. Expert felt they can find new customers needs at the step 1. Using step1, entire consultation time decrease by half.

In the step5, the changing function of customer's display was found to be effective. We have investigated how the tele-operating function is being used. The finding of which are as follows.

(1) Changing the page displayed on a customer's terminal to that needed by the customer.

This need was observed when a customer called the support staff because of confusion on how to use the terminal in order to see a particular page. The customer explained the service he wanted to expert who changed the page displayed on the customer's terminal for the customer. The customer could then continue to use the information services as before.

(2) Displaying explanations on the customer's terminal

This case arose when the staff needed to explain information to a customer using the pages contained in the information service. Expert, who had already initiated dialog with the customer, could also take control of the customer's terminal to aid in explanation by using information displayed on the customer's terminal.

Through the experiment, we found that not only customers but also experts felt mental pressure for communication. Experts hoped to make positive connection with customers with their own will, instead of waiting customer's call.

## 6. Conclusion

In this paper, we propose a customer support method for remote consultation systems. The characteristics of this method first classify customers to knowledge level, and then explanation scenario is dynamically generated according to the needs of the customer.

Basic model of the proposed method was shown to be effective when applied to an insurance company [5].

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